SITE MANAGEMENT PLAN

for

550 TENTH AVENUE FILLING STATION SITE
NEW YORK COUNTY
NEW YORK, NEW YORK

NYSDEC Site Number: C231148

Prepared for:

GO Covenant LLC
432 Park Avenue South, 2nd Floor
New York, New York 10016

Prepared by:

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DECEMBER 2023
100674402

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

CERTIFICATION STATEMENT

I, Christopher McMahon, certify that I am currently a Qualified Environmental Professional as in defined in 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 DER Technical Guidance for Site Investigation and Remediation (DER-10).



___12/19/2023_____DATE

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LIST OF ACRONYMS

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Greenhouse Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector

PRP	Potentially Responsible Party
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
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

ES EXECUTIVE SUMMARY

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 Site Management Plan:

Site Identification:	550 Tenth Avenue Filling Station Site (Site No. C231148)
Institutional Controls:	1. The Controlled Property may be used for: Restricted Residential as described in 6 NYCC Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCC 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 New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or 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 the 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 the 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;

Site Identification: 550 Tenth Avenue Filling Station Site (Site No. C231148)

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

Inspections:	Frequency
Site-Wide Inspection	Annually
Evaluations	
Climate Change Vulnerability Assessment	
Soil Vapor Intrusion evaluation	Upon change in use/as needed
Soil Vapor Intrusion Evaluation for New Occupied Buildings	As needed
Reporting:	
Inspections	Annually
Certification / Periodic Review Report	Every 5 years
Final Construction Report	Upon completion of Soil management/Excavation activities

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the 550 10th Avenue Site located in Manhattan, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP) Site No. C231148, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

GO Covenant LLC (the Volunteer) entered into a Brownfield Cleanup Agreement (BCA) on 5 October 2021 with the NYSDEC to remediate the Site. A BCA amendment was submitted on 2 June 2023 to reflect a change in ownership of the Site to the Volunteer and to provide proof in the form of a binding regulatory agreement this is an affordable housing project for purposes of obtaining the BCP tangible tax credits. A figure showing the site location and boundaries of this Site is provided in Figure 2. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in Appendix A.

After completion of the remedial work, some contamination was left at this Site, which is hereafter referred to as "remaining contamination". Institutional Controls (ICs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the New York County Clerk, requires compliance with this SMP and all ICs placed on the Site.

This SMP was prepared to manage remaining contamination at the Site, which is present at depths between 11.5 and 19.5 feet below sidewalk level and located beneath the building slab, until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC); and
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the BCA (Index #C231148-09-21; Site # C231148) 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.

This SMP was prepared by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan), on behalf of GO Covenant LLC (the Volunteer), in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated 3 May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs that are required by the Environmental Easement for the site.

1.2 Revisions and Alterations

Revisions and alterations to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the 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, 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 Professional Engineer. In accordance with the Environmental Easement for the Site, the NYSDEC project manager will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property 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 Environmental Conservation Law.

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 pursuant to the Excavation Work Plan. 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.

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

1. 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 Brownfield Cleanup Agreement (BCA), and all approved work plans and reports, including this SMP.

2. 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 table below 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.

NYSDEC Notification Contact Information*

Name	**Contact Information**
Steven Wu NYSDEC Project Manager	Telephone: 718-482-6725 Email: Steven.wu@dec.ny.gov
Andre Obligado NYSDEC Section Chief	Telephone: (718) 482-6412 E-mail: andre.obligado@dec.ny.gov
Kelly Lewandowski NYSDEC Site Control	Telephone: (518) 402-0193 E-mail: kelly.lewandowski@dec.ny.gov
Mark Sergott NYSDOH Project Manager	Telephone: 518-402-7860 Email: beei@health.ny.gov

* 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 Site is located in the Clinton neighborhood of Manhattan, New York and is identified as Block 1050 Lot 61. A Site Location Plan is provided as Figure 1. The Site is an approximately 15,939-square foot or 0.365-acre parcel bordered by 10th Avenue to the west, West 41st Street to the north, West 40th Street to the south, and the 12-story Covenant House building to the east. New York City Transit (NYCT) tunnels are located to the north of the site, below West 41st Street. Lincoln Tunnel entrance roads and access ramps for the nearby Port Authority Bus Terminal are located to the south of the site, beyond West 40th Street.

The boundaries of the Site are more fully described in Appendix A –Environmental Easement. A Site Plan is included as Figure 2. The owner of the Site at the time of issuance of this SMP is:

GO Covenant LLC
432 Park Avenue South, 2nd Floor
New York, New York 10016

The operator of the Site at the time of issuance of this SMP is:

GO Covenant LLC
432 Park Avenue South, 2nd Floor
New York, New York 10016

2.2 Physical Setting

2.2.1 Land Use

After remediation and upon completion of construction, the development will consist of a multi-story mixed-use commercial and residential building with an approximate footprint area of 14,000 square feet. The building will contain mechanical spaces in the cellar, a ground-floor residential lobby, a ground-floor retail space, office spaces associated with the adjacent Covenant House facility on the second and third floors, residential units, mechanical spaces, and an amenity space on the remaining floors. The proposed end-use of the development is consistent with existing zoning regulations.

The following is a summary of adjacent property usage:

Direction	Adjacent Properties		
	Block No.	Lot No.	Description
North	1051	7502	West 41st Street followed by a 59-story mixed-use residential/commercial building
East	1050	1	A 12-story Covenant House residential building (Phase 1)

Direction	Adjacent Properties		
	Block No.	Lot No.	Description
South	737	1	West 40th Street followed by the Port Authority Bus Terminal flyover approach to the Lincoln Tunnel
West	1069	7501	Tenth Avenue followed by a 51-story mixed-use residential/commercial building

2.2.2 Geology

According to the Boundary and Topographic Survey prepared by True North Surveyors, P.C. dated 15 September 2017, last revised 3 November 2020, elevations around the Site slope gently downward from the southwest (elevation [el] 25.1) to the northeast (el 24.31). All elevations are North American Vertical Datum of 1988 (NAVD 88).

Based on the findings of the Remedial Investigation (RI) work completed by Langan, the Site, prior to remediation, was underlain by historic fill material predominantly consisting of brown, fine- to coarse-grained sand with varying amounts of gravel, silt, brick clay, miscellaneous debris and concrete extending from surface grade to between approximately 9 and 20 feet below sidewalk level (bsl) across the Site footprint. The fill layer is generally underlain by a layer of silty sand. Based on the geotechnical investigation completed by Langan between January and February 2018, weathered mica schist was encountered between 24.5 and 34.9 feet bsl and competent schist was encountered between 28 and 45 feet bsl. Competent bedrock was not encountered in any of the soil borings advanced during the RI. A geologic cross section is shown in Figure 3. Site specific boring logs are provided in Appendix C.

2.2.3 Hydrogeology

Monitoring wells installed between 2017 and 2021 and surveyed as part of the October/November 2021 RI revealed groundwater between 12.5 and 12.7 feet below sidewalk level, corresponding to elevations between 11.82 and 12.25 NAVD88 in LMW-8 through LMW-12. Based on the groundwater elevations recorded during the October/November 2021 RI, groundwater flows to the northwest toward the Hudson River.

2.3 Investigation and Remedial History

The following environmental assessment and investigation reports have been prepared for the Site and were submitted as part of the BCP Application.

- Phase I Environmental Site Assessment prepared by TRC, dated 18 September 2015;
- Phase II Investigation Work Plan prepared by Langan, dated December 2019 (Including the results of 2017 and 2018 Limited Phase II Investigations);
- Remedial Investigation Report prepared by Langan, dated May 2021;
- Environmental Soil Pre-Characterization Results Letter Report prepared by Langan, dated 5 May 2021;
- Remedial Investigation Work Plan prepared by Langan, dated 27 May 2021 and approved 6 December 2021; and,
- Interim Remedial Measures Work Plan prepared by Langan, dated 28 May 2021 for demolition and installation of a 421-a caisson and caisson cap to meet an affordable housing deadline.

After submitting the BCP application, the following reports were prepared on behalf of the Volunteer:

- 60-Day Advance Notice of Site Change of Use prepared by Knauf Shaw LLP, dated 22 September 2021 to commence demolition with an associated Soil Excavation work plan attached;
- NYSDEC Work Notification Letter prepared by Langan, dated 8 November 2021;
- Remedial Investigation Report prepared by Langan, dated 1 February 2022, approved by NYSDEC on 23 February 2022;
- Remedial Action Work Plan prepared by Langan, dated May 2022, approved by NYSDEC on 10 June 2022;
- 60-Day Advanced Notice of a Change of Use and BCA Amendment prepared by Knauf Shaw LLP dated 2 June 2023 for the change in ownership of the Site and for the tangible property tax credits; and,
- Final Engineering Report prepared by Langan, dated December 2023.

Summaries of environmental findings of the reports listed above are provided below:

September 2015 Phase I Environmental Site Assessment, prepared by TRC

A Phase I Environmental Site Assessment (ESA) dated September 2015 was prepared by TRC for the Covenant House. According to the Phase I ESA completed by TRC Engineers, Inc. (TRC) in September 2015, historical use and features of the subject property included two filling stations and one automobile repair shop. The presence of historic urban fill or buried structures was identified as a Recognized Environmental Condition (REC) due to the potential of impacts to the Site. Historical Site operations, including two filling stations and one automobile repair shop, were also identified as a REC due to the potential use of hazardous substances associated with these operations and the duration of the activities. The Phase I ESA identified that the Covenant House is registered with NYSDEC for Spill No. 0613314, which was reported in 2007 following the observation of oily water in an onsite excavation. Approximately 3,000 gallons of oily water were pumped out of the excavation and no additional oily water infiltration was observed following the removal. The spill was administratively closed in 2009. A second spill was reported for the Site but was associated with the 7 Line Subway Extension. According to the ESA, petroleum impacted soils were identified during drilling for the subway extension and Spill No. 0404424 was reported in 2004. Contaminated soil was reportedly removed and allegedly replaced with clean fill and the spill was administratively closed in 2005. Current and historical operations conducted at adjacent and nearby properties involving the use of ASTs, USTs, spills, and the generation and disposal of hazardous waste, were also identified as an REC.

December 2019 Phase II Investigation Work Plan, prepared by Langan

A Phase II Investigation Work Plan dated December 2019 was prepared by Langan for GO Covenant LLC and was submitted to the NYCOER to satisfy the requirements of the E-Designation for hazardous materials that is associated with the Site.

The scope of work for the RI presented in the Phase II Investigation Work Plan consisted of:

- A limited ground-penetrating radar (GPR) survey within the vicinity of soil boring locations to investigate the location of subsurface utilities;
- Advancement of eight soil borings and collection of 12 soil samples (including one duplicate sample);
- Collection of four groundwater samples (including one duplicate sample); and
- Installation of one soil vapor sampling point and collection of two soil vapor samples (including one duplicate sample).

May 2021 NYCOER Remedial Investigation Report, prepared by Langan

A Remedial Investigation Report (RIR) dated May 2021 was prepared by Langan for GO Covenant LLC for submission to NYCOER. The NYCOER RIR included data generated during the previous due diligence investigations in 2017, 2018, and 2019, and included the following scopes of work that were implemented prior to the implementation of the December 2019 Phase II Investigation Work Plan:

- Conducted a Site inspection to identify areas of concern (AOCs) and physical obstructions;
- Completed two geophysical surveys in the vicinity of drilled locations to identify the potential presence of unidentified underground storage tanks and underground utilities;
- Installed 11 soil borings across the Site and collected 11 soil samples, in addition to two duplicate soil samples;
- Installed three permanent groundwater monitoring wells and two temporary groundwater monitoring wells within the Site and collected five groundwater samples, in addition to two duplicate groundwater samples; and,
- Installed three sub-slab soil vapor probes at the Site and collected three soil vapor samples, in addition to one duplicate soil vapor sample.

  GO Covenant LLC performed the following scope of work in February 2021 in accordance with the NYCOER-approved 2019 Phase II Work Plan to supplement the previously completed investigations and fill data gaps for meeting NYCOER RI requirements:

- Conducted a Site inspection to identify AOCs and physical;
- Completed a geophysical survey in the vicinity of drilled locations to identify the potential presence of unidentified underground storage tanks and underground utilities;
- Installed seven soil borings across the Site, and collected 12 soil samples, in addition to one duplicate soil sample;
- Installed one groundwater monitoring well at the Site and collected three groundwater samples, in addition to one duplicate groundwater sample;
- Installed one soil vapor probe at the Site and collected one soil vapor sample, in addition to one duplicate soil vapor sample.

The results of the historical investigations completed between 2017 and 2021 identified that the Site is underlain by fill underlain by a silty sand unit followed by weathered mica schist rock. Based on the results of the historical investigations, the fill material was contaminated with concentrations of semi-volatile organic compounds (SVOCs) and metals above the Unrestricted Use Soil Cleanup Objectives (SCOs) and Restricted-Residential Restricted Use SCOs (RUSCOs) in 17 samples and pesticides above the Unrestricted Use SCOs in one sample. Historical soil analytical results were presented on Figure 6A of the 2021 RIR.

The results of the historical investigations identified that groundwater at the Site was impacted with polycyclic aromatic hydrocarbons (PAHs) and metals above the NYCRR Part 703.5 and NYSDEC Technical & Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (collectively referred to as SGVs). Historical groundwater analytical results were presented on Figure 7 of the 2021 RIR.

The results of the historical investigations also identified that soil vapor at the Site contained low levels of petroleum-related volatile organic compounds (VOCs) including benzene, toluene, ethylbenzene, and xylene (BTEX); the BTEX results of the four soil vapor samples ranged from 1.83 µg/m^3 to 12.3 µg/m^3. Additionally, low levels of chlorinated VOCs were detected including carbon tetrachloride (max. 0.286 µg/m^3), methylene chloride (max. 11 µg/m^3), tetrachloroethylene (PCE)

(max. 4.1 µg/m^3), and trichloroethylene (TCE) (max. 1.2 µg/m^3). Historical soil vapor analytical results were presented on Figure 8 of the RIR.

May 2021 Environmental Soil Pre-Characterization Letter Report, prepared by Langan

An Environmental Soil Pre-Characterization Letter Report dated 5 May 2021 was prepared by Langan for GO Covenant LLC. The pre-characterization soil investigation sampling was completed in order to assess soil disposal options.

The soil analytical results identified SVOCs and metals at concentrations above the Unrestricted Use SCOs, Protection of Groundwater SCOs, and Restricted-Residential RUSCOs between 0 and 27.5 feet bsl. The metal lead was analyzed via toxicity characteristic leaching procedure (TCLP) and was detected at a concentration above the USEPA RCRA Maximum Concentration of Contaminants for the Toxicity Characteristic regulatory level in one composite soil sample collected from 9 to 18 feet bsl beneath the parking lot and consisting of soil composited from borings LSB-2A and LSB-21A. As such, the material characterized by this composite soil sample was considered to be hazardous. Historical pre-characterization soil analytical results were presented on Figure 6B in the 2021 RIR.

Data Usability Summary Reports

A DUSR was prepared for data collected during the investigations completed between 2017 and February 2021 and the pre-characterization investigation and were provided in Appendix F of the February 2022 RIR. All data were considered usable, as qualified.

BCP Application and BCA

The Volunteer, GO Covenant LLC, submitted a BCP Application to NYSDEC for the Site in May 2021. Data generated from the investigations discussed above were submitted with the Application. The BCA was executed on 5 October 2021.

BCP Remedial Investigation Work Plan, prepared by Langan dated May 2021 and approved 6 December 2021

A Remedial Investigation Work Plan (RIWP) dated May 2021 was prepared by Langan for GO Covenant LLC and submitted to the NYSDEC with the BCP Application; the RIWP was approved by the Department on 6 December 2021. The scope of work supplemented the investigation activities and results documented in the May 2021 Remedial Investigation (RI) Report that was prepared for submission to NYCOER.

The scope of work for the remedial investigation presented in the RIWP consisted of:

- A limited geophysical survey throughout all accessible portions of the Site to identify if any subsurface anomalies exist and to assess for the presence of subsurface structures, piping, and underground storage tanks that may contribute to the presence or migration of contamination;
- Advancement of eight soil borings and collection of seventeen soil samples (including one duplicate sample);
- Installation of one permanent monitoring well and collection of six groundwater samples (including one duplicate sample) from all Site wells;
- Survey and gauging of monitoring wells to evaluate groundwater elevation and flow direction; and,
- Installation of seven soil vapor sampling points and collection of eight soil vapor samples (including one duplicate sample), collection of seven co-located indoor air samples (including one duplicate sample), and one ambient sample.

The RIWP was approved on 6 December 2021.

September 2021 60-Day Advance Notice of Site Change of Use, prepared by Knauf Shaw LLP

The Volunteer submitted an Interim Remedial Measures Work Plan (IRMWP) with the May 2021 application for site preparation work, including demolition required for remediation under the existing building, and 421-a caisson and caisson cap in a hazardous lead contaminated area. NYSDEC subsequently asked the Volunteer to

submit a 60-Day Advanced Notification of Site Change of Use Form in September 2021 for these Site preparation activities, including the building demolition and an initial foundation element installation prior to Site remediation. The Site Change of Use submission included the demolition and foundation drawings as well as a Soil Management Plan/Excavation Work Plan, which included a Community Air Monitoring Plan (CAMP). NYSDEC acknowledged receipt of the Change of Use Form, Site Management Plan/Excavation Work Plan, and CAMP on 7 October 2021.

The 3 December 2021 RIR, included all validated data for the investigations implemented to date, and both the RIR and the RAWP included the DUSRs for all of the RI data, and waste characterization data prepared for the Site demonstrating contamination was present under the existing building requiring removal to meet the Track 2 SCOs. In addition, lead hazardous waste had to be removed in the area where the pile was being installed. The pile installation work commenced in early January 2022 after notice was provided to the Department and after the November 15, 2021 end of the 60-day notice in the Change of Use form. Asbestos abatement for demolition began in January 2022.

November 2021 NYSDEC Work Notification Letter, prepared by Langan

In a letter dated 8 November 2021, Langan prepared a formal notification letter to NYSDEC describing the proposed ground-intrusive activities that would disturb impacted hazardous lead source area material and contaminated fill at the Site. The letter described the scope of work necessary to install an initial foundation element in the northern portion of the Site (beneath the existing parking lot) for the planned 421(a) affordable housing component of the project prior to full building demolition. The scope of work included in the notification was as follows:

- Installation of two caissons to approximately 60 feet below sidewalk level;
- Excavation to about 13 feet below sidewalk level and off-site disposal of excavated hazardous lead material;
- Installation of one caisson cap; and,
- Backfilling to grade with an approved imported material.

The letter also included descriptions of how each task will be completed in compliance with the Soil Management Plan/Excavation Work Plan submitted as part of the Site Change of Use Package. This work was completed between 6 January and 21 February 2022. As noted above, validated RI and waste characterization data confirmed that the soil in the area where the pile was installed was hazardous for both lead and PAHs. The hazardous waste volumes and manifests for this material are included in the FER.

February 2022 Remedial Investigation Report (Langan)

A Remedial Investigation Report dated 1 February 2022 was prepared by Langan for GO Covenant LLC to document the Remedial Investigation completed in accordance with the RIWP. Visual observations made during the 2021 RI revealed that the Site is underlain by a layer of contaminated fill up to 20 feet bsl below the street-level parking lot in the northern portion of the Site (the base of the fill layer was not encountered prior to the boring termination depth of 20 feet bsl in soil boring LSB-1) and up to 13 feet below the existing cellar slab at soil boring LSB-8A (corresponding to approximately 24.5 feet bsl).The fill layer is underlain by a layer of silty sand. Competent bedrock was not encountered in any of the soil borings advanced. Depth to groundwater ranges from about 12.5 and 12.7 (corresponding to between el 11.82 and el 12.25 NAVD88) feet below sidewalk level. Based on the groundwater elevations recorded during the 2022 RI, groundwater flows to the northwest. Soil samples were collected between 0 and 19 feet bsl and analytical results were indicative of contaminated fill present on Site to depths of 17 feet bsl in some parts of the Site. Exceedances of the Track 1 Unrestricted Use Soil Cleanup Objectives (SCOs) for analytes associated with contaminated fill, including PAHs, pesticides, and metals, were detected within contaminated fill layer.

Two hazardous lead hotspots were identified during the 2021 environmental pre-characterization and the extents of these hotspots were further refined during the 2021 RI. Based on delineation soil sample analytical results, the hotspots were defined as two 15- by 15-foot areas centered on LSB-2A and LSB-21A between 9 and 18 feet bsl.

Groundwater sample analytical results did not identify the presence of pesticides, herbicides, or PCBs at concentrations above the screening and guidance values (SGVs) in samples collected during the 2021 RI. The VOC acetone was detected in one groundwater sample (TW-3) collected in the eastern portion of the Site during the 2017 investigation and the VOCs 1,2,3-trichloropropane, 1,2-dibromo-3-chloropropane, and 1,2-dichloroethane were detected at concentrations exceeding the SGVs in one groundwater sample (LMW-12) collected during the RI. Semi-volatile compounds (SVOCs) and metals were detected in exceedance of NYSDEC SGVs, although the exceedances were attributed to sediment entrainment in the samples; detections of dissolved metals were attributed to naturally occurring background concentrations with the exception of selenium, which had been detected in the contaminated fill layer at concentrations exceeding the Protection of Groundwater SCOs.

The soil vapor intrusion evaluation did not identify elevated concentrations of chlorinated VOCs requiring monitoring and/or mitigation according to New York State Department of Health (NYSDOH)Soil Vapor Intrusion Matrices A, B, and C. However, RI soil vapor sample analytical results did identify low concentrations of petroleum-related VOCs including BTEX, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene throughout the Site footprint.

May 2022 Remedial Action Work Plan (Langan)

A Remedial Action Work Plan (RAWP), dated 16 May 2022, was prepared by Langan on behalf of GO Covenant LLC. The RAWP summarized the nature and extent of contamination as determined from data gathered during the RI and to select a remedy that is consistent with the procedures defined in DER-10 and complies with applicable standards, criteria, and guidance, as well as with applicable federal, state and local laws, regulations and requirements. A Track 2 Restricted-Residential Restricted Use Remedy was selected for the remediation of the Site and includes the tasks summarized in Section 2.3, below.

The Remedial Action Work Plan was approved by NYSDEC in a letter dated 10 June 2022.

December 2023 Final Engineering Report (Langan)

A Final Engineering Report (FER), dated December 2023, was prepared by Langan on behalf of GO Covenant LLC. The FER documents the remedial actions implemented in accordance with the NYSDEC-approved Change of Use and Remedial Action Work Plan (RAWP) for Track 2 Restricted-Residential Use.

Site-wide remedial excavation was performed to approximately 11.5 feet bsl to remove contaminated fill and native material exceeding the Track 2 Restricted-Residential Use RUSCOs (shown in Table 1) as defined by 6 NYCRR Part 375-6.8(b). Five hotspot areas as defined in the RAWP were also excavated to depths between 14.5 and 19 feet bsl for the removal of isolated elevated concentrations of PAHs and metals above the Track 2 Restricted-Residential RUSCOs (including hazardous lead). Additionally, based on the preliminary review of confirmation endpoint sample analytical results discussed in Section 4.4.1.1, exceedances of the Restricted-Residential RUSCOs were identified in three endpoint soil samples, EPB09, EPB15 and EPB16. As a result, endpoint soil samples EPB09, EPB15 and EPB16 were subsequently over-excavated to 16.5 feet bsl for the remediation of these additional hotspots to remove the elevated concentration of metals above the Track 2 Restricted-Residential RUSCOs. Excavation for redevelopment included deeper localized excavation to about 25 feet bsl for the construction of deeper foundation elements. Documentation endpoint soil samples indicate that remaining contamination between 11.5 and 19.5 feet below sidewalk level consists of SVOCs and metals exceeding the Track 2 Restricted Residential Use Soil Cleanup Objectives (SCOs), which are listed in Table 1.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated June 2022 are as follows:

2.4.1 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

RAOs for Environmental Protection

- Remove the source of ground or surface water contamination.

2.4.2 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

2.4.3 Soil Vapor

RAOs for Public Health Protection

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

2.5 Remaining Contamination

2.5.1 Soil

As a result of the remediation described in Section 2.3, a Track 2 Restricted Residential Use remedy was achieved for the Site. Remaining impacts in soil were documented in endpoint samples collected from between 11.5 and 19.5 feet below sidewalk level and are located beneath the building slab.

Analytical results revealed no exceedances of the NYSDEC Unrestricted Use SCOs and Restricted Residential RUSCOs for pesticides, herbicides, or PFAS. The VOC acetone (0.061 mg/kg – 0.81 mg/kg) was detected at concentrations exceeding the Unrestricted Use SCO in five documentation soil samples (EPB01, EPB02, EPB09, EPB10, and EPB11). The SVOCs benzo(k)fluoranthene (1.75 mg/kg) and chrysene (2.34 mg/kg) were detected at concentrations exceeding the Unrestricted Use SCOs only and the SVOCs benzo(a)anthracene (2.45 mg/kg), benzo(a)pyrene (2.55 mg/kg), benzo(b)fluoranthene (2.19 mg/kg), dibenz(a,h)anthracene (0.564 mg/kg), and indeno(1,2,3-cd)pyrene (1.32 mg/kg) were detected at concentrations exceeding the Unrestricted Use SCOs and Restricted-Residential RUSCOs in one documentation soil sample (EPB07). Total PCBs (0.137 mg/kg) was detected at concentrations exceeding the Unrestricted Use SCO in one documentation soil sample (EPB04). Metals including trivalent chromium (30.4 mg/kg – 67.6 mg/kg), copper (66.9 mg/kg), lead (74.4 mg/kg – 264 mg/kg), mercury (0.218 mg/kg – 0.57 mg/kg), nickel (34.6 mg/kg), and zinc (110 mg/kg – 147 mg/kg) were detected at concentrations exceeding the Unrestricted Use SCOs in 13 endpoint soil samples. The metal lead (652 mg/kg – 767 mg/kg) was detected at a concentration exceeding the Unrestricted Use SCO and the Restricted-Residential RUSCO in two documentation soil samples (EPB17 and EPS22).

Tables 2 and 3 and Figures 4 and 5 summarize the results of all soil samples collected that exceed the Unrestricted Use SCOs and the Restricted-Residential Use SCOs at the site after completion of remedial action.

2.5.2 Groundwater

Groundwater analytical results collected between 2017 and 2021 identified exceedances of the SGVs for metals throughout the Site and VOCs, SVOCs, and PFAS at select well locations. VOC and PFAS exceedances may have been associated with the quality of the contaminated fill material; however, as VOCs and PFAS were not detected in exceedance of the Protection of Groundwater SCOs and Guidance Values, throughout the Site footprint, detections in groundwater may be attributable to an off-Site source or the contaminated fill. Detections of total metals and SVOCs were attributed to sediment entrainment in the samples; detections of dissolved metals were likely attributable to naturally occurring background concentrations with the exception of selenium, which was historically detected in the contaminated fill layer at concentrations exceeding the Protection of Groundwater SCOs. Groundwater and Site use restrictions to prevent exposure to remaining groundwater contamination are included in the Environmental Easement.

2.5.3 Soil Vapor

Soil vapor samples collected between 2019 and 2021 contained chlorinated VOCs, including 1,1,1-Trichloroethane (1,1,1-TCA), cis-1,2-Dichloroethene (Cis-1,2-DCE), carbon tetrachloride, methylene chloride, TCE, and PCE. However, the concentrations did not exceed their respective NYSDOH minimum mitigation threshold criteria. Furthermore, no chlorinated VOCs were detected in groundwater or soil at the Site. Based on the RI soil vapor and groundwater results, it was determined that there was no source of contamination that would result in a soil vapor intrusion condition into a new building from on-Site sources. A vapor barrier was installed during construction as a green remediation element. The GCP Applied Technologies vapor barrier system consists of a PrePrufe 300R Plus 46-mil grade membrane installed below concrete foundation elements and along the eastern exterior of the subsurface foundation walls to the first-floor grade and a Bituthene 4000 membrane installed along the northern, southern, and western exteriors of the subsurface foundation walls to the first-floor grade.

3.0 INSTITUTIONAL CONTROL PLAN

3.1 General

Since remaining contamination exists at the Site under the building and sidewalk, Institutional Controls (ICs) are required to protect human health and the environment. This IC Plan describes the procedures for the implementation and management of all ICs at the site. The IC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all ICs on the site;
- The basic implementation and intended role of each IC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of ICs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix D) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and,
- Any other provisions necessary to identify or establish methods for implementing the ICs required by the site remedy, as determined by the NYSDEC project manager.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) prevent future exposure to remaining contamination; and, (2) limit the use and development of the Site to Restricted-Residential uses only. Adherence to these ICs on the Site is required by the Environmental

Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. These ICs are:

- The Controlled Property may be used for: Restricted Residential as described in 6 NYCC Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCC Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv);
- All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);
- All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;
- Data and information pertinent to the Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;
- All future activities on the property that will disturb the remaining contaminated material must be conducted in accordance with the SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP; and,

- 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 the Environmental Easement.

3.3 Site – wide Inspection

Site-wide inspections will be performed at a minimum of once per year. 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 as defined in 6 NYCRR Part 375. 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 the remaining contamination at the Site. A comprehensive Site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report.

During these inspections, an inspection form will be completed as provided in Appendix G – Site Management Forms. The inspections will determine and document the following:

- Compliance with all ICs, including site usage;
- 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;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement; and,
- Confirm that site records are up to date.

Reporting requirements are outlined in Section 5.0 of this plan.

Inspections will also be performed in the event of an emergency. An inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the ICs implemented at the site by a qualified environmental professional, as determined by the NYSDEC project manager. 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.

4.0 PERIODIC ASSESSMENTS/EVALUATIONS

4.1 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 protectiveness of a given site. Vulnerability assessments provide information so that the Site is prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the Site during periodic assessments, and briefly summarizes the vulnerability of the Site and/or engineering controls to severe storms/weather events and associated flooding.

As stated in Section 3.3, Site-wide inspections will be performed after severe weather events to determine if the building foundation and sidewalk have been compromised. According to the National Flood Insurance Rate map for the City of New York published by the FEMA (Community Panel No. 3604970088F, effective date September 5, 2007), the Site is located in Zone X, which is designated for areas determined to be outside the 0.2% annual chance of flood and in an area of minimal flood hazard.

Site erosion is not expected during severe weather or precipitation events because remaining impacts in soil is covered with a concrete slab. The Site would not be susceptible to a spill or contaminant release because source material has been removed.

4.2 Soil Vapor Intrusion Evaluation

During the 2021 RI, one exterior soil vapor sampling point (LSV-13) was installed outside of the former building and five sub-slab soil vapor sampling points (LSV-14 through LSV-18) were installed immediately below the former building's basement concrete slab. Indoor air samples (IA-1 through IA-6) were collocated with all interior sub-slab soil vapor sampling points, with the exception of IA-6, which was collected as a standalone indoor air sample. Six of the eight NYSDOH matrix VOCs (1,1,1-TCA, Cis-1,2-DCE, Carbon tetrachloride, methylene chloride, TCE, and PCE) were detected in soil vapor and/or sub-slab soil vapor; however, when sub-slab vapor concentrations were applied with its co-located indoor air samples to the NYSDOH decision matrices, the recommendation for each VOC was "no further action".

Chlorinated VOCs were also not detected above the SGVs in groundwater or soil at the Site. Based on the RI soil vapor and groundwater results, there does not appear to be a source of contamination that would result in a soil vapor intrusion condition into the new building from on-Site sources. A vapor barrier was installed during construction as a green remediation element. The GCP Applied Technologies vapor barrier system consists of a PrePrufe 300R Plus 46-mil grade membrane installed below concrete foundation elements and along the eastern exterior of the subsurface foundation walls to the first-floor grade and a Bituthene 4000 membrane installed along the northern, southern, and western exteriors of the subsurface foundation walls to the first-floor grade.

Soil vapor intrusion is not expected to be a concern for the new development building due to the RI results and installation of the vapor barrier.

Nevertheless, a soil vapor intrusion evaluation must be performed upon a change in use of the property that will result in occupancy of a previously unoccupied building or initial occupancy of a new building. The breadth of this evaluation will be determined based upon discussion with the NYSDEC and NYSDOH project managers. Based upon these discussions and agency requirements, a work plan may need to be developed that requires

that sampling be performed. Upon completion of the evaluation, if an action is required, any actions taken or to be taken must be reflected in an updated SMP.

5.0 REPORTING REQUIREMENTS

5.1 Site Management Reports

All Site management inspection events will be recorded on the appropriate Site management forms provided in Appendix G. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375.

All applicable inspection forms and other records, including media sampling data generated for the Site during the reporting period will be provided in electronic format to the NYSDEC project manager in accordance with the following Table and summarized in the Periodic Review Report.

Task/Report	Reporting Frequency*
Inspection Report	Annually

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

All 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);

- Any observations, conclusions, or recommendations; and
- A determination as to whether conditions have changed since the last reporting event that would impact the remaining contaminants under the foundation slab and sidewalk.

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

- Date of event or reporting period;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed; and,
- 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).

5.2 Periodic Review Report

The Periodic Review Report (PRR) will consist only of the certification as specified in Section 5.2.1 except in the event where there have been changes to the site or data gathered during the certifying period. Given such an event, the submittal of a comprehensive PR report will be necessary, as specified below.

A PRR will be submitted to the Department beginning 30 days after the initial 15-month certifying period. This initial certifying period commences upon issuance of the Certificate of Completion. After submittal of the initial PRR, the next PRR shall be submitted every fifth year to the Department or at another frequency as may be subsequently 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 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 ICs required by the remedy for the Site.
- Results of the required annual Site inspections, fire inspections and severe condition inspections, if applicable.
- 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.
- A summary of any data and/or information generated during the reporting period, with comments and conclusions, if any.
- Description of any change of use, import of materials, or excavation that occurred during the certifying period.
- A Site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the Site-specific Remedial Action Work Plan (RAWP) and Decision Document;
  - Any new conclusions or observations regarding site contamination based on inspections or data generated;
  - Recommendations regarding any necessary changes to the remedy; and,
  - The overall performance and effectiveness of the remedy.

5.2.1 Certification of Institutional Controls

Following the last inspection of the reporting period and within 30 days after the end of each certifying period, a qualified environmental professional as defined in 6 NYCRR Part 375 or Professional Engineer 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 control identified for the site, I certify that all of the following statements are true:

- *The institutional 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;*
- *Use of the site is compliant with the environmental easement.*
- *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, Christopher McMahon, of Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C., am certifying as the Owner's Designated Site Representative for the Site."

Every five years, the following certification will be added to the above list:

- *The assumptions made in the qualitative exposure assessment remain valid.*

The signed certification will be included in the PRR, if such report is required for the period. Otherwise, the Certification will be submitted as a stand-alone document.

The PRR will be submitted, in electronic format, to the NYSDEC Central Office, the NYSDEC Regional Office in which the Site is located and the NYSDOH Bureau of Environmental

Exposure Investigation. The PRR may also need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

5.3 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 control, 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. Upon completion of the Corrective Measure, a signed certification form must be submitted to the Department.

6.0 REFERENCES

1. 6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

2. NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

3. NYSDEC, 1998. 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. Phase I Environmental Site Assessment prepared by TRC, dated 18 September 2015.

5. Phase II Investigation Work Plan prepared by Langan, dated December 2019.

6. Remedial Investigation Report prepared by Langan, dated May 2021.

7. Environmental Soil Pre-Characterization Results Letter Report prepared by Langan, dated 5 May 2021.

8. Remedial Investigation Work Plan prepared by Langan, dated 27 May 2021 and approved 6 December 2021.

9. Interim Remedial Measures Work Plan prepared by Langan, dated 28 May 2021.

10. NYSDEC Work Notification Letter prepared by Langan, dated 8 November 2021.

11. Remedial Investigation Report prepared by Langan, dated 1 February 2022, approved by NYSDEC on 23 February 2022.

12. Remedial Action Work Plan prepared by Langan, dated May 2022, approved by NYSDEC on 10 June 2022.

13. Decision Document, dated June 2022, prepared by NYSDEC.

14. Final Engineering Report, dated December 2023, prepared by Langan.

TABLES

Table 1
Site Management Plan
Soil Cleanup Objectives

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148

Analyte	CAS Number	Track 1 NYSDEC Part 375 Unrestricted Use SCOs	Track 2 NYSDEC Part 375 Restricted Use Restricted-Residential SCOs
Volatile Organic Compounds (mg/kg)			
1,1,1-Trichloroethane	71-55-6	0.68	100
1,1-Dichloroethane	75-34-3	0.27	26
1,1-Dichloroethene	75-35-4	0.33	100
1,2,4-Trimethylbenzene	95-63-6	3.6	52
1,2-Dichlorobenzene	95-50-1	1.1	100
1,2-Dichloroethane	107-06-2	0.02	3.1
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	52
1,3-Dichlorobenzene	541-73-1	2.4	49
1,4-Dichlorobenzene	106-46-7	1.8	13
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	13
Acetone	67-64-1	0.05	100
Benzene	71-43-2	0.06	4.8
Carbon Tetrachloride	56-23-5	0.76	2.4
Chlorobenzene	108-90-7	1.1	100
Chloroform	67-66-3	0.37	49
Cis-1,2-Dichloroethene	156-59-2	0.25	100
Ethylbenzene	100-41-4	1	41
Hexachlorobenzene	118-74-1	0.33	1.2
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	100
Methylene Chloride	75-09-2	0.05	100
Naphthalene	91-20-3	12	100
n-Butylbenzene	104-51-8	12	100
n-Propylbenzene	103-65-1	3.9	100
Sec-Butylbenzene	135-98-8	11	100
T-Butylbenzene	98-06-6	5.9	100
Tert-Butyl Methyl Ether	1634-04-4	0.93	100
Tetrachloroethene (PCE)	127-18-4	1.3	19
Toluene	108-88-3	0.7	100
Total Xylenes	1330-20-7	0.26	100
Trans-1,2-Dichloroethene	156-60-5	0.19	100
Trichloroethene (TCE)	79-01-6	0.47	21
Vinyl Chloride	75-01-4	0.02	0.9
Semivolatile Organic Compounds (mg/kg)			
1,2-Dichlorobenzene	95-50-1	1.1	100
1,3-Dichlorobenzene	541-73-1	2.4	49
1,4-Dichlorobenzene	106-46-7	1.8	13
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	13
2-Methylphenol (o-Cresol)	95-48-7	0.33	100
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	100
Acenaphthene	83-32-9	20	100
Acenaphthylene	208-96-8	100	100
Anthracene	120-12-7	100	100
Benzo(a)anthracene	56-55-3	1	1
Benzo(a)pyrene	50-32-8	1	1
Benzo(b)fluoranthene	205-99-2	1	1
Benzo(g,h,i)Perylene	191-24-2	100	100
Benzo(k)fluoranthene	207-08-9	0.8	3.9
Chrysene	218-01-9	1	3.9
Dibenz(a,h)anthracene	53-70-3	0.33	0.33
Dibenzofuran	132-64-9	7	59
Fluoranthene	206-44-0	100	100
Fluorene	86-73-7	30	100
Hexachlorobenzene	118-74-1	0.33	1.2
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	0.5
Naphthalene	91-20-3	12	100
Pentachlorophenol	87-86-5	0.8	6.7
Phenanthrene	85-01-8	100	100
Phenol	108-95-2	0.33	100
Pyrene	129-00-0	100	100

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Site Management Plan
Soil Cleanup Objectives

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148

Analyte	CAS Number	Track 1 NYSDEC Part 375 Unrestricted Use SCOs	Track 2 NYSDEC Part 375 Restricted Use Restricted-Residential SCOs
Pesticides (mg/kg)			
4,4'-DDD	72-54-8	0.0033	13
4,4'-DDE	72-55-9	0.0033	8.9
4,4'-DDT	50-29-3	0.0033	7.9
Aldrin	309-00-2	0.005	0.097
Alpha BHC (Alpha Hexachlorocyclohexane	319-84-6	0.02	0.48
Alpha Chlordane	5103-71-9	0.094	4.2
Alpha Endosulfan	959-98-8	2.4	24
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.36
Beta Endosulfan	33213-65-9	2.4	24
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	100
Dibenzofuran	132-64-9	7	59
Dieldrin	60-57-1	0.005	0.2
Endosulfan Sulfate	1031-07-8	2.4	24
Endrin	72-20-8	0.014	11
Gamma Bhc (Lindane)	58-89-9	0.1	1.3
Heptachlor	76-44-8	0.042	2.1
Herbicides (mg/kg)			
Silvex (2,4,5-Tp)	93-72-1	3.8	100
Polychlorinated Biphenyls (mg/kg)			
Total PCBs	1336-36-3	0.1	1
Inorganics (mg/kg)			
Arsenic	7440-38-2	13	16
Barium	7440-39-3	350	400
Beryllium	7440-41-7	7.2	72
Cadmium	7440-43-9	2.5	4.3
Chromium, Hexavalent	18540-29-9	1	110
Chromium, Trivalent	16065-83-1	30	180
Copper	7440-50-8	50	270
Total Cyanide	~	27	27
Lead	7439-92-1	63	400
Manganese	7439-96-5	1,600	2,000
Mercury	7439-97-6	0.18	0.81
Nickel	7440-02-0	30	310
Selenium	7782-49-2	3.9	180
Silver	7440-22-4	2	180
Zinc	7440-66-6	109	10,000

Notes:

1. Soil cleanup objectives taken from 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 and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCOs).
2. Criterion comparisons for 3- & 4-methylphenol (m&p cresol) are provided for reference. Promulgated SCOs are for 3-methylphenol (m-cresol) and
3. ~ = Regulatory limit for this analyte does not exist
4. mg/kg = milligrams per kilogram

Table 2
Site Management Plan
Confirmation Endpoint Soil Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

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	EPB01	EPB02	EPB02	EPB03	EPB04	EPB05	EPB05	EPB06	EPB07	EPB08	EPB09	EPB09
					Sample Name	EPB01_17.5-18	EPB02_17.5-18	DUP02_20221213	EPB03_17.5-18	EPB04_11.5-12	EPB05_11.5-12	DUP01_101922	EPB06_11.5-12	EPB07_11.5-12	EPB08_16-16.5	EPB09_13.5-14	EPB09_16.5-17
					Sample Date	12/12/2022	12/13/2022	12/13/2022	10/28/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	12/15/2022	01/03/2023
					Sample Depth	17.5-18	17.5-18	17.5-18	17.5-18	11.5-12	11.5-12	11.5-12	11.5-12	11.5-12	16-16.5	13.5-14	16.5-17
					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	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,1-Dichloroethane	75-34-3	0.27	0.27	26	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,1-Dichloroethene	75-35-4	0.33	0.33	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,2,4-Trimethylbenzene	95-63-6	3.6	3.6	52	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,2-Dichloroethane	107-06-2	0.02	0.02	3.1	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	8.4	52	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.19 U	<0.21 U	<0.16 U	<0.11 U	<0.066 U	<0.059 U	<0.054 U	<0.067 U	<0.059 U	<0.053 U	<0.12 U	<0.15 U
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Acetone	67-64-1	**0.05**	0.05	100	mg/kg	**0.061**	**0.43 E**	**0.24**	0.029 J	0.012 J	0.036 J	0.024 J	0.018 J	0.017 J	0.016 J	**0.08**	**0.072**
Acrolein	107-02-8	NS	NS	NS	mg/kg	<0.019 U	<0.021 U	<0.016 U	<0.011 U	<0.0066 U	<0.0059 U	<0.0054 U	<0.0067 U	<0.0059 U	<0.0053 U	<0.012 U	<0.015 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Benzene	71-43-2	0.06	0.06	4.8	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	0.0065 J	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Carbon Tetrachloride	56-23-5	0.76	0.76	2.4	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Chlorobenzene	108-90-7	1.1	1.1	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Chloroform	67-66-3	0.37	0.37	49	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Cyclohexane	110-82-7	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Ethylbenzene	100-41-4	1	1	41	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0095 UJ	<0.01 UJ	<0.0081 UJ	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	<0.019 U	<0.021 U	<0.016 U	<0.011 U	<0.0066 U	<0.0059 U	0.0034 J	<0.0067 U	<0.0059 U	<0.0053 U	<0.012 U	<0.015 U
Methyl Acetate	79-20-9	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	0.0039 J	<0.0077 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	100	mg/kg	0.0077 J	<0.01 U	0.0044 J	0.0081	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	0.0027	0.0038 J	0.0076 J
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 UJ	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Methylcyclohexane	108-87-2	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Methylene Chloride	75-09-2	0.05	0.05	100	mg/kg	<0.019 U	<0.021 U	<0.016 U	<0.011 U	<0.0066 U	<0.0059 U	<0.0054 U	<0.0067 U	<0.0059 U	<0.0053 U	<0.012 U	<0.015 U
n-Butylbenzene	104-51-8	12	12	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
n-Propylbenzene	103-65-1	3.9	3.9	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	0.0021 J	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
p-Cymene (p-Isopropyltoluene)	CYMP	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	0.0097	<0.0077 U
Sec-Butylbenzene	135-98-8	11	11	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
T-Butylbenzene	98-06-6	5.9	5.9	100	mg/kg	<0.0095 UJ	<0.01 UJ	<0.0081 UJ	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 UJ
Tert-Butyl Alcohol	75-65-0	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Tetrachloroethene (PCE)	127-18-4	1.3	1.3	19	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Toluene	108-88-3	0.7	0.7	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Total Xylenes	1330-20-7	0.26	1.6	100	mg/kg	<0.028 U	<0.031 U	<0.024 U	<0.016 U	<0.0099 U	<0.0088 U	0.0055 J	<0.01 U	<0.0088 U	<0.008 U	<0.017 U	<0.023 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	100	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Trichloroethene (TCE)	79-01-6	0.47	0.47	21	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 UJ	<0.0029 UJ	<0.0027 UJ	<0.0033 UJ	<0.0029 UJ	<0.0027 UJ	<0.0058 U	<0.0077 U
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	NA	NA	NA	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	NA	<0.0077 U
Vinyl Chloride	75-01-4	0.02	0.02	0.9	mg/kg	<0.0095 U	<0.01 U	<0.0081 U	<0.0053 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0033 U	<0.0029 U	<0.0027 U	<0.0058 U	<0.0077 U

Table 2
Site Management Plan
Confirmation Endpoint Soil Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

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	EPB01	EPB02	EPB02	EPB03	EPB04	EPB05	EPB05	EPB06	EPB07	EPB08	EPB09	EPB09
					Sample Name	EPB01_17.5-18	EPB02_17.5-18	DUP02_20221213	EPB03_17.5-18	EPB04_11.5-12	EPB05_11.5-12	DUP01_101922	EPB06_11.5-12	EPB07_11.5-12	EPB08_16-16.5	EPB09_13.5-14	EPB09_16.5-17
					Sample Date	12/12/2022	12/13/2022	12/13/2022	10/28/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	12/15/2022	01/03/2023
					Sample Depth	17.5-18	17.5-18	17.5-18	17.5-18	11.5-12	11.5-12	11.5-12	11.5-12	11.5-12	16-16.5	13.5-14	16.5-17
					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	<0.201 U	<0.211 U	<0.213 U	<0.206 UJ	<0.189 U	<0.197 U	<0.196 U	<0.193 U	<0.189 U	<0.19 U	<0.203 U	<0.201 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
1,2-Diphenylhydrazine	122-66-7	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.0185 U	<0.02 U	<0.02 U	<0.019 U	<0.0194 U	<0.0198 U	<0.0194 U	<0.0196 U	<0.0198 U	<0.0196 U	<0.0189 U	<0.0194 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	NS	NS	mg/kg	<0.201 U	<0.211 UJ	<0.213 UJ	<0.206 UJ	<0.189 UJ	<0.197 UJ	<0.196 UJ	<0.193 UJ	<0.189 U	<0.19 U	<0.203 UJ	<0.201 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<0.201 U	<0.211 UJ	<0.213 UJ	<0.206 UJ	<0.189 UJ	<0.197 UJ	<0.196 UJ	<0.193 UJ	<0.189 U	<0.19 U	<0.203 UJ	<0.201 U
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	0.156 D	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	0.113 J	0.361 J	<0.0966 U	0.233 D	<0.0953 U	<0.102 U	<0.101 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	100	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.201 U	<0.211 U	<0.213 U	<0.206 UJ	<0.189 U	<0.197 U	<0.196 U	<0.193 U	<0.189 U	<0.19 U	<0.203 U	<0.201 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	100	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.201 U	<0.211 U	<0.213 U	<0.206 UJ	<0.189 U	<0.197 U	<0.196 U	<0.193 U	<0.189 U	<0.19 U	<0.203 U	<0.201 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<0.201 U	<0.211 UJ	<0.213 UJ	<0.206 UJ	<0.189 UJ	<0.197 UJ	<0.196 UJ	<0.193 UJ	<0.189 U	<0.19 U	<0.203 UJ	<0.201 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.201 U	<0.211 U	<0.213 U	<0.206 UJ	<0.189 U	<0.197 U	<0.196 U	<0.193 U	<0.189 U	<0.19 U	<0.203 U	<0.201 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<0.201 U	<0.211 UJ	<0.213 UJ	<0.206 UJ	<0.189 UJ	<0.197 UJ	<0.196 UJ	<0.193 UJ	<0.189 U	<0.19 U	<0.203 UJ	<0.201 U
Acenaphthene	83-32-9	20	98	100	mg/kg	0.213 D	<0.105 U	0.0708 JD	<0.103 UJ	0.0477 JD	0.134 J	0.746 J	<0.0966 U	0.354 D	<0.0953 U	0.0651 JD	<0.101 U
Acenaphthylene	208-96-8	100	107	100	mg/kg	0.0626 JD	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	0.0642 JD	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	NS	NS	mg/kg	<0.402 U	<0.422 U	<0.428 U	<0.413 UJ	<0.379 U	<0.394 U	<0.392 U	<0.387 U	<0.38 U	<0.382 U	<0.408 U	<0.403 U
Anthracene	120-12-7	100	1000	100	mg/kg	0.405 J	<0.105 U	0.163 D	<0.103 UJ	0.126 D	0.295 J	1.49 J	<0.0966 U	0.957 D	<0.0953 U	0.107 D	<0.101 U
Atrazine	1912-24-9	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Benzaldehyde	100-52-7	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Benzidine	92-87-5	NS	NS	NS	mg/kg	<0.402 U	<0.422 U	<0.428 U	<0.413 UJ	<0.379 U	<0.394 U	<0.392 U	<0.387 U	<0.38 U	<0.382 U	<0.408 U	<0.403 U
Benzo(a)anthracene	56-55-3	**1**	1	1	mg/kg	0.783 D	0.112 J	0.376 J	<0.103 UJ	0.321 D	0.54 J	**2.01 J**	0.0942 JD	**2.45 D**	0.0808 JD	0.286 D	<0.101 U
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	0.72 D	0.0994 JD	0.302 D	<0.103 UJ	0.291 D	0.468 J	**1.71 J**	0.0973 D	**2.55 D**	0.0846 JD	0.289 D	<0.101 U
Benzo(b)fluoranthene	205-99-2	**1**	1.7	1	mg/kg	0.628 D	0.0826 JD	0.272 D	<0.103 UJ	0.263 D	0.387 J	**1.39 J**	0.078 JD	**2.19 D**	0.0732 JD	0.232 D	<0.101 U
Benzo(g,h,i)Perylene	191-24-2	100	1000	100	mg/kg	0.422 D	0.0598 JD	0.171 D	<0.103 UJ	0.19 D	0.305 J	0.994 J	0.0633 JD	1.59 D	0.0564 JD	0.157 D	<0.101 U
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	3.9	mg/kg	0.586 D	0.0801 JD	0.23 D	<0.103 UJ	0.224 D	0.397 J	**1.32 J**	0.0818 JD	**1.75 D**	0.0617 JD	0.251 D	<0.101 U
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 UJ	<0.102 UJ	<0.101 U
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	4.64 D	0.0657 JD	0.191 D	<0.103 UJ	0.269 D	0.895 J	0.139 J	<0.0966 U	7.36 D	<0.0953 U	0.208 D	<0.101 U
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	0.0591 JD	<0.0953 U	<0.102 U	<0.101 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	0.11 D	<0.105 U	0.0794 JD	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Caprolactam	105-60-2	NS	NS	NS	mg/kg	<0.201 U	<0.211 U	<0.213 U	<0.206 UJ	<0.189 U	<0.197 U	<0.196 U	<0.193 U	<0.189 U	<0.19 U	<0.203 U	<0.201 U
Carbazole	86-74-8	NS	NS	NS	mg/kg	0.181 J	<0.105 U	0.0785 JD	<0.103 UJ	0.0621 JD	0.12 D	0.114 D	<0.0966 U	0.47 D	<0.0953 U	0.0578 JD	<0.101 U
Chrysene	218-01-9	**1**	1	3.9	mg/kg	0.775 D	0.123 J	0.373 J	<0.103 UJ	0.288 D	0.523 J	**1.93 J**	0.0973 D	**2.34 D**	0.0846 JD	0.313 D	<0.101 U
Dibenz(a,h)anthracene	53-70-3	**0.33**	1000	0.33	mg/kg	0.119 D	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	0.0874 J	**0.402 J**	<0.0966 U	**0.564 D**	<0.0953 U	<0.102 U	<0.101 U
Dibenzofuran	132-64-9	7	210	59	mg/kg	0.141 D	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	0.0952 J	0.679 J	<0.0966 U	0.21 D	<0.0953 U	<0.102 U	<0.101 U
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	0.164 J	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	0.0629 JD	<0.0953 U	0.0716 JD	<0.101 U
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	0.0658 JD	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	0.0708 JD	0.0704 JD	<0.0966 U	0.097 D	<0.0953 U	<0.102 U	<0.101 U
Fluoranthene	206-44-0	100	1000	100	mg/kg	1.85 D	0.267 J	0.875 J	<0.103 UJ	0.639 D	1.15 J	5.17 J	0.198 D	5.44 D	0.175 D	0.623 D	<0.101 U
Fluorene	86-73-7	30	386	100	mg/kg	0.246 D	<0.105 U	0.0751 JD	<0.103 UJ	0.0507 JD	0.162 J	0.985 J	<0.0966 U	0.326 D	<0.0953 U	0.0651 JD	<0.101 U
Hexachlorobenzene	118-74-1	0.33	3.2	1.2	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	0.5	mg/kg	0.451 D	0.064 JD	0.209 D	<0.103 UJ	0.184 D	0.267 J	**0.876 J**	0.0509 JD	**1.32 D**	0.0587 JD	0.181 D	<0.101 U
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Naphthalene	91-20-3	12	12	100	mg/kg	0.182 D	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	0.151 D	0.0744 JD	<0.0966 U	0.097 D	<0.0953 U	<0.102 U	<0.101 U
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
n-Nitrosodimethylamine	62-75-9	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.1 U	<0.105 U	<0.107 U	<0.103 UJ	<0.0947 U	<0.0985 U	<0.0979 U	<0.0966 U	<0.0948 U	<0.0953 U	<0.102 U	<0.101 U
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
Phenanthrene	85-01-8	100	1000	100	mg/kg	1.84 D	0.201 J	0.749 J	<0.103 UJ	0.488 D	1.21 J	6.6 J	0.216 D	3.48 D	0.128 D	0.614 D	<0.101 U
Phenol	108-95-2	0.33	0.33	100	mg/kg	<0.1 U	<0.105 UJ	<0.107 UJ	<0.103 UJ	<0.0947 UJ	<0.0985 UJ	<0.0979 UJ	<0.0966 UJ	<0.0948 U	<0.0953 U	<0.102 UJ	<0.101 U
Pyrene	129-00-0	100	1000	100	mg/kg	1.43 D	0.247 J	0.842 J	<0.103 UJ	0.575 D	0.996 J	4.34 J	0.145 D	4.25 D	0.143 D	0.481 D	<0.101 U
Pyridine	110-86-1	NS	NS	NS	mg/kg	<0.402 U	<0.422 U	<0.428 U	<0.413 UJ	<0.379 U	<0.394 U	<0.392 U	<0.387 U	<0.38 U	<0.382 U	<0.408 U	<0.403 U

Table 2
Site Management Plan
Confirmation Endpoint Soil Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

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	EPB01	EPB02	EPB02	EPB03	EPB04	EPB05	EPB05	EPB06	EPB07	EPB08	EPB09	EPB09
					Sample Name	EPB01_17.5-18	EPB02_17.5-18	DUP02_20221213	EPB03_17.5-18	EPB04_11.5-12	EPB05_11.5-12	DUP01_101922	EPB06_11.5-12	EPB07_11.5-12	EPB08_16-16.5	EPB09_13.5-14	EPB09_16.5-17
					Sample Date	12/12/2022	12/13/2022	12/13/2022	10/28/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	12/15/2022	01/03/2023
					Sample Depth	17.5-18	17.5-18	17.5-18	17.5-18	11.5-12	11.5-12	11.5-12	11.5-12	11.5-12	16-16.5	13.5-14	16.5-17
					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	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
4,4'-DDE	72-55-9	**0.0033**	17	8.9	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	**0.00334 D**	<0.00199 U
4,4'-DDT	50-29-3	0.0033	136	7.9	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Aldrin	309-00-2	0.005	0.19	0.097	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	0.48	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Alpha Chlordane	5103-71-9	0.094	2.9	4.2	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	0.00215 D	<0.00199 U
Alpha Endosulfan	959-98-8	2.4	102	24	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.09	0.36	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Beta Endosulfan	33213-65-9	2.4	102	24	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.0399 U	<0.0375 U	<0.0391 U	<0.039 U	<0.0376 U	<0.0378 U	<0.038 U	<0.00205 U	<0.0398 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.25	100	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Dieldrin	60-57-1	0.005	0.1	0.2	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Endosulfan Sulfate	1031-07-8	2.4	1000	24	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Endrin	72-20-8	0.014	0.06	11	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Gamma Bhc (Lindane)	58-89-9	0.1	0.1	1.3	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Gamma-Chlordane	5566-34-7	NS	NS	NS	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	0.00227 J	<0.00199 U
Heptachlor	76-44-8	0.042	0.38	2.1	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	<0.00195 U	<0.00205 U	<0.00208 U	<0.00199 U	<0.00187 U	<0.00195 U	<0.00195 U	<0.00188 U	<0.00189 U	<0.0019 U	<0.00205 U	<0.00199 U
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	<0.195 U	<0.205 U	<0.208 U	<0.199 U	<0.187 U	<0.195 U	<0.195 U	<0.188 U	<0.189 U	<0.19 U	<0.205 U	<0.199 U
Herbicides																	
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	NS	NS	mg/kg	<0.024 U	<0.025 U	<0.0258 U	<0.0501 U	NA	NA	NA	NA	NA	NA	<0.0245 U	<0.0241 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	NS	NS	mg/kg	<0.024 U	<0.025 U	<0.0258 U	<0.0501 U	NA	NA	NA	NA	NA	NA	<0.0245 U	<0.0241 U
Silvex (2,4,5-Tp)	93-72-1	3.8	3.8	100	mg/kg	<0.024 U	<0.025 U	<0.0258 U	<0.0501 U	NA	NA	NA	NA	NA	NA	<0.0245 U	<0.0241 U
Polychlorinated Biphenyl																	
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0197 U	<0.0207 U	<0.0211 U	<0.0201 U	<0.0189 U	<0.0197 U	<0.0197 U	<0.019 U	<0.0191 U	<0.0192 U	<0.0207 U	<0.0201 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0197 U	<0.0207 U	<0.0211 U	<0.0201 U	<0.0189 U	<0.0197 U	<0.0197 U	<0.019 U	<0.0191 U	<0.0192 U	<0.0207 U	<0.0201 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0197 U	<0.0207 U	<0.0211 U	<0.0201 U	<0.0189 U	<0.0197 U	<0.0197 U	<0.019 U	<0.0191 U	<0.0192 U	<0.0207 U	<0.0201 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	<0.0197 U	<0.0207 U	<0.0211 U	<0.0201 U	<0.0189 U	<0.0197 U	<0.0197 U	<0.019 U	<0.0191 U	<0.0192 U	<0.0207 U	<0.0201 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0197 U	<0.0207 U	<0.0211 U	<0.0201 U	<0.0189 U	<0.0197 U	<0.0197 U	<0.019 U	<0.0191 U	<0.0192 U	<0.0207 U	<0.0201 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	0.0254	<0.0207 U	<0.0211 U	<0.0201 U	0.137	0.0227	<0.0197 U	0.0214	<0.0191 U	<0.0192 U	0.0312	<0.0201 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	<0.0197 U	<0.0207 U	0.0548	<0.0201 U	<0.0189 U	<0.0197 U	<0.0197 U	<0.019 U	<0.0191 U	<0.0192 U	<0.0207 U	<0.0201 U
Total PCBs	1336-36-3	**0.1**	3.2	1	mg/kg	0.0254	<0.0207 U	0.0548	<0.0201 U	**0.137**	0.0227	<0.0197 U	0.0214	<0.0191 U	<0.0192 U	0.0312	<0.0201 U
Metals																	
Aluminum	7429-90-5	NS	NS	NS	mg/kg	13,600	19,300	10,000	16,300	11,200	16,000	15,200	14,000	14,100	12,200	12,100	13,500
Antimony	7440-36-0	NS	NS	NS	mg/kg	<2.51 U	<2.67 U	<2.71 U	5.37	<2.38 UJ	4.02	2.88	2.6	<2.39 U	2.5	<2.59 U	2.65
Arsenic	7440-38-2	13	16	16	mg/kg	1.77	3.81	1.72	2.24	2.94	8.14 J	2.68 J	1.99	3.29	2.9	3.26	2.41
Barium	7440-39-3	350	820	400	mg/kg	176	116	132	97.8	115	198	194	168	179	97.9	130	54.9
Beryllium	7440-41-7	7.2	47	72	mg/kg	1.53	1.17	1.24	<0.052 U	<0.048 UJ	<0.05 U	<0.05 U	<0.049 U	<0.048 U	<0.049 U	0.765	0.482
Cadmium	7440-43-9	2.5	7.5	4.3	mg/kg	<0.301 U	<0.32 U	<0.325 U	<0.31 U	0.352	0.32	0.609	<0.29 U	0.357	<0.292 U	<0.311 U	<0.304 U
Calcium	7440-70-2	NS	NS	NS	mg/kg	29,700	2,520	18,600	1,460	40,800	21,500 B	22,900 B	22,200 B	36,000 B	18,200 B	36,500 B	1,070
Chromium, Hexavalent	18540-29-9	1	19	110	mg/kg	<0.602 U	<0.64 U	<0.651 U	<0.62 U	<0.571 U	<0.598 U	<0.593 U	<0.581 U	<0.574 U	<0.583 U	<0.623 U	<0.609 U
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	33.3	25.6	23.2	18.1	22.8	37	30.3	30.4	32.2	19.2	27.5	14.9
Chromium, Trivalent	16065-83-1	**30**	NS	180	mg/kg	**33.3**	25.6	23.2	18.1	22.8	**37**	30	**30.4**	**32.2**	19.2	27.5	14.9
Cobalt	7440-48-4	NS	NS	NS	mg/kg	12	13.5	8.9	7.92	8.53	15.7	14.2	12.8	13	8.24	9.01	6.23
Copper	7440-50-8	**50**	1720	270	mg/kg	34.1	22.4	**144**	18.3	31 J	34.9	34.2	41.2	36.9	21.5	32.2	13.3
Cyanide	57-12-5	27	40	27	mg/kg	<0.602 U	<0.64 U	<0.651 U	<0.62 U	<0.571 U	<0.598 U	<0.593 U	<0.581 U	<0.574 U	<0.583 U	<0.623 U	<0.609 U
Iron	7439-89-6	NS	NS	NS	mg/kg	20,200	23,000	15,600	21,400	16,300	26,900	21,700	19,700	21,300	18,300	18,500	17,800
Lead	7439-92-1	**63**	450	400	mg/kg	**105**	24.2	**66.2**	49	57.3 J	**74.4**	**73.1**	44.9	58.6	52.9	**789**	17.1
Magnesium	7439-95-4	NS	NS	NS	mg/kg	7,360	4,390	5,460	3,150	5,440	8,790	8,180	7,290	7,970	4,590	5,700	3,360
Manganese	7439-96-5	1600	2000	2000	mg/kg	265	285	168	275	245	295	280	256	322	272	269	160
Mercury	7439-97-6	**0.18**	0.73	0.81	mg/kg	0.153	0.104	0.155	0.101	0.0773	0.0977	0.13	0.11	0.156	0.0927	**0.317**	0.0443
Nickel	7440-02-0	**30**	130	310	mg/kg	24.3	24.6	16.7	15.6	18.6	30	27.6	24.3	24.9	18.1	17.6	15
Potassium	7440-09-7	NS	NS	NS	mg/kg	6,240	1,980	5,250	1,070	3,350 B	7,890 B	6,910 B	5,540 B	5,300 B	1,880 B	2,880 B	994
Selenium	7782-49-2	3.9	4	180	mg/kg	<2.51 UJ	<2.67 UJ	<2.71 UJ	<2.58 U	<2.38 U	<2.49 U	<2.47 U	<2.42 U	<2.39 U	<2.43 U	<2.59 UJ	<2.54 UJ
Silver	7440-22-4	2	8.3	180	mg/kg	<0.505 U	<0.538 U	<0.547 U	<0.521 U	<0.48 U	<0.502 U	<0.498 U	<0.488 U	<0.482 U	<0.49 U	<0.523 U	<0.511 U
Sodium	7440-23-5	NS	NS	NS	mg/kg	469	289	328	327	699 J	469 J	578 J	651 J	572 J	583 J	407 J	163
Thallium	7440-28-0	NS	NS	NS	mg/kg	<2.51 U	<2.67 U	<2.71 U	<2.58 U	<2.38 U	<2.49 U	<2.47 U	<2.42 U	<2.39 U	<2.43 U	<2.59 U	<2.54 U
Vanadium	7440-62-2	NS	NS	NS	mg/kg	36.7	35.6	27.2	29.1	28.7	81.3 J	41.2 J	38.7	37.9	23.5	29.1	20.7
Zinc	7440-66-6	**109**	2480	10000	mg/kg	97	59.4	68	42.7	88.5	95.9	92.4	74.2	89.5	85.7	96.1	39.6
General Chemistry																	
Solids, Percent	SOLID	NS	NS	NS	Percent	83.1	78.1	76.8	80.6	87.5	83.6	84.3	86.1	87.1	85.8	80.3	82.1

Table 2
Site Management Plan
Confirmation Endpoint Soil Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

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	EPB01	EPB02	EPB02	EPB03	EPB04	EPB05	EPB05	EPB06	EPB07	EPB08	EPB09	EPB09
					Sample Name	EPB01_17.5-18	EPB02_17.5-18	DUP02_20221213	EPB03_17.5-18	EPB04_11.5-12	EPB05_11.5-12	DUP01_101922	EPB06_11.5-12	EPB07_11.5-12	EPB08_16-16.5	EPB09_13.5-14	EPB09_16.5-17
					Sample Date	12/12/2022	12/13/2022	12/13/2022	10/28/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	10/19/2022	12/15/2022	01/03/2023
					Sample Depth	17.5-18	17.5-18	17.5-18	17.5-18	11.5-12	11.5-12	11.5-12	11.5-12	11.5-12	16-16.5	13.5-14	16.5-17
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Perfluorooctanoic acids																	
N-ethyl perfluorooctane- sulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	0.000362	<0.000296 UJ	0.000461	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	0.000316 J	<0.00029 U
N-methyl perfluorooctane- sulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 UJ	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorooctanesulfonamide (FOSA)	754-91-6	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 UJ	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 UJ	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	0.00088	0.001	0.044	mg/kg	<0.000291 U	0.00035	<0.00031 U	<0.000296 U	0.000696	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.0008	0.033	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorotetradecanoic Acid (PFTA)	376-06-7	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 UJ	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	0.000453	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	NS	NS	mg/kg	<0.000291 U	<0.000298 U	<0.00031 U	<0.000296 UJ	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2) (8:2FTS)	39108-34-4	NS	NS	NS	mg/kg	<0.000291 UJ	<0.000298 U	<0.00031 U	<0.000296 U	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 UJ
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2) (6:2FTS)	27619-97-2	NS	NS	NS	mg/kg	<0.000291 UJ	<0.000298 UJ	<0.00031 UJ	<0.000296 UJ	<0.00028 U	<0.000294 U	<0.000286 U	<0.000282 U	<0.000281 U	<0.000267 U	<0.000305 UJ	<0.00029 U

Table 2
Site Management Plan
Confirmation Endpoint Soil Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

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	EPB10	EPB11	EPB12	EPB13	EPB14	EPB15	EPB15	EPB16	EPB16	EPB17	EPB18
					Sample Name	EPB10_13.5-14	EPB11_13.5-14	EPB12_25.5-26	EPB13_11.5-12	EPB14_18-18.5	EPB15_13.5-14	EPB15_16.5-17	EPB16_13.5-14	EPB16_16.5-17	EPB17_17-17.5	EPB18_11.5-12
					Sample Date	12/15/2022	12/12/2022	11/22/2022	10/19/2022	10/28/2022	12/15/2022	01/03/2023	12/15/2022	01/03/2023	11/22/2022	10/19/2022
					Sample Depth	13.5-14	13.5-14	25.5-26	11.5-12	18-18.5	13.5-14	16.5-17	13.5-14	16.5-17	17-17.5	11.5-12
					Unit	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	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,1,1-Trichloroethane	71-55-6	0.68	0.68	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,1,2-Trichloroethane	79-00-5	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,1-Dichloroethane	75-34-3	0.27	0.27	26	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,1-Dichloroethene	75-35-4	0.33	0.33	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,1-Dichloropropene	563-58-6	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,2,3-Trichlorobenzene	87-61-6	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,2,3-Trichloropropane	96-18-4	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,2,4-Trimethylbenzene	95-63-6	3.6	3.6	52	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	0.007	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,2-Dibromo-3-Chloropropane	96-12-8	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,2-Dichloroethane	107-06-2	0.02	0.02	3.1	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,2-Dichloropropane	78-87-5	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	8.4	8.4	52	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 UJ	<0.0057 U	<0.0027 U
1,3-Dichloropropane	142-28-9	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 UJ	<0.0057 U	<0.0027 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.14 U	<0.16 U	<0.13 U	<0.054 U	<0.16 U	<0.13 U	<0.1 U	<0.11 U	<0.11 U	<0.11 U	<0.055 U
2,2-Dichloropropane	594-20-7	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
2-Chlorotoluene	95-49-8	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
2-Hexanone (MBK)	591-78-6	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
4-Chlorotoluene	106-43-4	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Acetone	67-64-1	**0.05**	0.05	100	mg/kg	**0.81 J**	**0.17**	0.026	0.023 J	0.043 J	**0.096**	0.038	**0.2**	0.028	0.018	0.018 J
Acrolein	107-02-8	NS	NS	NS	mg/kg	<0.014 U	<0.016 U	<0.013 U	<0.0054 U	<0.016 U	<0.013 U	<0.01 U	<0.011 U	<0.011 U	<0.011 U	<0.0055 U
Acrylonitrile	107-13-1	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Benzene	71-43-2	0.06	0.06	4.8	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	0.0038 J	<0.0027 U
Bromobenzene	108-86-1	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Bromochloromethane	74-97-5	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Bromodichloromethane	75-27-4	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Bromoform	75-25-2	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Bromomethane	74-83-9	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Carbon Disulfide	75-15-0	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	0.0071	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Carbon Tetrachloride	56-23-5	0.76	0.76	2.4	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Chlorobenzene	108-90-7	1.1	1.1	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Chloroethane	75-00-3	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Chloroform	67-66-3	0.37	0.37	49	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Chloromethane	74-87-3	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Cis-1,2-Dichloroethene	156-59-2	0.25	0.25	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Cis-1,3-Dichloropropene	10061-01-5	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Cyclohexane	110-82-7	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	0.0045 J	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Dibromochloromethane	124-48-1	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Dibromomethane	74-95-3	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Dichlorodifluoromethane	75-71-8	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Ethylbenzene	100-41-4	1	1	41	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 UJ	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 UJ	<0.0057 U	<0.0027 U
Isopropylbenzene (Cumene)	98-82-8	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	0.035	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
M,P-Xylene	179601-23-1	NS	NS	NS	mg/kg	<0.014 U	<0.016 U	<0.013 U	<0.0054 U	<0.016 U	<0.013 U	<0.01 U	<0.011 U	<0.011 U	<0.011 U	<0.0055 U
Methyl Acetate	79-20-9	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	0.0054 J	<0.0027 U	0.0052 J	<0.0063 U	<0.0051 U	0.011	<0.0054 U	<0.0057 U	0.0091
Methyl Ethyl Ketone (2-Butanone)	78-93-3	0.12	0.12	100	mg/kg	0.0048 J	<0.0082 U	<0.0066 U	0.0016 J	0.01	0.0067	0.0082	<0.0055 U	0.004 J	<0.0057 U	0.0027
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 UJ	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 UJ	<0.0057 U	<0.0027 U
Methylcyclohexane	108-87-2	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	0.042	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Methylene Chloride	75-09-2	0.05	0.05	100	mg/kg	<0.014 U	<0.016 U	<0.013 U	<0.0054 U	<0.016 U	<0.013 U	<0.01 U	<0.011 U	<0.011 U	<0.011 U	<0.0055 U
n-Butylbenzene	104-51-8	12	12	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	0.014	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
n-Propylbenzene	103-65-1	3.9	3.9	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	0.063	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
p-Cymene (p-Isopropyltoluene)	CYMP	NS	NS	NS	mg/kg	0.027	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	0.012	<0.0051 U	<0.0055 U	0.0044 J	<0.0057 U	<0.0027 U
Sec-Butylbenzene	135-98-8	11	11	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	0.014	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Styrene	100-42-5	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
T-Butylbenzene	98-06-6	5.9	5.9	100	mg/kg	<0.0068 U	<0.0082 UJ	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 UJ	<0.0055 U	<0.0054 UJ	<0.0057 U	<0.0027 U
Tert-Butyl Alcohol	75-65-0	NS	NS	NS	mg/kg	0.0095	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Tert-Butyl Methyl Ether	1634-04-4	0.93	0.93	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Tetrachloroethene (PCE)	127-18-4	1.3	1.3	19	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 UJ	<0.0057 U	<0.0027 U
Toluene	108-88-3	0.7	0.7	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Total Xylenes	1330-20-7	0.26	1.6	100	mg/kg	<0.02 U	<0.025 U	<0.02 U	<0.0082 U	<0.024 U	<0.019 U	<0.015 U	<0.017 U	<0.016 U	<0.017 U	<0.0082 U
Trans-1,2-Dichloroethene	156-60-5	0.19	0.19	100	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Trans-1,3-Dichloropropene	10061-02-6	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Trichloroethene (TCE)	79-01-6	0.47	0.47	21	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U
Trichlorofluoromethane	75-69-4	NS	NS	NS	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 UJ	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 UJ
Vinyl Acetate	108-05-4	NS	NS	NS	mg/kg	NA	NA	<0.0066 U	<0.0027 U	<0.0081 U	NA	<0.0051 U	NA	<0.0054 U	<0.0057 U	<0.0027 U
Vinyl Chloride	75-01-4	0.02	0.02	0.9	mg/kg	<0.0068 U	<0.0082 U	<0.0066 U	<0.0027 U	<0.0081 U	<0.0063 U	<0.0051 U	<0.0055 U	<0.0054 U	<0.0057 U	<0.0027 U

Table 2
Site Management Plan
Confirmation Endpoint Soil Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

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	EPB10	EPB11	EPB12	EPB13	EPB14	EPB15	EPB15	EPB16	EPB16	EPB17	EPB18
					Sample Name	EPB10_13.5-14	EPB11_13.5-14	EPB12_25.5-26	EPB13_11.5-12	EPB14_18-18.5	EPB15_13.5-14	EPB15_16.5-17	EPB16_13.5-14	EPB16_16.5-17	EPB17_17-17.5	EPB18_11.5-12
					Sample Date	12/15/2022	12/12/2022	11/22/2022	10/19/2022	10/28/2022	12/15/2022	01/03/2023	12/15/2022	01/03/2023	11/22/2022	10/19/2022
					Sample Depth	13.5-14	13.5-14	25.5-26	11.5-12	18-18.5	13.5-14	16.5-17	13.5-14	16.5-17	17-17.5	11.5-12
					Unit	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	<0.195 U	<0.205 U	<0.326 U	<0.197 U	<0.2 UJ	<0.198 U	<0.197 U	<0.192 U	<0.201 U	<0.202 U	<0.197 U
1,2,4-Trichlorobenzene	120-82-1	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
1,2-Dichlorobenzene	95-50-1	1.1	1.1	100	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
1,2-Diphenylhydrazine	122-66-7	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
1,3-Dichlorobenzene	541-73-1	2.4	2.4	49	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
1,4-Dichlorobenzene	106-46-7	1.8	1.8	13	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
1,4-Dioxane (P-Dioxane)	123-91-1	0.1	0.1	13	mg/kg	<0.02 U	<0.019 U	<0.0185 U	<0.0196 U	<0.0187 U	<0.0198 U	<0.0194 U	<0.019 U	<0.0192 U	<0.0196 U	<0.0194 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	NS	NS	mg/kg	<0.195 UJ	<0.205 U	<0.326 U	<0.197 UJ	<0.2 UJ	<0.198 UJ	<0.197 U	<0.192 U	<0.201 U	<0.202 U	<0.197 UJ
2,4,5-Trichlorophenol	95-95-4	NS	NS	NS	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 UJ
2,4,6-Trichlorophenol	88-06-2	NS	NS	NS	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 UJ
2,4-Dichlorophenol	120-83-2	NS	NS	NS	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 UJ
2,4-Dimethylphenol	105-67-9	NS	NS	NS	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 UJ
2,4-Dinitrophenol	51-28-5	NS	NS	NS	mg/kg	<0.195 UJ	<0.205 U	<0.326 U	<0.197 UJ	<0.2 UJ	<0.198 UJ	<0.197 U	<0.192 U	<0.201 U	<0.202 U	<0.197 UJ
2,4-Dinitrotoluene	121-14-2	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	1.07 D	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
2,6-Dinitrotoluene	606-20-2	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	1.4 D	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
2-Chloronaphthalene	91-58-7	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
2-Chlorophenol	95-57-8	NS	NS	NS	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 UJ
2-Methylnaphthalene	91-57-6	NS	NS	NS	mg/kg	0.0516 JD	0.159 D	<0.163 U	0.0584 JD	<0.1 UJ	0.0649 JD	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
2-Methylphenol (o-Cresol)	95-48-7	0.33	0.33	100	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 UJ
2-Nitroaniline	88-74-4	NS	NS	NS	mg/kg	<0.195 U	<0.205 U	<0.326 U	<0.197 U	<0.2 UJ	<0.198 U	<0.197 U	<0.192 U	<0.201 U	<0.202 U	<0.197 U
2-Nitrophenol	88-75-5	NS	NS	NS	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 UJ
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	0.33	100	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 UJ
3,3'-Dichlorobenzidine	91-94-1	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
3-Nitroaniline	99-09-2	NS	NS	NS	mg/kg	<0.195 U	<0.205 U	<0.326 U	<0.197 U	<0.2 UJ	<0.198 U	<0.197 U	<0.192 U	<0.201 U	<0.202 U	<0.197 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	NS	mg/kg	<0.195 UJ	<0.205 U	<0.326 U	<0.197 UJ	<0.2 UJ	<0.198 UJ	<0.197 U	<0.192 U	<0.201 U	<0.202 U	<0.197 UJ
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	NS	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	0.0593 JD	<0.1 U	<0.101 U	<0.0987 UJ
4-Chloroaniline	106-47-8	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
4-Nitroaniline	100-01-6	NS	NS	NS	mg/kg	<0.195 U	<0.205 U	<0.326 U	<0.197 U	<0.2 UJ	<0.198 U	<0.197 U	<0.192 U	<0.201 U	<0.202 U	<0.197 U
4-Nitrophenol	100-02-7	NS	NS	NS	mg/kg	<0.195 UJ	<0.205 U	<0.326 U	<0.197 UJ	<0.2 UJ	<0.198 UJ	<0.197 U	<0.192 U	<0.201 U	<0.202 U	<0.197 UJ
Acenaphthene	83-32-9	20	98	100	mg/kg	0.0696 JD	0.0985 JD	<0.163 U	0.0994 D	<0.1 UJ	0.0847 JD	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Acenaphthylene	208-96-8	100	107	100	mg/kg	<0.0978 U	0.0517 JD	0.0823 JD	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Acetophenone	98-86-2	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	NS	NS	NS	mg/kg	<0.392 U	<0.411 U	<0.654 U	<0.395 U	<0.402 UJ	<0.397 U	<0.395 U	<0.386 U	<0.402 U	<0.404 U	<0.395 U
Anthracene	120-12-7	100	1000	100	mg/kg	0.138 D	0.244 J	<0.163 U	0.267 D	<0.1 UJ	0.89 D	<0.0987 U	0.0616 JD	<0.1 U	<0.101 U	<0.0987 U
Atrazine	1912-24-9	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Benzaldehyde	100-52-7	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Benzidine	92-87-5	NS	NS	NS	mg/kg	<0.392 U	<0.411 U	<0.654 U	<0.395 U	<0.402 UJ	<0.397 U	<0.395 U	<0.386 U	<0.402 U	<0.404 U	<0.395 U
Benzo(a)anthracene	56-55-3	**1**	1	1	mg/kg	0.306 D	0.549 D	<0.163 U	0.659 D	<0.1 UJ	0.407 D	<0.0987 U	0.169 D	<0.1 U	0.0573 JD	0.0758 JD
Benzo(a)pyrene	50-32-8	**1**	22	1	mg/kg	0.3 D	0.52 D	<0.163 U	0.628 D	<0.1 UJ	0.35 D	<0.0987 U	0.187 D	<0.1 U	<0.101 U	0.071 JD
Benzo(b)fluoranthene	205-99-2	**1**	1.7	1	mg/kg	0.248 D	0.469 D	<0.163 U	0.553 D	<0.1 UJ	0.291 D	<0.0987 U	0.149 D	<0.1 U	<0.101 U	0.0537 JD
Benzo(g,h,i)Perylene	191-24-2	100	1000	100	mg/kg	0.182 D	0.31 D	<0.163 U	0.439 D	<0.1 UJ	0.22 D	<0.0987 U	0.116 D	<0.1 U	<0.101 U	<0.0987 U
Benzo(k)fluoranthene	207-08-9	**0.8**	1.7	3.9	mg/kg	0.242 D	0.403 D	<0.163 U	0.47 D	<0.1 UJ	0.313 D	<0.0987 U	0.151 D	<0.1 U	<0.101 U	0.0616 JD
Benzoic Acid	65-85-0	NS	NS	NS	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Benzyl Alcohol	100-51-6	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 UJ
Benzyl Butyl Phthalate	85-68-7	NS	NS	NS	mg/kg	0.0633 JD	0.605 D	<0.163 U	3.15 D	<0.1 UJ	0.0713 JD	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Biphenyl (Diphenyl)	92-52-4	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Bis(2-chloroethoxy) methane	111-91-1	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Bis(2-chloroisopropyl) ether	108-60-1	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Bis(2-ethylhexyl) phthalate	117-81-7	NS	NS	NS	mg/kg	<0.0978 U	0.112 D	<0.163 U	0.257 D	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Caprolactam	105-60-2	NS	NS	NS	mg/kg	<0.195 U	<0.205 U	<0.326 U	<0.197 U	<0.2 UJ	<0.198 U	<0.197 U	<0.192 U	<0.201 U	<0.202 U	<0.197 U
Carbazole	86-74-8	NS	NS	NS	mg/kg	0.0633 JD	0.126 J	<0.163 U	0.143 D	<0.1 UJ	0.0768 JD	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Chrysene	218-01-9	**1**	1	3.9	mg/kg	0.322 D	0.539 D	<0.163 U	0.625 D	<0.1 UJ	0.437 D	<0.0987 U	0.163 D	<0.1 U	0.0548 JD	0.0876 JD
Dibenz(a,h)anthracene	53-70-3	**0.33**	1000	0.33	mg/kg	0.0852 JD	0.0944 JD	<0.163 U	0.145 D	<0.1 UJ	0.0665 JD	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Dibenzofuran	132-64-9	7	210	59	mg/kg	<0.0978 U	0.0739 JD	<0.163 U	0.067 JD	<0.1 UJ	0.0546 JD	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Dibutyl phthalate	84-74-2	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Diethyl phthalate	84-66-2	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Dimethyl phthalate	131-11-3	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	0.424 D	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Dioctyl phthalate	117-84-0	NS	NS	NS	mg/kg	<0.0978 U	0.0575 JD	<0.163 U	0.201 D	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Fluoranthene	206-44-0	100	1000	100	mg/kg	0.818 D	1.22 D	0.0888 JD	1.41 D	<0.1 UJ	1.06 D	<0.0987 U	0.305 D	<0.1 U	0.105 D	0.152 D
Fluorene	86-73-7	30	386	100	mg/kg	0.0899 JD	0.132 D	<0.163 U	0.104 D	<0.1 UJ	0.099 JD	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Hexachlorobenzene	118-74-1	0.33	3.2	1.2	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Hexachlorobutadiene	87-68-3	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Hexachlorocyclopentadiene	77-47-4	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Hexachloroethane	67-72-1	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Indeno(1,2,3-cd)pyrene	193-39-5	**0.5**	8.2	0.5	mg/kg	0.192 D	0.331 D	<0.163 U	0.362 D	<0.1 UJ	0.26 D	<0.0987 U	0.0924 JD	<0.1 U	<0.101 U	<0.0987 U
Isophorone	78-59-1	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Naphthalene	91-20-3	12	12	100	mg/kg	0.0758 JD	0.0969 JD	<0.163 U	<0.0986 U	<0.1 UJ	0.0744 JD	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Nitrobenzene	98-95-3	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
n-Nitrosodimethylamine	62-75-9	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
n-Nitrosodiphenylamine	86-30-6	NS	NS	NS	mg/kg	<0.0978 U	<0.103 U	<0.163 U	<0.0986 U	<0.1 UJ	<0.0991 U	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 U
Pentachlorophenol	87-86-5	0.8	0.8	6.7	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	<0.1 U	<0.101 U	<0.0987 UJ
Phenanthrene	85-01-8	100	1000	100	mg/kg	0.638 D	1.1 D	0.124 JD	1.02 D	<0.1 UJ	0.885 D	<0.0987 U	0.315 D	<0.1 U	0.111 D	0.233 D
Phenol	108-95-2	0.33	0.33	100	mg/kg	<0.0978 UJ	<0.103 U	<0.163 U	<0.0986 UJ	<0.1 UJ	<0.0991 UJ	<0.0987 U	<0.0963 U	0.0666 JD	<0.101 U	<0.0987 UJ
Pyrene	129-00-0	100	1000	100	mg/kg	0.548 D	0.976 D	0.0914 JD	1.13 D	<0.1 UJ	0.704 D	<0.0987 U	0.283 D	<0.1 U	0.0984 JD	0.133 D
Pyridine	110-86-1	NS	NS	NS	mg/kg	<0.392 U	<0.411 U	<0.654 U	<0.395 U	<0.402 UJ	<0.397 U	<0.395 U	<0.386 U	<0.402 U	<0.404 U	<0.395 U

Table 2
Site Management Plan
Confirmation Endpoint Soil Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

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	EPB10	EPB11	EPB12	EPB13	EPB14	EPB15	EPB15	EPB16	EPB16	EPB17	EPB18
					Sample Name	EPB10_13.5-14	EPB11_13.5-14	EPB12_25.5-26	EPB13_11.5-12	EPB14_18-18.5	EPB15_13.5-14	EPB15_16.5-17	EPB16_13.5-14	EPB16_16.5-17	EPB17_17-17.5	EPB18_11.5-12
					Sample Date	12/15/2022	12/12/2022	11/22/2022	10/19/2022	10/28/2022	12/15/2022	01/03/2023	12/15/2022	01/03/2023	11/22/2022	10/19/2022
					Sample Depth	13.5-14	13.5-14	25.5-26	11.5-12	18-18.5	13.5-14	16.5-17	13.5-14	16.5-17	17-17.5	11.5-12
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides																
4,4'-DDD	72-54-8	0.0033	14	13	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
4,4'-DDE	72-55-9	**0.0033**	17	8.9	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
4,4'-DDT	50-29-3	0.0033	136	7.9	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Aldrin	309-00-2	0.005	0.19	0.097	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.02	0.02	0.48	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Alpha Chlordane	5103-71-9	0.094	2.9	4.2	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Alpha Endosulfan	959-98-8	2.4	102	24	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.036	0.09	0.36	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Beta Endosulfan	33213-65-9	2.4	102	24	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Chlordane (alpha and gamma)	57-74-9	NS	NS	NS	mg/kg	<0.00191 U	<0.00203 U	<0.0432 U	<0.0393 U	<0.04 U	<0.00199 U	<0.0389 U	<0.00194 U	<0.0399 U	<0.0394 U	<0.0388 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	0.25	100	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Dieldrin	60-57-1	0.005	0.1	0.2	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Endosulfan Sulfate	1031-07-8	2.4	1000	24	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Endrin	72-20-8	0.014	0.06	11	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Endrin Aldehyde	7421-93-4	NS	NS	NS	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Endrin Ketone	53494-70-5	NS	NS	NS	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Gamma Bhc (Lindane)	58-89-9	0.1	0.1	1.3	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Gamma-Chlordane	5566-34-7	NS	NS	NS	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Heptachlor	76-44-8	0.042	0.38	2.1	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Heptachlor Epoxide	1024-57-3	NS	NS	NS	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Methoxychlor	72-43-5	NS	NS	NS	mg/kg	<0.00191 U	<0.00203 U	<0.00216 U	<0.00196 U	<0.002 U	<0.00199 U	<0.00195 U	<0.00194 U	<0.00199 U	<0.00197 U	<0.00194 U
Toxaphene	8001-35-2	NS	NS	NS	mg/kg	<0.191 U	<0.203 U	<0.216 U	<0.196 U	<0.2 U	<0.199 U	<0.195 U	<0.194 U	<0.199 U	<0.197 U	<0.194 U
Herbicides																
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	NS	NS	NS	mg/kg	<0.0236 U	<0.0248 U	<0.0261 U	NA	<0.0241 U	<0.0239 U	<0.0233 U	<0.0236 U	<0.024 U	<0.0242 U	NA
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	NS	NS	NS	mg/kg	<0.0236 U	<0.0248 U	<0.0261 U	NA	<0.0241 U	<0.0239 U	<0.0233 U	<0.0236 U	<0.024 U	<0.0242 U	NA
Silvex (2,4,5-Tp)	93-72-1	3.8	3.8	100	mg/kg	<0.0236 U	<0.0248 U	<0.0261 U	NA	<0.0241 U	<0.0239 U	<0.0233 U	<0.0236 U	<0.024 U	<0.0242 U	NA
Polychlorinated Biphenyl																
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	NS	mg/kg	<0.0193 U	<0.0205 U	<0.0218 U	<0.0198 U	<0.0202 U	<0.0201 U	<0.0197 U	<0.0196 U	<0.0201 U	<0.0199 U	<0.0196 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	NS	mg/kg	<0.0193 U	<0.0205 U	<0.0218 U	<0.0198 U	<0.0202 U	<0.0201 U	<0.0197 U	<0.0196 U	<0.0201 U	<0.0199 U	<0.0196 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	NS	mg/kg	<0.0193 U	<0.0205 U	<0.0218 U	<0.0198 U	<0.0202 U	<0.0201 U	<0.0197 U	<0.0196 U	<0.0201 U	<0.0199 U	<0.0196 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	NS	mg/kg	<0.0193 U	<0.0205 U	<0.0218 U	<0.0198 U	<0.0202 U	<0.0201 U	<0.0197 U	<0.0196 U	<0.0201 U	<0.0199 U	<0.0196 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	NS	mg/kg	<0.0193 U	<0.0205 U	<0.0218 U	<0.0198 U	<0.0202 U	<0.0201 U	<0.0197 U	<0.0196 U	<0.0201 U	<0.0199 U	<0.0196 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	NS	mg/kg	<0.0193 U	<0.0205 U	<0.0218 U	0.023	<0.0202 U	<0.0201 U	<0.0197 U	<0.0196 U	<0.0201 U	<0.0199 U	<0.0196 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	NS	mg/kg	0.0315	<0.0205 U	<0.0218 U	<0.0198 U	<0.0202 U	<0.0201 U	<0.0197 U	<0.0196 U	<0.0201 U	<0.0199 U	<0.0196 U
Total PCBs	1336-36-3	**0.1**	3.2	1	mg/kg	0.0315	<0.0205 U	<0.0218 U	0.023	<0.0202 U	<0.0201 U	<0.0197 U	<0.0196 U	<0.0201 U	<0.0199 U	<0.0196 U
Metals																
Aluminum	7429-90-5	NS	NS	NS	mg/kg	11,700	13,000	9,570	13,000	11,200	12,200	10,100	13,100	12,800	14,200	13,700
Antimony	7440-36-0	NS	NS	NS	mg/kg	<2.47 U	<2.61 U	<2.73 UJ	<2.5 U	3.85	<2.52 U	<2.49 U	<2.47 UJ	<2.53 U	<2.54 U	<2.48 U
Arsenic	7440-38-2	13	16	16	mg/kg	3.4	3.54	<1.64 U	2.8	1.93	3.09	2.48	3.65	5.66	<1.52 U	6.46
Barium	7440-39-3	350	820	400	mg/kg	124	135	70.2	142	62.8	141	50.7	153	130	234	130
Beryllium	7440-41-7	7.2	47	72	mg/kg	0.726	1.26	<0.055 UJ	<0.05 U	<0.051 U	0.767	0.542	0.869	0.74	<0.051 U	<0.05 U
Cadmium	7440-43-9	2.5	7.5	4.3	mg/kg	<0.297 U	<0.313 U	<0.328 U	0.526	<0.305 U	<0.303 U	<0.299 U	<0.296 U	0.37	<0.304 U	<0.298 U
Calcium	7440-70-2	NS	NS	NS	mg/kg	29,200 B	22,900	9,980	44,300 B	1,100	35,500 B	2,380	35,200 B	30,900	27,300	65,500 B
Chromium, Hexavalent	18540-29-9	1	19	110	mg/kg	<0.594 U	<0.626 U	<0.656 UJ	<0.599 U	<0.61 UJ	<0.606 U	<0.598 U	<0.593 U	<0.608 U	<0.609 U	<0.596 U
Chromium, Total	7440-47-3	NS	NS	NS	mg/kg	25.7	28.9	17.3	26.5	14.8	30.5	13.2	44.5 J	16.4	20.5	67.6
Chromium, Trivalent	16065-83-1	**30**	NS	180	mg/kg	25.7	28.9	17.3	26.5	14.8	**30.5**	13.2	**44.5**	16.4	20.5	**67.6**
Cobalt	7440-48-4	NS	NS	NS	mg/kg	8.08	10.2	8.69	11.4	9.13	9.53	6.7	11.3	7.4	6.88	10.4
Copper	7440-50-8	**50**	1720	270	mg/kg	31.5	31.3	33.3 J	40.5	17.4	36.8	16.4	**69.3 J**	35.7	32.3	**66.9**
Cyanide	57-12-5	27	40	27	mg/kg	5.7	<0.626 U	<0.656 U	<0.599 U	<0.61 U	<0.606 U	<0.598 U	2.63 J	<0.608 U	<0.609 U	<0.596 U
Iron	7439-89-6	NS	NS	NS	mg/kg	17,400	20,200	15,900	19,700	16,000	18,100	15,300	26,600	20,900	16,400	20,400
Lead	7439-92-1	**63**	450	400	mg/kg	**264**	**136**	31.9	54.2	38.6	**700**	33.3	**169**	**145**	**652**	**208**
Magnesium	7439-95-4	NS	NS	NS	mg/kg	5,120	5,430	4,140	7,720	3,390	4,820	3,350	5,470	8,150	4,130	7,340
Manganese	7439-96-5	1600	2000	2000	mg/kg	311	308	227	351	140	266	179	340	474	232	633
Mercury	7439-97-6	**0.18**	0.73	0.81	mg/kg	**0.22**	**0.218**	0.0744	0.166	0.125	**0.302**	**0.233**	**0.937**	**0.57**	**0.334**	0.0673
Nickel	7440-02-0	**30**	130	310	mg/kg	20	22.1	16.9	22.2	17.1	20.3	14.6	27.6	14.3	15.9	**34.6**
Potassium	7440-09-7	NS	NS	NS	mg/kg	2,790 B	3,810	2,050	4,210 B	1,430	2,900 B	1,070	3,690 B	1,740	1,840	3,320 B
Selenium	7782-49-2	3.9	4	180	mg/kg	<2.47 UJ	<2.61 UJ	<2.73 U	<2.5 U	<2.54 U	<2.52 UJ	<2.49 UJ	<2.47 UJ	<2.53 UJ	<2.54 U	<2.48 U
Silver	7440-22-4	2	8.3	180	mg/kg	<0.499 U	<0.526 U	<0.551 U	<0.503 U	<0.512 U	<0.509 U	<0.502 U	<0.498 UJ	<0.511 U	<0.511 U	<0.501 U
Sodium	7440-23-5	NS	NS	NS	mg/kg	291 J	356	<54.7 UJ	804	263	432 J	157	586 J	826	<50.7 UJ	670 J
Thallium	7440-28-0	NS	NS	NS	mg/kg	<2.47 U	<2.61 U	<2.73 U	<2.5 U	<2.54 U	<2.52 U	<2.49 U	<2.47 UJ	<2.53 U	<2.54 U	<2.48 U
Vanadium	7440-62-2	NS	NS	NS	mg/kg	25.9	31	26	30.8	20.9	34.7	18.2	35.1	25	24.6	40
Zinc	7440-66-6	**109**	2480	10000	mg/kg	85.3	**110**	39.6	109	41	91	42.8	102	**118**	88.3	**147**
General Chemistry																
Solids, Percent	SOLID	NS	NS	NS	Percent	84.2	79.9	76.2	83.4	82	82.5	83.6	84.3	82.2	82.1	83.9

Table 2
Site Management Plan
Confirmation Endpoint Soil Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

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	EPB10	EPB11	EPB12	EPB13	EPB14	EPB15	EPB15	EPB16	EPB16	EPB17	EPB18
					Sample Name	EPB10_13.5-14	EPB11_13.5-14	EPB12_25.5-26	EPB13_11.5-12	EPB14_18-18.5	EPB15_13.5-14	EPB15_16.5-17	EPB16_13.5-14	EPB16_16.5-17	EPB17_17-17.5	EPB18_11.5-12
					Sample Date	12/15/2022	12/12/2022	11/22/2022	10/19/2022	10/28/2022	12/15/2022	01/03/2023	12/15/2022	01/03/2023	11/22/2022	10/19/2022
					Sample Depth	13.5-14	13.5-14	25.5-26	11.5-12	18-18.5	13.5-14	16.5-17	13.5-14	16.5-17	17-17.5	11.5-12
					Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Perfluorooctanoic acids																
N-ethyl perfluorooctane- sulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	NS	NS	mg/kg	<0.000295 U	0.000387	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 UJ	<0.000283 U	<0.000277 U	<0.000298 U
N-methyl perfluorooctane- sulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorobutanoic acid (PFBA)	375-22-4	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	0.000799	<0.000298 U
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 UJ	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorononanoic Acid (PFNA)	375-95-1	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorooctanesulfonamide (FOSA)	754-91-6	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	0.00088	0.001	0.044	mg/kg	0.000341	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	0.00028 J	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorooctanoic Acid (PFOA)	335-67-1	0.00066	0.0008	0.033	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorotetradecanoic Acid (PFTA)	376-06-7	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 U	<0.000274 U	<0.000275 U	<0.000283 U	<0.000277 U	<0.000298 U
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2) (8:2FTS)	39108-34-4	NS	NS	NS	mg/kg	<0.000295 UJ	<0.000288 U	<0.000313 U	<0.000272 U	<0.000286 U	<0.000275 UJ	<0.000274 UJ	<0.000275 UJ	<0.000283 UJ	<0.000277 U	<0.000298 U
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2) (6:2FTS)	27619-97-2	NS	NS	NS	mg/kg	<0.000295 U	<0.000288 UJ	<0.000313 U	<0.000272 U	<0.000286 UJ	<0.000275 UJ	<0.000274 U	<0.000275 UJ	<0.000283 U	<0.000277 UJ	<0.000298 UJ

Table 2
Site Management Plan
Confirmation Endpoint Soil Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

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).
Confirmation soil samples EPB09_13.5-14, EPB15_13.5-14, and EPB16_13.5-14 were over-excavated and additional endpoint soil samples were collected.

Qualifiers:

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

E - The result is estimated and cannot be accurately reported due to levels encountered or interferences. (York)

B - The analyte was found in the associated analysis batch blank.
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 3
Site Management Plan
Hazardous Lead Confirmation Endpoint Soil Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	RCRA Characteristics of Hazardous Waste	Location	EPB19	EPB24	EPS20	EPS21	EPS22	EPS23	EPS25	EPS26	EPS27	EPS28
						Sample Name	EPB19_19.5-20.0	EPB24_19.5-20.0	EPS20_19-19.5	EPS21_19-19.5	EPS22_19-19.5	EPS23_19-19.5	EPS25_19-19.5	EPS26_19-19.5	EPS27_19-19.5	EPS28_19-19.5
						Sample Date	10/27/2022	10/27/2022	10/27/2022	10/27/2022	10/27/2022	10/27/2022	10/27/2022	10/27/2022	10/27/2022	10/27/2022
						Sample Depth	19.5-20	19.5-20	19-19.5	19-19.5	19-19.5	19-19.5	19-19.5	19-19.5	19-19.5	19-19.5
						Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Metals - Total																
Lead	7439-92-1	**63**	450	400	NS	mg/kg	41.5	39.3	37	**77.2**	**767**	**78.9**	17.2	**187**	61.7	16
Metals - TCLP																
Lead	7439-92-1	NS	NS	NS	5	mg/l	<0.125 U	<0.125 U	<0.125 U	<0.125 U	0.175	<0.125 U	<0.125 U	0.459	0.147	<0.125 U
General Chemistry																
Solids, Percent	SOLID	NS	NS	NS	NS	Percent	75.6	80.3	79.1	76.4	80.3	76.8	76.8	80.8	76.2	81.1

Notes:
TCLP - Toxicity Characteristic Leaching Procedure
CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
mg/l - milligram per liter
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 Leachate sample analytical results are compared to the 6 New York Codes, Rules and Regulations (NYCRR) Part 371.3 and 40 CFR 261 Subpart C and Table 1 of 40 CFR 261.24 - Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) Characteristics of Hazardous Waste.

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 Unrestricted Use SCOs
10 - Result exceeds Protection of Groundwater SCOs
10 - Result exceeds Restricted Use Restricted-Residential SCOs
10 - Result exceeds the RCRA Maximum Concentration of Contaminants for the Toxicity Characteristic

Table 4
Site Management Plan
Groundwater Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	NYSDEC SGVs	NYSDEC Guidance Values	Location	LMW-8	LMW-9	LMW-9	LMW-9	LMW-10	LMW-10	LMW-11	LMW-11	TW-2
				Sample Name	LMW-8_20180712	LMW-9_20180712	DUP-7_20180712	LMW-9_20210212	LMW-10_20180712	LMW-10_20210212	LMW-11_20210212	DUP-1_20210212	TW-2_20172111
				Sample Date	12/7/2018	12/7/2018	12/7/2018	2/12/2021	12/7/2018	2/12/2021	2/12/2021	2/12/2021	11/21/2017
				Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds													
1,1,1,2-Tetrachloroethane	630-20-6	5	NS	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
1,1,1-Trichloroethane	71-55-6	5	NS	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
1,1,2,2-Tetrachloroethane	79-34-5	5	NS	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
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	5	NS	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
1,1,2-Trichloroethane	79-00-5	1	NS	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
1,1-Dichloroethane	75-34-3	5	NS	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
1,1-Dichloroethene	75-35-4	5	NS	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
1,1-Dichloropropene	563-58-6	5	NS	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	NA
1,2,3-Trichlorobenzene	87-61-6	5	NS	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 UJ
1,2,3-Trichloropropane	96-18-4	**0.04**	NS	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
1,2,4-Trichlorobenzene	120-82-1	5	NS	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 UJ
1,2,4-Trimethylbenzene	95-63-6	5	NS	ug/l	0.66	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2-Dibromo-3-Chloropropane	96-12-8	**0.04**	NS	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
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.0006	NS	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
1,2-Dichlorobenzene	95-50-1	3	NS	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
1,2-Dichloroethane	107-06-2	**0.6**	NS	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
1,2-Dichloropropane	78-87-5	1	NS	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
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5	NS	ug/l	0.31 J	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,3-Dichlorobenzene	541-73-1	3	NS	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
1,3-Dichloropropane	142-28-9	5	NS	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
1,4-Dichlorobenzene	106-46-7	3	NS	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
1,4-Diethyl Benzene	105-05-5	NS	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	<0.2 U
1,4-Dioxane (P-Dioxane)	123-91-1	NS	1	ug/l	<40 UJ	<40 UJ	<40 UJ	<40 U	<40 UJ	<40 U	<40 U	<40 U	<40 UJ
2,2-Dichloropropane	594-20-7	5	NS	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	NA
2-Chlorotoluene	95-49-8	5	NS	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	NA
2-Hexanone (MBK)	591-78-6	50	NS	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
4-Chlorotoluene	106-43-4	5	NS	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	NA
4-Ethyltoluene	622-96-8	NS	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	<0.2 U
Acetone	67-64-1	50	NS	ug/l	1.57 J	<1 UJ	<1 UJ	<1 U	<1 UJ	<1 U	4.83	4.37	<2 U
Acrolein	107-02-8	5	NS	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
Acrylonitrile	107-13-1	5	NS	ug/l	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 U	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Benzene	71-43-2	1	NS	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
Bromobenzene	108-86-1	5	NS	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	NA
Bromochloromethane	74-97-5	5	NS	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
Bromodichloromethane	75-27-4	50	NS	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
Bromoform	75-25-2	50	NS	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
Bromomethane	74-83-9	5	NS	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
Carbon Disulfide	75-15-0	60	NS	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.3 J	0.25 J	<0.2 U
Carbon Tetrachloride	56-23-5	5	NS	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
Chlorobenzene	108-90-7	5	NS	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
Chloroethane	75-00-3	5	NS	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
Chloroform	67-66-3	7	NS	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
Chloromethane	74-87-3	5	NS	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
Cis-1,2-Dichloroethene	156-59-2	5	NS	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
Cis-1,3-Dichloropropene	10061-01-5	0.4	NS	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
Cyclohexane	110-82-7	NS	NS	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
Dibromochloromethane	124-48-1	50	NS	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
Dibromomethane	74-95-3	5	NS	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
Dichlorodifluoromethane	75-71-8	5	NS	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
Ethylbenzene	100-41-4	5	NS	ug/l	0.33 J	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	NA
Hexachlorobutadiene	87-68-3	0.5	NS	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
Isopropylbenzene (Cumene)	98-82-8	5	NS	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
M,P-Xylene	179601-23-1	5	NS	ug/l	1.81	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
Methyl Acetate	79-20-9	NS	NS	ug/l	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 U	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Methyl Ethyl Ketone (2-Butanone)	78-93-3	50	NS	ug/l	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.5 U	<0.2 UJ	<2 U	<2 U	<0.61 U	<0.2 UJ
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	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
Methylcyclohexane	108-87-2	NS	NS	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
Methylene Chloride	75-09-2	5	NS	ug/l	<1 UJ	<1 UJ	<1 UJ	<1 U	<1 UJ	<1 U	<1 U	<1 U	<1 U
n-Butylbenzene	104-51-8	5	NS	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
n-Propylbenzene	103-65-1	5	NS	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
o-Xylene (1,2-Dimethylbenzene)	95-47-6	5	NS	ug/l	0.94	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
p-Cymene (p-Isopropyltoluene)	CYMP	NS	NS	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
Sec-Butylbenzene	135-98-8	5	NS	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
Styrene	100-42-5	5	NS	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
T-Butylbenzene	98-06-6	5	NS	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
Tert-Butyl Alcohol	75-65-0	NS	NS	ug/l	<0.5 UJ	<0.5 UJ	<0.5 UJ	<0.5 UJ	<0.5 UJ	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U
Tert-Butyl Methyl Ether	1634-04-4	10	NS	ug/l	<0.2 UJ	<0.2 UJ	<0.2 UJ	<0.2 U	<0.2 UJ	<0.2 U	0.43 J	0.37 J	<0.2 U
Tetrachloroethene (PCE)	127-18-4	5	NS	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
Toluene	108-88-3	5	NS	ug/l	4.21	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Total Xylenes	1330-20-7	5	NS	ug/l	2.75	<0.6 U	<0.6 U	<0.6 U	<0.6 U	<0.6 U	<0.6 U	<0.6 U	<0.6 U
Trans-1,2-Dichloroethene	156-60-5	5	NS	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
Trans-1,3-Dichloropropene	10061-02-6	0.4	NS	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
Trichloroethene (TCE)	79-01-6	5	NS	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
Trichlorofluoromethane	75-69-4	5	NS	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
Vinyl Acetate	108-05-4	NS	NS	ug/l	NA	NA	NA	<0.2 U	NA	<0.2 U	<0.2 U	<0.2 U	NA
Vinyl Chloride	75-01-4	2	NS	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

Table 4
Site Management Plan
Groundwater Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	NYSDEC SGVs	NYSDEC Guidance Values	Location	LMW-8	LMW-9	LMW-9	LMW-9	LMW-10	LMW-10	LMW-11	LMW-11	TW-2
				Sample Name	LMW-8_20180712	LMW-9_20180712	DUP-7_20180712	LMW-9_20210212	LMW-10_20180712	LMW-10_20210212	LMW-11_20210212	DUP-1_20210212	TW-2_20172111
				Sample Date	12/7/2018	12/7/2018	12/7/2018	2/12/2021	12/7/2018	2/12/2021	2/12/2021	2/12/2021	11/21/2017
				Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds													
1,2,4,5-Tetrachlorobenzene	95-94-3	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
1,2,4-Trichlorobenzene	120-82-1	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
1,2-Dichlorobenzene	95-50-1	3	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
1,2-Diphenylhydrazine	122-66-7	0	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
1,3-Dichlorobenzene	541-73-1	3	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
1,4-Dichlorobenzene	106-46-7	3	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
1,4-Dioxane (P-Dioxane)	123-91-1	NS	1	ug/l	NA	NA	NA	NA	NA	NA	<0.3 U	NA	NA
2,3,4,6-Tetrachlorophenol	58-90-2	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 UJ
2,4,6-Trichlorophenol	88-06-2	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
2,4-Dichlorophenol	120-83-2	1	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 UJ
2,4-Dimethylphenol	105-67-9	1	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
2,4-Dinitrophenol	51-28-5	1	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
2,4-Dinitrotoluene	121-14-2	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
2,6-Dinitrotoluene	606-20-2	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
2-Chloronaphthalene	91-58-7	10	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
2-Chlorophenol	95-57-8	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
2-Methylnaphthalene	91-57-6	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
2-Methylphenol (o-Cresol)	95-48-7	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 UJ
2-Nitroaniline	88-74-4	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
2-Nitrophenol	88-75-5	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
3,3'-Dichlorobenzidine	91-94-1	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 UJ
3-Nitroaniline	99-09-2	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
4-Chloroaniline	106-47-8	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
4-Nitroaniline	100-01-6	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
4-Nitrophenol	100-02-7	NS	NS	ug/l	<5.56 U	<5.26 U	<5.41 U	<5.41 U	<5.41 U	<5 U	<6.06 U	<5.56 U	<3.85 UJ
Acenaphthene	83-32-9	20	NS	ug/l	<0.0556 U	0.0737	0.0973	0.108	0.195	0.58	<0.0606 U	<0.0556 U	1.17
Acenaphthylene	208-96-8	NS	NS	ug/l	<0.0556 U	<0.0526 U	0.0541	<0.0541 U	<0.0541 U	<0.05 U	<0.0606 U	<0.0556 U	0.0385
Acetophenone	98-86-2	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Alpha-Terpineol	98-55-5	NS	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	<3.85 U
Aniline (Phenylamine, Aminobenzene)	62-53-3	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Anthracene	120-12-7	50	NS	ug/l	<0.0556 U	0.0947	0.141	<0.0541 U	0.119	0.11	<0.0606 U	<0.0556 U	0.338
Atrazine	1912-24-9	7.5	NS	ug/l	<0.556 U	<0.526 U	<0.541 U	<0.541 U	<0.541 U	<0.5 U	<0.606 U	<0.556 U	<0.385 U
Benzaldehyde	100-52-7	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Benzidine	92-87-5	5	NS	ug/l	<5.56 U	<5.26 U	<5.41 U	<5.41 U	<5.41 U	<5 U	<6.06 U	<5.56 U	<3.85 U
Benzo(a)anthracene	56-55-3	0.002	NS	ug/l	**0.0556**	**0.0947 J**	**0.227 J**	<0.0541 U	<0.0541 U	<0.05 U	<0.0606 U	<0.0556 U	**0.115 J**
Benzo(a)pyrene	50-32-8	0	NS	ug/l	<0.0556 U	**0.0842 J**	**0.238 J**	<0.0541 U	<0.0541 U	<0.05 U	<0.0606 U	<0.0556 U	**0.0615**
Benzo(b)fluoranthene	205-99-2	0.002	NS	ug/l	<0.0556 U	**0.0842 J**	**0.162 J**	<0.0541 U	<0.0541 U	<0.05 U	<0.0606 U	<0.0556 U	**0.0385**
Benzo(g,h,i)Perylene	191-24-2	NS	NS	ug/l	<0.0556 U	0.0526 J	0.162 J	<0.0541 U	<0.0541 U	<0.05 U	<0.0606 U	<0.0556 U	0.0385
Benzo(k)fluoranthene	207-08-9	0.002	NS	ug/l	<0.0556 U	**0.0737 J**	**0.205 J**	<0.0541 U	<0.0541 U	<0.05 U	<0.0606 U	<0.0556 U	**0.0385**
Benzoic Acid	65-85-0	NS	NS	ug/l	<27.8 UJ	<26.3 UJ	<27 UJ	<2.7 U	<27 UJ	<2.5 U	<3.03 U	<2.78 U	<19.2 UJ
Benzyl Alcohol	100-51-6	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	3.99 J	3.47 J	<1.92 U
Benzyl Butyl Phthalate	85-68-7	50	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Biphenyl (Diphenyl)	92-52-4	5	NS	ug/l	<2.78 UJ	<2.63 UJ	<2.7 UJ	<2.7 U	<2.7 UJ	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Bis(2-chloroethoxy) methane	111-91-1	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	1	NS	ug/l	<1.11 U	<1.05 U	<1.08 U	<1.08 U	<1.08 U	<1 U	<1.21 U	<1.11 U	<0.769 U
Bis(2-chloroisopropyl) ether	108-60-1	5	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Bis(2-ethylhexyl) phthalate	117-81-7	5	NS	ug/l	<0.556 U	<0.526 U	<0.541 U	1.41 J	<0.541 U	4.9 J	4.17 J	<1.17 U	<0.385 U
Caprolactam	105-60-2	NS	NS	ug/l	<2.78 UJ	<2.63 UJ	<2.7 UJ	<2.7 U	<2.7 UJ	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Carbazole	86-74-8	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Chrysene	218-01-9	0.002	NS	ug/l	<0.0556 U	**0.0947 J**	**0.27 J**	<0.0541 U	<0.0541 U	<0.05 U	<0.0606 U	<0.0556 U	**0.108 J**
Dibenz(a,h)anthracene	53-70-3	NS	NS	ug/l	<0.0556 U	<0.0526 U	0.0649	<0.0541 U	<0.0541 U	<0.05 U	<0.0606 U	<0.0556 U	<0.0385 U
Dibenzofuran	132-64-9	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Dibutyl phthalate	84-74-2	50	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	3.09 J	<3.03 U	<2.78 U	<1.92 U
Diethyl phthalate	84-66-2	50	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Dimethyl phthalate	131-11-3	50	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Dioctyl phthalate	117-84-0	50	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Fluoranthene	206-44-0	50	NS	ug/l	0.0778	0.305 J	0.735 J	0.0865	0.476	0.36	<0.0606 U	<0.0556 U	0.623
Fluorene	86-73-7	50	NS	ug/l	<0.0556 U	0.0632	0.0757	<0.0541 U	0.0649	<0.05 U	<0.0606 U	<0.0556 U	0.292
Hexachlorobenzene	118-74-1	0.04	NS	ug/l	<0.0222 U	<0.0211 U	<0.0216 U	<0.0216 U	<0.0216 U	<0.02 U	0.0242	<0.0222 U	<0.0154 U
Hexachlorobutadiene	87-68-3	0.5	NS	ug/l	<0.556 U	<0.526 U	<0.541 U	<0.541 U	<0.541 U	<0.5 U	<0.606 U	<0.556 U	<0.385 U
Hexachlorocyclopentadiene	77-47-4	5	NS	ug/l	<5.56 U	<5.26 U	<5.41 U	<5.41 U	<5.41 U	<5 U	<6.06 U	<5.56 U	<3.85 UJ
Hexachloroethane	67-72-1	5	NS	ug/l	<0.556 U	<0.526 U	<0.541 U	<0.541 U	<0.541 U	<0.5 U	<0.606 U	<0.556 U	<0.385 U
Indeno(1,2,3-cd)pyrene	193-39-5	0.002	NS	ug/l	<0.0556 U	**0.0526 J**	**0.141 J**	<0.0541 U	<0.0541 U	<0.05 U	<0.0606 U	<0.0556 U	<0.0385 U
Isophorone	78-59-1	50	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Naphthalene	91-20-3	10	NS	ug/l	0.211	<0.0526 U	0.0649	<0.0541 U	0.0757	0.07	<0.0606 U	<0.0556 U	0.115
Nitrobenzene	98-95-3	0.4	NS	ug/l	<0.278 U	<0.263 U	<0.27 U	<0.27 U	<0.27 U	<0.25 U	<0.303 U	<0.278 U	<0.192 U
n-Nitrosodimethylamine	62-75-9	NS	NS	ug/l	<0.556 UJ	<0.526 UJ	<0.541 UJ	<0.541 U	<0.541 UJ	<0.5 U	<0.606 U	<0.556 U	<0.385 U
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
n-Nitrosodiphenylamine	86-30-6	50	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Pentachlorophenol	87-86-5	1	NS	ug/l	<0.278 U	<0.263 U	<0.27 U	<0.27 U	<0.27 U	<0.25 U	<0.303 U	<0.278 U	<0.192 U
Phenanthrene	85-01-8	50	NS	ug/l	0.111	0.263	0.324	<0.0541 U	0.238	0.14	<0.0606 U	0.0556	1.02
Phenol	108-95-2	1	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	<1.92 U
Pyrene	129-00-0	50	NS	ug/l	0.0667	0.284 J	0.778 J	0.0649	0.389	0.28	0.0727	<0.0556 U	0.731
Pyridine	110-86-1	50	NS	ug/l	<2.78 U	<2.63 U	<2.7 U	<2.7 U	<2.7 U	<2.5 U	<3.03 U	<2.78 U	NA

Table 4
Site Management Plan
Groundwater Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	NYSDEC SGVs	NYSDEC Guidance Values	Location	LMW-8	LMW-9	LMW-9	LMW-9	LMW-10	LMW-10	LMW-11	LMW-11	TW-2
				Sample Name	LMW-8_20180712	LMW-9_20180712	DUP-7_20180712	LMW-9_20210212	LMW-10_20180712	LMW-10_20210212	LMW-11_20210212	DUP-1_20210212	TW-2_20172111
				Sample Date	12/7/2018	12/7/2018	12/7/2018	2/12/2021	12/7/2018	2/12/2021	2/12/2021	2/12/2021	11/21/2017
				Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides													
4,4'-DDD	72-54-8	0.3	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
4,4'-DDE	72-55-9	0.2	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 UJ	<0.00471 U	<0.00432 UJ	<0.00435 UJ	<0.00444 UJ	NA
4,4'-DDT	50-29-3	0.2	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 UJ	<0.00471 U	<0.00432 UJ	<0.00435 UJ	<0.00444 UJ	NA
Aldrin	309-00-2	0	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.01	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Alpha Chlordane	5103-71-9	NS	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Alpha Endosulfan	959-98-8	NS	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.04	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Beta Endosulfan	33213-65-9	NS	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Chlordane (alpha and gamma)	57-74-9	0.05	NS	ug/l	<0.0222 UJ	<0.0235 U	<0.0216 U	<0.216 U	<0.0235 U	<0.216 U	<0.217 U	<0.222 U	NA
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Dieldrin	60-57-1	0.004	NS	ug/l	<0.00222 UJ	<0.00235 U	<0.00216 U	<0.00216 U	<0.00235 U	<0.00216 U	<0.00217 U	<0.00222 U	NA
Endosulfan Sulfate	1031-07-8	NS	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Endrin	72-20-8	0	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Endrin Aldehyde	7421-93-4	5	NS	ug/l	<0.0111 UJ	<0.0118 U	<0.0108 U	<0.0108 U	<0.0118 U	<0.0108 U	<0.0109 U	<0.0111 U	NA
Endrin Ketone	53494-70-5	5	NS	ug/l	<0.0111 UJ	<0.0118 U	<0.0108 U	<0.0108 U	<0.0118 U	<0.0108 U	<0.0109 U	<0.0111 U	NA
Gamma Bhc (Lindane)	58-89-9	0.05	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Gamma-Chlordane	5566-34-7	NS	NS	ug/l	<0.0111 UJ	<0.0118 U	<0.0108 U	<0.0108 UJ	<0.0118 U	<0.0108 UJ	<0.0109 UJ	<0.0111 UJ	NA
Heptachlor	76-44-8	0.04	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Heptachlor Epoxide	1024-57-3	0.03	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 U	<0.00471 U	<0.00432 U	<0.00435 U	<0.00444 U	NA
Methoxychlor	72-43-5	35	NS	ug/l	<0.00444 UJ	<0.00471 U	<0.00432 U	<0.00432 UJ	<0.00471 U	<0.00432 UJ	<0.00435 UJ	<0.00444 UJ	NA
Toxaphene	8001-35-2	0.06	NS	ug/l	<0.111 UJ	<0.118 U	<0.108 U	<0.108 U	<0.118 U	<0.108 U	<0.109 U	<0.111 U	NA
Herbicides													
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	35	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	50	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silvex (2,4,5-Tp)	93-72-1	0.26	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyl													
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	ug/l	<0.0556 U	<0.0588 U	<0.0541 U	<0.0541 U	<0.0588 U	<0.0541 U	<0.0543 U	<0.0556 U	NA
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	ug/l	<0.0556 U	<0.0588 U	<0.0541 U	<0.0541 U	<0.0588 U	<0.0541 U	<0.0543 U	<0.0556 U	NA
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	ug/l	<0.0556 U	<0.0588 U	<0.0541 U	<0.0541 U	<0.0588 U	<0.0541 U	<0.0543 U	<0.0556 U	NA
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	ug/l	<0.0556 U	<0.0588 U	<0.0541 U	<0.0541 U	<0.0588 U	<0.0541 U	<0.0543 U	<0.0556 U	NA
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	ug/l	<0.0556 U	<0.0588 U	<0.0541 U	<0.0541 U	<0.0588 U	<0.0541 U	<0.0543 U	<0.0556 U	NA
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	ug/l	<0.0556 U	<0.0588 U	<0.0541 U	<0.0541 U	<0.0588 U	<0.0541 U	<0.0543 U	<0.0556 U	NA
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	ug/l	<0.0556 U	<0.0588 U	<0.0541 U	<0.0541 U	<0.0588 U	<0.0541 U	<0.0543 U	<0.0556 U	NA
Total PCBs	1336-36-3	0.09	NS	ug/l	<0.0556 U	<0.0588 U	<0.0541 U	<0.0541 U	<0.0588 U	<0.0541 U	<0.0543 U	<0.0556 U	NA
Metals - Dissolved													
Aluminum	7429-90-5	NS	NS	ug/l	<55.6 U	<55.6 U	<55.6 U	<55.6 U	<55.6 U	<55.6 U	<71.1 U	<60.8 U	NA
Antimony	7440-36-0	3	NS	ug/l	1.36	1.88	2.01	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	NA
Arsenic	7440-38-2	25	NS	ug/l	6.3	1.79	1.52	2.29	<1.11 U	<1.11 U	3.99	4.66	NA
Barium	7440-39-3	1000	NS	ug/l	104	204	204	188	285	425	217	208	NA
Beryllium	7440-41-7	3	NS	ug/l	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 U	<0.333 UJ	NA
Cadmium	7440-43-9	5	NS	ug/l	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	NA
Calcium	7440-70-2	NS	NS	ug/l	178,000	203,000	206,000	212,000	193,000	282,000	160,000	161,000	NA
Chromium, Total	7440-47-3	50	NS	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	NA
Cobalt	7440-48-4	NS	NS	ug/l	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	NA
Copper	7440-50-8	200	NS	ug/l	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<22.2 U	<22.2 U	NA
Iron	7439-89-6	**300**	NS	ug/l	<278 U	<278 U	<278 U	<278 U	<278 U	<278 U	<278 U	<278 U	NA
Lead	7439-92-1	25	NS	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	NA
Magnesium	7439-95-4	35000	NS	ug/l	13,500	15,200	15,600	16,100	17,000	28,400	17,100	16,200	NA
Manganese	7439-96-5	300	NS	ug/l	**745**	191	232	**441**	**684**	**1,660**	**938**	**786**	NA
Mercury	7439-97-6	0.7	NS	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	NA
Nickel	7440-02-0	100	NS	ug/l	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	NA
Potassium	9/7/7440	NS	NS	ug/l	27,200	39,900	39,400	39,700 B	34,200	43,000 B	71,300 B	70,500 B	NA
Selenium	7782-49-2	**10**	NS	ug/l	7.92	**10.2**	8.21	<1.11 U	5.81	<1.11 U	<1.11 U	<1.11 U	NA
Silver	7440-22-4	50	NS	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	NA
Sodium	7440-23-5	**20000**	NS	ug/l	**312,000**	**1,380,000**	**1,370,000**	**678,000**	**1,480,000 D**	**1,000,000**	**273,000**	**271,000**	NA
Thallium	7440-28-0	0.5	NS	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	NA
Vanadium	7440-62-2	NS	NS	ug/l	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	NA
Zinc	7440-66-6	2000	NS	ug/l	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U	NA
Metals - Total													
Aluminum	7429-90-5	NS	NS	ug/l	506	40,100	51,100	<55.6 U	276	<55.6 U	2,560 J	21,700 J	23,600 D
Antimony	7440-36-0	3	NS	ug/l	1.24	2.97	2.84	<1.11 U	<1.11 U	<1.11 U	<1.11 U	1.38	<1.11 UJ
Arsenic	7440-38-2	25	NS	ug/l	9.13	15.1	18.7	3.61	1.24	<1.11 U	7.92 J	15 J	10.7 J
Barium	7440-39-3	1000	NS	ug/l	132	471	523	207	314	463	274 J	526 J	**1,930 D**
Beryllium	7440-41-7	3	NS	ug/l	<0.333 U	0.718	0.718	<0.333 U	<0.333 U	<0.333 U	<0.333 U	0.423 J	**4.81 J**
Cadmium	7440-43-9	5	NS	ug/l	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 U	<0.556 UJ
Calcium	7440-70-2	NS	NS	ug/l	159,000	213,000	214,000	206,000	188,000	276,000	169,000	195,000	400,000 D
Chromium, Hexavalent	18540-29-9	50	NS	ug/l	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Chromium, Total	7440-47-3	NS	NS	ug/l	<5.56 U	56.2	72.9	<5.56 U	<5.56 U	<5.56 U	6.54 J	43.3 J	<55.6 U
Chromium, Trivalent	16065-83-1	NS	NS	ug/l	<10 U	56.2	72.9	<10 U	<10 U	<10 U	<10 U	43.3	NA
Cobalt	7440-48-4	NS	NS	ug/l	<4.44 U	23.8	30.6	<4.44 U	<4.44 U	<4.44 U	<4.44 UJ	17.6 J	NA
Copper	7440-50-8	200	NS	ug/l	<22.2 U	95	119	<22.2 U	<22.2 U	<22.2 U	<22.2 UJ	86.4 J	<33.3 U
Cyanide	57-12-5	200	NS	ug/l	NA	NA	NA	<10 U	NA	<10 U	<10 U	<10 U	NA
Iron	7439-89-6	**300**	NS	ug/l	**2,440**	**51,000**	**64,400**	**1,280**	**1,630**	**2,500**	**6,790 J**	**40,400 J**	**93,100 D**
Lead	7439-92-1	**25**	NS	ug/l	**151**	**313**	**335**	<5.56 U	<5.56 U	<5.56 U	**49.7 J**	**472 J**	**92.8 D**
Magnesium	7439-95-4	35000	NS	ug/l	11,900	20,100	22,300	16,500	17,500	28,700	18,300	22,900	27,100 D
Manganese	7439-96-5	300	NS	ug/l	**726**	**1,050**	**1,190**	**455**	**808**	**1,710**	**1,210**	**1,590**	**7,470 D**
Mercury	7439-97-6	0.7	NS	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 UJ	**1 J**	<0.2 U
Molybdenum	7439-98-7	NS	NS	ug/l	NA	NA	NA	NA	NA	NA	NA	NA	1.13
Nickel	7440-02-0	100	NS	ug/l	<11.1 U	36.4 J	51 J	<11.1 U	<11.1 U	<11.1 U	<11.1 UJ	27.1 J	<55.6 U
Potassium	9/7/7440	NS	NS	ug/l	25,300 B	45,700 B	46,200 B	36,800 B	34,800 B	38,200 B	64,800 B	67,400 B	29,800 J
Selenium	7782-49-2	**10**	NS	ug/l	9.29	**60**	**71.4**	<1.11 U	8.23	<3.34 U	<1.14 U	<3.19 U	**28.7 J**
Silver	7440-22-4	50	NS	ug/l	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<55.6 U
Sodium	7440-23-5	**20000**	NS	ug/l	**299,000**	**1,320,000**	**1,310,000**	**717,000 J**	**1,660,000 E**	**988,000 J**	**282,000 J**	**277,000 J**	**779,000 BD**
Thallium	7440-28-0	0.5	NS	ug/l	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 UJ
Vanadium	7440-62-2	NS	NS	ug/l	<11.1 U	88.2	105	<11.1 U	<11.1 U	<11.1 U	<11.1 UJ	52.9 J	217 D
Zinc	7440-66-6	2000	NS	ug/l	<27.8 U	315	364	<27.8 U	<27.8 U	<27.8 U	40.2 J	239 J	730 D

Table 4
Site Management Plan
Groundwater Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	NYSDEC SGVs	NYSDEC Guidance Values	Location	LMW-8	LMW-9	LMW-9	LMW-9	LMW-10	LMW-10	LMW-11	LMW-11	TW-2
				Sample Name	LMW-8_20180712	LMW-9_20180712	DUP-7_20180712	LMW-9_20210212	LMW-10_20180712	LMW-10_20210212	LMW-11_20210212	DUP-1_20210212	TW-2_20172111
				Sample Date	12/7/2018	12/7/2018	12/7/2018	2/12/2021	12/7/2018	2/12/2021	2/12/2021	2/12/2021	11/21/2017
				Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
Perfluorooctanoic acids													
N-ethyl perfluorooctane- sulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
N-methyl perfluorooctane- sulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	0.0084	NA	NA
Perfluorobutanoic acid (PFBA)	375-22-4	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	0.0263	NA	NA
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	0.0175	NA	NA
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	0.0127	NA	NA
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	0.0181	NA	NA
Perfluorononanoic Acid (PFNA)	375-95-1	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	0.00305	NA	NA
Perfluorooctanesulfonamide (FOSA)	754-91-6	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	NS	0.01	ug/l	NA	NA	NA	NA	NA	NA	0.0675	NA	NA
Perfluorooctanoic Acid (PFOA)	335-67-1	NS	0.01	ug/l	NA	NA	NA	NA	NA	NA	0.0454	NA	NA
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	0.022	NA	NA
Perfluorotetradecanoic Acid (PFTA)	376-06-7	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2) (8:2FTS)	39108-34-4	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.002 U	NA	NA
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2) (6:2FTS)	27619-97-2	NS	0.1	ug/l	NA	NA	NA	NA	NA	NA	<0.005 U	NA	NA

Table 4
Site Management Plan
Groundwater Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	NYSDEC SGVs	NYSDEC Guidance Values	Location	TW-2	TW-3	LMW-12	LMW-8	LMW-9	LMW-10	LMW-11	LMW-11
				Sample Name	DUP-2_20172111	TW-3_20172111	095_LMW-12	101_LMW-8	099_LMW-9	100_LMW-10	093_LMW-11	094_DUP-1
				Sample Date	11/21/2017	11/21/2017	11/1/2021	11/2/2021	11/2/2021	11/2/2021	11/1/2021	11/1/2021
				Unit	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds												
1,1,1,2-Tetrachloroethane	630-20-6	5	NS	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
1,1,1-Trichloroethane	71-55-6	5	NS	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
1,1,2,2-Tetrachloroethane	79-34-5	5	NS	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
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	5	NS	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
1,1,2-Trichloroethane	79-00-5	1	NS	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
1,1-Dichloroethane	75-34-3	5	NS	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
1,1-Dichloroethene	75-35-4	5	NS	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
1,1-Dichloropropene	563-58-6	5	NS	ug/l	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2,3-Trichlorobenzene	87-61-6	5	NS	ug/l	<0.2 UJ	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2,3-Trichloropropane	96-18-4	**0.04**	NS	ug/l	<0.2 U	<0.2 U	**3.47**	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2,4-Trichlorobenzene	120-82-1	5	NS	ug/l	<0.2 UJ	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2,4-Trimethylbenzene	95-63-6	5	NS	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
1,2-Dibromo-3-Chloropropane	96-12-8	**0.04**	NS	ug/l	<0.2 U	<0.2 U	**29.9**	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	0.0006	NS	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
1,2-Dichlorobenzene	95-50-1	3	NS	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
1,2-Dichloroethane	107-06-2	**0.6**	NS	ug/l	<0.2 U	<0.2 U	**0.66**	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2-Dichloropropane	78-87-5	1	NS	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
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	5	NS	ug/l	<0.2 U	<0.2 U	0.21 J	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,3-Dichlorobenzene	541-73-1	3	NS	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
1,3-Dichloropropane	142-28-9	5	NS	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
1,4-Dichlorobenzene	106-46-7	3	NS	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
1,4-Diethyl Benzene	105-05-5	NS	NS	ug/l	<0.2 U	<0.2 U	NA	NA	NA	NA	NA	NA
1,4-Dioxane (P-Dioxane)	123-91-1	NS	1	ug/l	<40 UJ	<40 UJ	<40 U	<40 U	<40 U	<40 U	<40 U	<40 U
2,2-Dichloropropane	594-20-7	5	NS	ug/l	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
2-Chlorotoluene	95-49-8	5	NS	ug/l	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
2-Hexanone (MBK)	591-78-6	50	NS	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
4-Chlorotoluene	106-43-4	5	NS	ug/l	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
4-Ethyltoluene	622-96-8	NS	NS	ug/l	<0.2 U	<0.2 U	NA	NA	NA	NA	NA	NA
Acetone	67-64-1	50	NS	ug/l	<2.41 U	**65.2 J**	1.03 J	<1 U	<2 U	<2 U	<1 U	1.33 J
Acrolein	107-02-8	5	NS	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
Acrylonitrile	107-13-1	5	NS	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
Benzene	71-43-2	1	NS	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
Bromobenzene	108-86-1	5	NS	ug/l	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Bromochloromethane	74-97-5	5	NS	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
Bromodichloromethane	75-27-4	50	NS	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
Bromoform	75-25-2	50	NS	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
Bromomethane	74-83-9	5	NS	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
Carbon Disulfide	75-15-0	60	NS	ug/l	<0.2 U	0.26 J	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Carbon Tetrachloride	56-23-5	5	NS	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
Chlorobenzene	108-90-7	5	NS	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
Chloroethane	75-00-3	5	NS	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
Chloroform	67-66-3	7	NS	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
Chloromethane	74-87-3	5	NS	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
Cis-1,2-Dichloroethene	156-59-2	5	NS	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
Cis-1,3-Dichloropropene	10061-01-5	0.4	NS	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
Cyclohexane	110-82-7	NS	NS	ug/l	<0.2 U	<0.2 U	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Dibromochloromethane	124-48-1	50	NS	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
Dibromomethane	74-95-3	5	NS	ug/l	<0.2 U	<0.2 U	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Dichlorodifluoromethane	75-71-8	5	NS	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
Ethylbenzene	100-41-4	5	NS	ug/l	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Hexachlorobutadiene	87-68-3	0.5	NS	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
Isopropylbenzene (Cumene)	98-82-8	5	NS	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
M,P-Xylene	179601-23-1	5	NS	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
Methyl Acetate	79-20-9	NS	NS	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
Methyl Ethyl Ketone (2-Butanone)	78-93-3	50	NS	ug/l	<0.2 UJ	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	0.57	<0.2 U	<0.2 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	NS	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
Methylcyclohexane	108-87-2	NS	NS	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
Methylene Chloride	75-09-2	5	NS	ug/l	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
n-Butylbenzene	104-51-8	5	NS	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
n-Propylbenzene	103-65-1	5	NS	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
o-Xylene (1,2-Dimethylbenzene)	95-47-6	5	NS	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
p-Cymene (p-Isopropyltoluene)	CYMP	NS	NS	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.28 J	<0.2 U	<0.2 U
Sec-Butylbenzene	135-98-8	5	NS	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
Styrene	100-42-5	5	NS	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
T-Butylbenzene	98-06-6	5	NS	ug/l	<0.2 U	<0.2 U	<0.2 UJ	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Tert-Butyl Alcohol	75-65-0	NS	NS	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
Tert-Butyl Methyl Ether	1634-04-4	10	NS	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
Tetrachloroethene (PCE)	127-18-4	5	NS	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
Toluene	108-88-3	5	NS	ug/l	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.22 J	<0.2 U	<0.2 U
Total Xylenes	1330-20-7	5	NS	ug/l	<0.6 U	<0.6 U	<0.6 U	<0.6 U	<0.6 U	<0.6 U	<0.6 U	<0.6 U
Trans-1,2-Dichloroethene	156-60-5	5	NS	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
Trans-1,3-Dichloropropene	10061-02-6	0.4	NS	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
Trichloroethene (TCE)	79-01-6	5	NS	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
Trichlorofluoromethane	75-69-4	5	NS	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
Vinyl Acetate	108-05-4	NS	NS	ug/l	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Vinyl Chloride	75-01-4	2	NS	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

Table 4
Site Management Plan
Groundwater Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	NYSDEC SGVs	NYSDEC Guidance Values	Location	TW-2	TW-3	LMW-12	LMW-8	LMW-9	LMW-10	LMW-11	LMW-11
				Sample Name	DUP-2_20172111	TW-3_20172111	095_LMW-12	101_LMW-8	099_LMW-9	100_LMW-10	093_LMW-11	094_DUP-1
				Sample Date	11/21/2017	11/21/2017	11/1/2021	11/2/2021	11/2/2021	11/2/2021	11/1/2021	11/1/2021
				Unit	Result	Result	Result	Result	Result	Result	Result	Result
Semi-Volatile Organic Compounds												
1,2,4,5-Tetrachlorobenzene	95-94-3	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
1,2,4-Trichlorobenzene	120-82-1	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
1,2-Dichlorobenzene	95-50-1	3	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
1,2-Diphenylhydrazine	122-66-7	0	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
1,3-Dichlorobenzene	541-73-1	3	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
1,4-Dichlorobenzene	106-46-7	3	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
1,4-Dioxane (P-Dioxane)	123-91-1	NS	1	ug/l	NA	NA	<0.3 U	<0.3 U	<0.3 U	<0.3 U	<0.3 U	<0.3 U
2,3,4,6-Tetrachlorophenol	58-90-2	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2,4,5-Trichlorophenol	95-95-4	NS	NS	ug/l	<1.92 UJ	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2,4,6-Trichlorophenol	88-06-2	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2,4-Dichlorophenol	120-83-2	1	NS	ug/l	<1.92 UJ	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2,4-Dimethylphenol	105-67-9	1	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2,4-Dinitrophenol	51-28-5	1	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2,4-Dinitrotoluene	121-14-2	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2,6-Dinitrotoluene	606-20-2	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2-Chloronaphthalene	91-58-7	10	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2-Chlorophenol	95-57-8	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2-Methylnaphthalene	91-57-6	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2-Methylphenol (o-Cresol)	95-48-7	NS	NS	ug/l	<1.92 UJ	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2-Nitroaniline	88-74-4	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
2-Nitrophenol	88-75-5	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
3,3'-Dichlorobenzidine	91-94-1	5	NS	ug/l	<1.92 UJ	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
3-Nitroaniline	99-09-2	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
4,6-Dinitro-2-Methylphenol	534-52-1	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
4-Bromophenyl Phenyl Ether	101-55-3	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
4-Chloro-3-Methylphenol	59-50-7	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
4-Chloroaniline	106-47-8	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
4-Chlorophenyl Phenyl Ether	7005-72-3	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
4-Nitroaniline	100-01-6	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
4-Nitrophenol	100-02-7	NS	NS	ug/l	<3.85 UJ	NA	<5.71 U	<5.56 U	<5.88 U	<5.13 U	<5.88 U	<5.41 U
Acenaphthene	83-32-9	20	NS	ug/l	1.22	NA	<0.0571 U	<0.0556 U	<0.0588 U	0.338	<0.0588 U	<0.0541 U
Acenaphthylene	208-96-8	NS	NS	ug/l	0.0385	NA	<0.0571 U	<0.0556 U	<0.0588 U	<0.0513 U	<0.0588 U	<0.0541 U
Acetophenone	98-86-2	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Alpha-Terpineol	98-55-5	NS	NS	ug/l	<3.85 U	NA	NA	NA	NA	NA	NA	NA
Aniline (Phenylamine, Aminobenzene)	62-53-3	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Anthracene	120-12-7	50	NS	ug/l	0.346	NA	<0.0571 U	<0.0556 U	<0.0588 U	0.113	<0.0588 U	<0.0541 U
Atrazine	1912-24-9	7.5	NS	ug/l	<0.385 U	NA	<0.571 U	<0.556 U	<0.588 U	<0.513 U	<0.588 U	<0.541 U
Benzaldehyde	100-52-7	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Benzidine	92-87-5	5	NS	ug/l	<3.85 U	NA	<5.71 U	<5.56 U	<5.88 U	<5.13 U	<5.88 U	<5.41 U
Benzo(a)anthracene	56-55-3	0.002	NS	ug/l	**0.0615 J**	NA	<0.0571 U	<0.0556 U	<0.0588 U	<0.0513 U	<0.0588 U	<0.0541 U
Benzo(a)pyrene	50-32-8	0	NS	ug/l	<0.0385 U	NA	<0.0571 U	<0.0556 U	<0.0588 U	<0.0513 U	<0.0588 U	<0.0541 U
Benzo(b)fluoranthene	205-99-2	0.002	NS	ug/l	<0.0385 U	NA	<0.0571 U	<0.0556 U	<0.0588 U	<0.0513 U	<0.0588 U	<0.0541 U
Benzo(g,h,i)Perylene	191-24-2	NS	NS	ug/l	<0.0385 U	NA	<0.0571 U	<0.0556 U	<0.0588 U	<0.0513 U	<0.0588 U	<0.0541 U
Benzo(k)fluoranthene	207-08-9	0.002	NS	ug/l	<0.0385 U	NA	<0.0571 U	<0.0556 U	<0.0588 U	<0.0513 U	<0.0588 U	<0.0541 U
Benzoic Acid	65-85-0	NS	NS	ug/l	<19.2 UJ	NA	<2.86 U	<2.78 U	<2.94 UJ	<2.56 UJ	<2.94 U	<2.7 U
Benzyl Alcohol	100-51-6	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Benzyl Butyl Phthalate	85-68-7	50	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Biphenyl (Diphenyl)	92-52-4	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Bis(2-chloroethoxy) methane	111-91-1	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	111-44-4	1	NS	ug/l	<0.769 U	NA	<1.14 U	<1.11 U	<1.18 U	<1.03 U	<1.18 U	<1.08 U
Bis(2-chloroisopropyl) ether	108-60-1	5	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Bis(2-ethylhexyl) phthalate	117-81-7	5	NS	ug/l	0.477	NA	<0.571 U	<0.556 U	<0.659 U	<1.52 U	<0.588 U	<0.541 U
Caprolactam	105-60-2	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Carbazole	86-74-8	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Chrysene	218-01-9	0.002	NS	ug/l	**0.0538 J**	NA	<0.0571 U	<0.0556 U	<0.0588 U	<0.0513 U	<0.0588 U	<0.0541 U
Dibenz(a,h)anthracene	53-70-3	NS	NS	ug/l	<0.0385 U	NA	<0.0571 U	<0.0556 U	<0.0588 U	<0.0513 U	<0.0588 U	<0.0541 U
Dibenzofuran	132-64-9	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Dibutyl phthalate	84-74-2	50	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Diethyl phthalate	84-66-2	50	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Dimethyl phthalate	131-11-3	50	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Dioctyl phthalate	117-84-0	50	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Fluoranthene	206-44-0	50	NS	ug/l	0.538	NA	0.0571	<0.0556 U	<0.0588 U	0.0718	<0.0588 U	<0.0541 U
Fluorene	86-73-7	50	NS	ug/l	0.323	NA	<0.0571 U	<0.0556 U	<0.0588 U	0.123	<0.0588 U	<0.0541 U
Hexachlorobenzene	118-74-1	0.04	NS	ug/l	<0.0154 U	NA	<0.0229 U	<0.0222 U	<0.0235 U	<0.0205 U	<0.0235 U	<0.0216 U
Hexachlorobutadiene	87-68-3	0.5	NS	ug/l	<0.385 U	NA	<0.571 U	<0.556 U	<0.588 U	<0.513 U	<0.588 U	<0.541 U
Hexachlorocyclopentadiene	77-47-4	5	NS	ug/l	<3.85 UJ	NA	<5.71 U	<5.56 UJ	<5.88 U	<5.13 U	<5.88 U	<5.41 U
Hexachloroethane	67-72-1	5	NS	ug/l	<0.385 U	NA	<0.571 U	<0.556 U	<0.588 U	<0.513 U	<0.588 U	<0.541 U
Indeno(1,2,3-cd)pyrene	193-39-5	0.002	NS	ug/l	<0.0385 U	NA	<0.0571 U	<0.0556 U	<0.0588 U	<0.0513 U	<0.0588 U	<0.0541 U
Isophorone	78-59-1	50	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Naphthalene	91-20-3	10	NS	ug/l	0.1	NA	<0.0571 U	0.0667	<0.0588 U	0.0513	<0.0588 U	<0.0541 U
Nitrobenzene	98-95-3	0.4	NS	ug/l	<0.192 U	NA	<0.286 U	<0.278 U	<0.294 U	<0.256 U	<0.294 U	<0.27 U
n-Nitrosodimethylamine	62-75-9	NS	NS	ug/l	<0.385 U	NA	<0.571 UJ	<0.556 UJ	<0.588 UJ	<0.513 UJ	<0.588 UJ	<0.541 UJ
n-Nitrosodi-N-Propylamine	621-64-7	NS	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
n-Nitrosodiphenylamine	86-30-6	50	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Pentachlorophenol	87-86-5	1	NS	ug/l	<0.192 U	NA	<0.286 U	<0.278 U	<0.294 U	<0.256 U	<0.294 U	<0.27 U
Phenanthrene	85-01-8	50	NS	ug/l	1.1	NA	<0.0571 U	<0.0556 U	<0.0588 U	0.164	<0.0588 U	<0.0541 U
Phenol	108-95-2	1	NS	ug/l	<1.92 U	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U
Pyrene	129-00-0	50	NS	ug/l	0.623	NA	0.0571	0.0889	0.0824	0.0615	<0.0588 U	<0.0541 U
Pyridine	110-86-1	50	NS	ug/l	NA	NA	<2.86 U	<2.78 U	<2.94 U	<2.56 U	<2.94 U	<2.7 U

Table 4
Site Management Plan
Groundwater Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	NYSDEC SGVs	NYSDEC Guidance Values	Location	TW-2	TW-3	LMW-12	LMW-8	LMW-9	LMW-10	LMW-11	LMW-11
				Sample Name	DUP-2_20172111	TW-3_20172111	095_LMW-12	101_LMW-8	099_LMW-9	100_LMW-10	093_LMW-11	094_DUP-1
				Sample Date	11/21/2017	11/21/2017	11/1/2021	11/2/2021	11/2/2021	11/2/2021	11/1/2021	11/1/2021
				Unit	Result	Result	Result	Result	Result	Result	Result	Result
Pesticides												
4,4'-DDD	72-54-8	0.3	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
4,4'-DDE	72-55-9	0.2	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
4,4'-DDT	50-29-3	0.2	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Aldrin	309-00-2	0	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Alpha BHC (Alpha Hexachlorocyclohexane)	319-84-6	0.01	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Alpha Chlordane	5103-71-9	NS	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Alpha Endosulfan	959-98-8	NS	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Beta Bhc (Beta Hexachlorocyclohexane)	319-85-7	0.04	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Beta Endosulfan	33213-65-9	NS	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Chlordane (alpha and gamma)	57-74-9	0.05	NS	ug/l	NA	NA	<0.216 U	<0.216 U	<0.229 U	<0.229 U	<0.222 U	<0.235 U
Delta Bhc (Delta Hexachlorocyclohexane)	319-86-8	0.04	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Dieldrin	60-57-1	0.004	NS	ug/l	NA	NA	<0.00216 U	<0.00216 U	<0.00229 U	<0.00229 U	<0.00222 U	<0.00235 U
Endosulfan Sulfate	1031-07-8	NS	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Endrin	72-20-8	0	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Endrin Aldehyde	7421-93-4	5	NS	ug/l	NA	NA	<0.0108 U	<0.0108 U	<0.0114 U	<0.0114 U	<0.0111 U	<0.0118 U
Endrin Ketone	53494-70-5	5	NS	ug/l	NA	NA	<0.0108 U	<0.0108 U	<0.0114 U	<0.0114 U	<0.0111 U	<0.0118 U
Gamma Bhc (Lindane)	58-89-9	0.05	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Gamma-Chlordane	5566-34-7	NS	NS	ug/l	NA	NA	<0.0108 U	<0.0108 U	<0.0114 U	<0.0114 U	<0.0111 U	<0.0118 U
Heptachlor	76-44-8	0.04	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Heptachlor Epoxide	1024-57-3	0.03	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Methoxychlor	72-43-5	35	NS	ug/l	NA	NA	<0.00432 U	<0.00432 U	<0.00457 U	<0.00457 U	<0.00444 U	<0.00471 U
Toxaphene	8001-35-2	0.06	NS	ug/l	NA	NA	<0.108 U	<0.108 U	<0.114 U	<0.114 U	<0.111 U	<0.118 U
Herbicides												
2,4,5-T (Trichlorophenoxyacetic Acid)	93-76-5	35	NS	ug/l	NA	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
2,4-D (Dichlorophenoxyacetic Acid)	94-75-7	50	NS	ug/l	NA	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Silvex (2,4,5-Tp)	93-72-1	0.26	NS	ug/l	NA	NA	<5 U	<5 U	<5 U	<5 U	<5 U	<5 U
Polychlorinated Biphenyl												
PCB-1016 (Aroclor 1016)	12674-11-2	NS	NS	ug/l	NA	NA	<0.0541 U	<0.0541 U	<0.0571 U	<0.0571 U	<0.0556 U	<0.0588 U
PCB-1221 (Aroclor 1221)	11104-28-2	NS	NS	ug/l	NA	NA	<0.0541 U	<0.0541 U	<0.0571 U	<0.0571 U	<0.0556 U	<0.0588 U
PCB-1232 (Aroclor 1232)	11141-16-5	NS	NS	ug/l	NA	NA	<0.0541 U	<0.0541 U	<0.0571 U	<0.0571 U	<0.0556 U	<0.0588 U
PCB-1242 (Aroclor 1242)	53469-21-9	NS	NS	ug/l	NA	NA	<0.0541 U	<0.0541 U	<0.0571 U	<0.0571 U	<0.0556 U	<0.0588 U
PCB-1248 (Aroclor 1248)	12672-29-6	NS	NS	ug/l	NA	NA	<0.0541 U	<0.0541 U	<0.0571 U	<0.0571 U	<0.0556 U	<0.0588 U
PCB-1254 (Aroclor 1254)	11097-69-1	NS	NS	ug/l	NA	NA	<0.0541 U	<0.0541 U	<0.0571 U	<0.0571 U	<0.0556 U	<0.0588 U
PCB-1260 (Aroclor 1260)	11096-82-5	NS	NS	ug/l	NA	NA	<0.0541 U	<0.0541 U	<0.0571 U	<0.0571 U	<0.0556 U	<0.0588 U
Total PCBs	1336-36-3	0.09	NS	ug/l	NA	NA	<0.0541 U	<0.0541 U	<0.0571 U	<0.0571 U	<0.0556 U	<0.0588 U
Metals - Dissolved												
Aluminum	7429-90-5	NS	NS	ug/l	NA	NA	78.6	<55.6 U	<55.6 U	<67.5 U	<55.6 U	<55.6 U
Antimony	7440-36-0	3	NS	ug/l	NA	NA	<1.11 UJ	1.3 J	<1.11 UJ	<1.11 UJ	<1.11 UJ	<1.11 UJ
Arsenic	7440-38-2	25	NS	ug/l	NA	NA	4.98	3.2	3.44	4.31	3.09	2.97
Barium	7440-39-3	1000	NS	ug/l	NA	NA	121	123	98.9	50.7	84	84.3
Beryllium	7440-41-7	3	NS	ug/l	NA	NA	<0.333 U	<0.333 UJ	<0.333 U	<0.333 U	<0.333 U	<0.333 U
Cadmium	7440-43-9	5	NS	ug/l	NA	NA	<0.556 UJ	<0.556 UJ	<0.556 UJ	<0.556 UJ	<0.556 UJ	<0.556 UJ
Calcium	7440-70-2	NS	NS	ug/l	NA	NA	99,200 J	151,000 J	104,000 J	48,400 J	58,100 J	58,300 J
Chromium, Total	7440-47-3	50	NS	ug/l	NA	NA	<5.56 U	14.6	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Cobalt	7440-48-4	NS	NS	ug/l	NA	NA	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U
Copper	7440-50-8	200	NS	ug/l	NA	NA	<22.2 U	26.8	<22.2 U	<22.2 U	<22.2 U	<22.2 U
Iron	7439-89-6	**300**	NS	ug/l	NA	NA	<278 U	<278 U	<278 U	285	<278 U	**2,290**
Lead	7439-92-1	25	NS	ug/l	NA	NA	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Magnesium	7439-95-4	35000	NS	ug/l	NA	NA	9,930	8,960	7,410	2,010	5,560	5,560
Manganese	7439-96-5	300	NS	ug/l	NA	NA	16.3	<5.56 U	105	50.5	203	217
Mercury	7439-97-6	0.7	NS	ug/l	NA	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Nickel	7440-02-0	100	NS	ug/l	NA	NA	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Potassium	9/7/7440	NS	NS	ug/l	NA	NA	44,200 B	37,400 B	30,100 B	32,800 B	56,300 B	56,000 B
Selenium	7782-49-2	**10**	NS	ug/l	NA	NA	2.69	**31.6 J**	<1.11 U	<1.11 U	1.59	2.14
Silver	7440-22-4	50	NS	ug/l	NA	NA	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Sodium	7440-23-5	**20000**	NS	ug/l	NA	NA	**504,000**	**113,000**	**530,000**	**302,000**	**71,400**	**70,400**
Thallium	7440-28-0	0.5	NS	ug/l	NA	NA	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Vanadium	7440-62-2	NS	NS	ug/l	NA	NA	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Zinc	7440-66-6	2000	NS	ug/l	NA	NA	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U
Metals - Total												
Aluminum	7429-90-5	NS	NS	ug/l	20,600 D	NA	1,160	<55.6 U	89	97.2	313	164
Antimony	7440-36-0	3	NS	ug/l	<1.11 UJ	NA	2.03	1.51 J	<1.11 UJ	<1.11 UJ	1.55	1.53
Arsenic	7440-38-2	25	NS	ug/l	9.57 J	NA	5.85 J	3.23	3.45	4.53	3.62	3.49
Barium	7440-39-3	1000	NS	ug/l	**1,700 D**	NA	154	130	104	53.5	91	74.9
Beryllium	7440-41-7	3	NS	ug/l	**4.54**	NA	<0.333 UJ	<0.333 UJ	<0.333 U	<0.333 U	<0.333 U	<0.333 U
Cadmium	7440-43-9	5	NS	ug/l	<0.556 UJ	NA	<0.556 U	<0.556 UJ	<0.556 UJ	<0.556 UJ	<0.556 U	<0.556 U
Calcium	7440-70-2	NS	NS	ug/l	346,000 D	NA	99,700	155,000	106,000	48,500	59,100	18,000
Chromium, Hexavalent	18540-29-9	50	NS	ug/l	<10 U	NA	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Chromium, Total	7440-47-3	NS	NS	ug/l	<55.6 U	NA	<5.56 U	12.5	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Chromium, Trivalent	16065-83-1	NS	NS	ug/l	NA	NA	<10 U	12.5	<10 U	<10 U	<10 U	<10 U
Cobalt	7440-48-4	NS	NS	ug/l	NA	NA	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U	<4.44 U
Copper	7440-50-8	200	NS	ug/l	<33.3 U	NA	22.5	27.7	<22.2 U	<22.2 U	<22.2 U	<22.2 U
Cyanide	57-12-5	200	NS	ug/l	NA	NA	<10 U	<10 U	<10 U	<10 U	<10 U	<10 U
Iron	7439-89-6	**300**	NS	ug/l	**80,100 D**	NA	**1,600**	<278 U	<278 U	**432**	**1,000**	**375**
Lead	7439-92-1	**25**	NS	ug/l	**78.9 D**	NA	**59.4**	7.01	<5.56 U	<5.56 U	7.31	<5.56 U
Magnesium	7439-95-4	35000	NS	ug/l	23,200 D	NA	9,250	8,870	7,180	1,930	5,240	3,520
Manganese	7439-96-5	300	NS	ug/l	**6,490 D**	NA	42.3	6.3	106	51.2	220	15.5
Mercury	7439-97-6	0.7	NS	ug/l	<0.2 U	NA	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Molybdenum	7439-98-7	NS	NS	ug/l	1.29	NA	NA	NA	NA	NA	NA	NA
Nickel	7440-02-0	100	NS	ug/l	<55.6 U	NA	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Potassium	9/7/7440	NS	NS	ug/l	28,400 J	NA	41,400	39,200	29,500	30,900	53,600	5,620
Selenium	7782-49-2	**10**	NS	ug/l	**23.1 J**	NA	1.89	**35.1 J**	1.65	1.31	<1.11 U	<1.11 U
Silver	7440-22-4	50	NS	ug/l	<55.6 U	NA	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Sodium	7440-23-5	**20000**	NS	ug/l	**718,000 BD**	NA	**468,000**	**102,000**	**521,000**	**288,000**	**68,400**	**55,300**
Thallium	7440-28-0	0.5	NS	ug/l	<1.11 U	NA	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U	<1.11 U
Vanadium	7440-62-2	NS	NS	ug/l	182 D	NA	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U	<11.1 U
Zinc	7440-66-6	2000	NS	ug/l	610 D	NA	31.8	<27.8 U	<27.8 U	<27.8 U	<27.8 U	<27.8 U

Table 4
Site Management Plan
Groundwater Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	NYSDEC SGVs	NYSDEC Guidance Values	Location	TW-2	TW-3	LMW-12	LMW-8	LMW-9	LMW-10	LMW-11	LMW-11
				Sample Name	DUP-2_20172111	TW-3_20172111	095_LMW-12	101_LMW-8	099_LMW-9	100_LMW-10	093_LMW-11	094_DUP-1
				Sample Date	11/21/2017	11/21/2017	11/1/2021	11/2/2021	11/2/2021	11/2/2021	11/1/2021	11/1/2021
				Unit	Result	Result	Result	Result	Result	Result	Result	Result
Perfluorooctanoic acids												
N-ethyl perfluorooctane- sulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	NS	0.1	ug/l	NA	NA	<0.00185 U	<0.00192 U	<0.00185 U	0.0388	0.00613	0.00407
N-methyl perfluorooctane- sulfonamidoacetic Acid (NMeFOSAA)	2355-31-9	NS	0.1	ug/l	NA	NA	<0.00185 U	<0.00192 U	<0.00185 U	0.0051	<0.00192 U	<0.00185 U
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	NS	0.1	ug/l	NA	NA	0.00842	0.00927	0.00591	0.00545	0.00338	0.00255
Perfluorobutanoic acid (PFBA)	375-22-4	NS	0.1	ug/l	NA	NA	0.0291	0.0472	0.0225	0.0229	0.0219	0.0257
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	NS	0.1	ug/l	NA	NA	<0.00185 U	<0.00192 U	<0.00185 U	0.00256	<0.00192 U	<0.00185 U
Perfluorodecanoic Acid (PFDA)	335-76-2	NS	0.1	ug/l	NA	NA	0.00198	<0.00192 U	<0.00185 U	0.00593	0.00226	0.00221
Perfluorododecanoic Acid (PFDoA)	307-55-1	NS	0.1	ug/l	NA	NA	<0.00185 U	<0.00192 U	<0.00185 U	<0.00185 U	<0.00192 U	<0.00185 U
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	NS	0.1	ug/l	NA	NA	<0.00185 U	0.00215	0.0021	<0.00185 U	0.00195	<0.00185 U
Perfluoroheptanoic acid (PFHpA)	375-85-9	NS	0.1	ug/l	NA	NA	0.0146	0.0217	0.0124	0.0176	0.0121	0.011
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	NS	0.1	ug/l	NA	NA	0.0145	0.0123	0.0114	0.00994	0.0077	0.0086
Perfluorohexanoic Acid (PFHxA)	307-24-4	NS	0.1	ug/l	NA	NA	0.0257	0.025	0.0177	0.0249	0.0129	0.0126
Perfluorononanoic Acid (PFNA)	375-95-1	NS	0.1	ug/l	NA	NA	0.00622	0.0053	0.00361	0.00556	0.00342	0.00287
Perfluorooctanesulfonamide (FOSA)	754-91-6	NS	0.1	ug/l	NA	NA	0.0112 J	<0.00192 UJ	0.00197 J	0.00509 J	0.00819 J	0.0087 J
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	NS	0.01	ug/l	NA	NA	0.0658	0.158	0.0747	0.189	0.181	0.18
Perfluorooctanoic Acid (PFOA)	335-67-1	NS	0.01	ug/l	NA	NA	0.0475	0.0668	0.0437	0.0497	0.031	0.0284
Perfluoropentanoic Acid (PFPeA)	2706-90-3	NS	0.1	ug/l	NA	NA	0.04	0.0248	0.0226	0.0217	0.0112	0.00911
Perfluorotetradecanoic Acid (PFTA)	376-06-7	NS	0.1	ug/l	NA	NA	<0.00185 U	<0.00192 U	<0.00185 U	<0.00185 U	<0.00192 U	<0.00185 U
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	NS	0.1	ug/l	NA	NA	<0.00185 U	<0.00192 U	<0.00185 U	<0.00185 U	<0.00192 U	<0.00185 U
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	NS	0.1	ug/l	NA	NA	<0.00185 U	<0.00192 U	<0.00185 U	0.0019	<0.00192 U	<0.00185 U
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2) (8:2FTS)	39108-34-4	NS	0.1	ug/l	NA	NA	<0.00185 U	<0.00192 U	<0.00185 U	<0.00185 U	<0.00192 U	<0.00185 U
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2) (6:2FTS)	27619-97-2	NS	0.1	ug/l	NA	NA	<0.00463 U	<0.00481 U	<0.00463 U	<0.00463 U	<0.00481 U	<0.00463 U

Table 4
Site Management Plan
Groundwater Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

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 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").
Groundwater sample analytical results are compared to the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs guidance document dated June 2021 and the 1,4-Dioxane value reflects the drinking water maximum contaminant level (MCL) adopted by New York State for public water systems (July 2020). Pursuant to Part 375-1.7(f)(2), the NYSDEC will treat the MCL as relevant and appropriate and will consider this value in remedy selection.
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).
The criteria comparison for total chromium is provided for reference. The promulgated SCO shown is for hexavalent chromium.

Qualifiers:
B - The analyte was found in the associated analysis batch blank.
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 reporting limit (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
10 - Result exceeds NYSDEC Guidance Values

Table 5
Site Management Plan
Sub-Slab Vapor and Indoor Air Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	NYSDOH AGVs	Location	LSV-09	LSV-09	LSV-10	LSV-11	LSV-12	LSV-12	AMBIENT-1	IA-1/LSV-14		
			Sample Name	002 LSV-9_20190509	005 DUP-1_20190509	003 LSV-10_20190508	004 LSV-11_20190508	LSV-12_20210212	DUP-1_20210212	079_AMBIENT-1	081_IA-1	082_LSV-14	083_DUP-1
			Sample Date	5/9/2019	5/9/2019	5/8/2019	5/8/2019	2/12/2021	2/12/2021	11/1/2021	11/1/2021	11/1/2021	11/1/2021
			Sample Type	SV	SV	SV	SV	SV	SV	AA	IA	SSV	SSV
			Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds													
1,1,1,2-Tetrachloroethane	630-20-6	NS	ug/m3	<0.99 U	<1 U	<10 U	<2.2 U	<1.04 U	<2.35 U	<0.549 U	<0.537 U	<1.11 U	<1.14 U
1,1,1-Trichloroethane	71-55-6	NS	ug/m3	<0.79 U	<0.82 U	<8.2 U	<1.8 U	<0.827 U	<1.87 U	<0.437 U	<0.427 U	<0.883 U	<0.907 U
1,1,2,2-Tetrachloroethane	79-34-5	NS	ug/m3	<0.99 U	<1 U	<10 U	<2.2 U	<1.04 U	<2.35 U	<0.549 U	<0.537 U	<1.11 U	<1.14 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	NS	ug/m3	<1.1 U	<1.2 U	<11 U	<2.5 U	<1.16 U	<2.62 U	<0.613 U	<0.599 U	<1.24 U	<1.27 U
1,1,2-Trichloroethane	79-00-5	NS	ug/m3	<0.79 U	<0.82 U	<8.2 U	<1.8 U	<0.827 U	<1.87 U	<0.437 U	<0.427 U	<0.883 U	<0.907 U
1,1-Dichloroethane	75-34-3	NS	ug/m3	<0.58 U	<0.61 U	<6.1 U	<1.3 U	<0.613 U	<1.38 U	<0.324 U	<0.317 U	<0.655 U	<0.673 U
1,1-Dichloroethene	75-35-4	NS	ug/m3	<0.14 U	<0.15 U	<1.5 U	<0.32 U	<0.3 U	<0.678 U	<0.159 U	<0.155 U	<0.321 U	<0.33 U
1,2,4-Trichlorobenzene	120-82-1	NS	ug/m3	<1.1 U	<1.1 U	<11 UJ	<2.4 U	<1.12 UJ	<2.54 UJ	<0.594 U	<0.58 U	<1.2 U	<1.23 U
1,2,4-Trimethylbenzene	95-63-6	NS	ug/m3	4.2 J	1.9 J	72 D	2.1 D	<0.745 U	<1.68 U	0.472 D	1.15 D	1.99 D	1.63 D
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	NS	ug/m3	<1.1 U	<1.2 U	<12 U	<2.5 U	<1.16 U	<2.63 U	<0.615 U	<0.601 U	<1.24 U	<1.28 U
1,2-Dichlorobenzene	95-50-1	NS	ug/m3	<0.87 U	<0.91 U	<9 U	<1.9 U	<0.911 U	<2.06 U	<0.481 U	<0.47 U	<0.973 U	<1 U
1,2-Dichloroethane	107-06-2	NS	ug/m3	<0.58 U	<0.61 U	<6.1 U	<1.3 U	<0.613 U	<1.38 U	<0.324 U	<0.316 U	<0.655 U	<0.673 U
1,2-Dichloropropane	78-87-5	NS	ug/m3	<0.67 U	<0.7 U	<6.9 U	<1.5 U	<0.7 U	<1.58 U	<0.37 U	<0.361 U	<0.748 U	<0.768 U
1,2-Dichlorotetrafluoroethane	76-14-2	NS	ug/m3	<1 U	<1.1 U	<10 U	<2.3 U	<1.06 U	<2.39 U	<0.559 U	<0.547 U	<1.13 U	<1.16 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	NS	ug/m3	1.1 D	<0.74 U	26 D	<1.6 U	<0.745 U	<1.68 U	<0.393 U	0.384 D	<0.796 U	<0.818 U
1,3-Butadiene	106-99-0	NS	ug/m3	<0.96 U	<1 U	<9.9 U	<2.1 U	<1.01 U	<2.27 U	<0.531 U	<0.519 U	<1.07 U	<1.1 U
1,3-Dichlorobenzene	541-73-1	NS	ug/m3	<0.87 U	<0.91 U	<9 U	<1.9 U	<0.911 U	<2.06 U	<0.481 U	<0.47 U	<0.973 U	<1 U
1,3-Dichloropropane	142-28-9	NS	ug/m3	<0.67 U	<0.7 U	<6.9 U	<1.5 U	<0.7 U	<1.58 U	<0.37 U	<0.361 U	<0.748 U	<0.769 U
1,4-Dichlorobenzene	106-46-7	NS	ug/m3	<0.87 U	<0.91 U	<9 U	<1.9 U	<0.911 U	<2.06 U	<0.481 U	<0.47 U	<0.973 U	<1 U
1,4-Dioxane (P-Dioxane)	123-91-1	NS	ug/m3	<1 U	<1.1 U	<11 U	<2.3 U	<1.09 U	<2.46 U	<0.577 U	<0.564 U	1.81 D	1.56 D
2-Hexanone (MBK)	591-78-6	NS	ug/m3	<1.2 U	<1.2 U	19 D	<2.6 U	<1.24 U	<2.8 U	<0.655 U	<0.641 U	<1.33 U	<1.36 U
4-Bromofluorobenzene	460-00-4	NS	ug/m3	9.3 BD	8.8 BD	9.3 BD	9.1 BD	NA	NA	NA	NA	NA	NA
4-Ethyltoluene	622-96-8	NS	ug/m3	2.5 J	1.3 J	32 D	1.6 D	<0.745 U	<1.68 U	0.433 D	0.884 D	1.75 D	1.47 D
Acetone	67-64-1	NS	ug/m3	18 J	4.2 J	1,500 D	560 D	3.49 J	9.34 J	5.93 D	14.8 D	105 D	101 D
Acrylonitrile	107-13-1	NS	ug/m3	<0.31 U	<0.33 U	<3.3 U	<0.7 U	<0.329 U	<0.742 U	<0.174 U	<0.17 U	<0.351 U	<0.361 U
Allyl Chloride (3-Chloropropene)	107-05-1	NS	ug/m3	<2.3 U	<2.4 U	<23 U	<5.1 U	<2.37 U	<5.35 U	<1.25 U	<1.22 U	<2.53 U	<2.6 U
Benzene	71-43-2	NS	ug/m3	<0.46 U	<0.48 U	<4.8 U	<1 U	0.92 J	80.4 J	0.588 D	0.824 D	6.05 D	6.11 D
Benzyl Chloride	100-44-7	NS	ug/m3	<0.75 U	<0.78 U	<7.8 U	<1.7 U	<0.784 U	<1.77 U	<0.414 U	<0.405 U	<0.838 U	<0.861 U
Bromodichloromethane	75-27-4	NS	ug/m3	2.3 J	3.3 J	<10 U	<2.2 U	<1.01 U	<2.29 U	<0.536 U	<0.524 U	<1.08 U	<1.11 U
Bromoethene	593-60-2	NS	ug/m3	<0.63 U	<0.66 U	<6.6 U	<1.4 U	<0.663 U	<1.5 U	<0.35 U	<0.342 U	<0.708 U	<0.727 U
Bromoform	75-25-2	NS	ug/m3	<1.5 U	<1.6 U	<15 U	<3.3 U	<1.57 U	<3.54 U	<0.827 U	<0.808 U	<1.67 U	<1.72 U
Bromomethane	74-83-9	NS	ug/m3	<0.56 U	<0.59 U	<5.8 U	<1.3 U	<0.588 U	<1.33 U	<0.311 U	<0.304 U	<0.629 U	<0.646 U
Carbon Disulfide	75-15-0	NS	ug/m3	7.6 J	12 J	53 D	2.1 D	<0.472 U	<1.07 U	<0.249 U	<0.244 U	76.8 D	82.1 D
Carbon Tetrachloride	56-23-5	NS	ug/m3	0.64 D	0.57 D	<2.4 U	0.81 D	0.286 D	<0.538 U	0.554 D	0.541 D	0.509 D	0.523 D
Chlorobenzene	108-90-7	NS	ug/m3	<0.66 U	<0.7 U	<6.9 U	<1.5 U	<0.697 U	<1.57 U	<0.368 U	<0.36 U	<0.745 U	<0.766 U
Chloroethane	75-00-3	NS	ug/m3	<0.38 U	<0.4 U	<4 U	<0.85 U	<0.4 U	<0.902 U	<0.211 U	<0.206 U	<0.427 U	<0.439 U
Chloroform	67-66-3	NS	ug/m3	44 D	52 D	13 D	<1.6 U	<0.74 UJ	6.35 J	<0.391 U	1.11 D	4.11 D	4.06 D
Chloromethane	74-87-3	NS	ug/m3	0.51 D	<0.31 U	<3.1 U	1.7 D	1.06 D	<0.706 U	1.47 D	1.34 D	1.17 J	0.859 J
Cis-1,2-Dichloroethene	156-59-2	NS	ug/m3	<0.14 U	<0.15 U	<1.5 U	<0.32 U	<0.3 U	<0.678 U	<0.159 U	<0.155 U	<0.321 U	<0.33 U
Cis-1,3-Dichloropropene	10061-01-5	NS	ug/m3	<0.65 U	<0.69 U	<6.8 U	<1.5 U	<0.688 U	<1.55 U	<0.363 U	<0.355 U	<0.735 U	<0.755 U
Cyclohexane	110-82-7	NS	ug/m3	<0.5 U	<0.52 U	6.2 D	3.3 D	<0.521 UJ	12.2 J	<0.275 U	<0.269 U	<0.557 U	<0.572 U
Dibromochloromethane	124-48-1	NS	ug/m3	<1.2 U	<1.3 U	<13 U	<2.8 U	<1.29 U	<2.91 U	<0.681 U	<0.666 U	<1.38 U	<1.42 U
Dichlorodifluoromethane	75-71-8	NS	ug/m3	2.4 J	2.3 J	<7.4 U	2.7 J	2.1 D	1.69 D	2.69 D	2.55 D	2.8 D	2.71 D
Ethyl Acetate	141-78-6	NS	ug/m3	<1 U	<1.1 U	<11 U	<2.3 U	<1.09 UJ	8.38 J	1.84 D	2.09 D	<1.17 U	<1.2 U
Ethylbenzene	100-41-4	NS	ug/m3	1.4 J	0.72 J	<6.5 U	<1.4 U	<0.658 U	<1.49 U	<0.347 U	0.543 D	1.34 D	1.3 D
Hexachlorobutadiene	87-68-3	NS	ug/m3	<1.5 U	<1.6 U	<16 U	<3.4 U	<1.62 U	<3.65 U	<0.853 U	<0.834 U	<1.73 U	<1.77 U
Isopropanol	67-63-0	NS	ug/m3	3.8 J	<0.74 UJ	66 D	21 D	2.68 J	11.3 J	3.85 D	17.5 D	17 D	17.1 D
M,P-Xylene	179601-23-1	NS	ug/m3	5.9 J	3.1 J	<13 U	3.2 D	<1.32 U	<2.97 U	1.18 D	2.65 D	5.55 D	5.34 D
Methyl Ethyl Ketone (2-Butanone)	78-93-3	NS	ug/m3	1.6 J	<0.45 UJ	45 D	3.7 D	0.491 D	1.21 D	0.92 D	1.22 D	15.8 D	15.1 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	NS	ug/m3	<0.59 U	<0.62 U	29 D	<1.3 U	<0.621 U	<1.4 U	<0.328 U	<0.32 U	0.73 D	<0.681 U
Methyl Methacrylate	80-62-6	NS	ug/m3	<0.59 U	<0.62 U	<6.1 U	<1.3 U	<0.62 U	<1.4 U	1.02 D	<0.32 UJ	0.795 D	<0.681 U
Methylene Chloride	75-09-2	60	ug/m3	4.4 J	<1 UJ	11 D	8.3 D	2.26 J	10.1 J	10.3 D	10.5 D	<1.12 U	<1.16 U
n-Heptane	142-82-5	NS	ug/m3	0.77 D	<0.62 U	<6.1 U	<1.3 U	<0.621 UJ	25.5 J	0.59 D	0.801 D	3.52 D	3.2 D
n-Hexane	110-54-3	NS	ug/m3	3.8 J	2 J	740 D	350 D	2.24 J	212 J	0.338 D	0.827 D	2.91 D	2.99 D
o-Xylene (1,2-Dimethylbenzene)	95-47-6	NS	ug/m3	2.1 J	1.1 J	<6.5 U	<1.4 U	<0.658 U	<1.48 U	0.382 D	1.02 D	2.53 D	2.46 D
Propylene	115-07-1	NS	ug/m3	<0.25 U	<0.26 U	<2.6 U	<0.56 U	<0.261 U	<0.589 U	<0.138 U	<0.135 U	<0.279 U	<0.286 U
Styrene	100-42-5	NS	ug/m3	<0.61 U	<0.64 U	<6.4 U	<1.4 U	<0.645 U	<1.46 U	<0.341 U	<0.333 U	1.66 D	1.56 D
Tert-Butyl Methyl Ether	1634-04-4	NS	ug/m3	<0.52 U	<0.54 U	<5.4 U	<1.2 U	<0.546 U	<1.23 U	<0.288 U	<0.282 U	<0.584 U	<0.6 U
Tetrachloroethene (PCE)	127-18-4	30	ug/m3	6.2 D	6.1 D	4.1 D	1.8 D	<1.03 U	<2.32 U	<0.543 U	0.583 D	1.76 D	1.92 D
Tetrahydrofuran	109-99-9	NS	ug/m3	<0.85 U	<0.89 U	<8.8 U	1.9 D	<0.894 U	<2.02 U	<0.472 U	0.669 D	8.64 D	7.95 D
Toluene	108-88-3	NS	ug/m3	2.9 J	1.7 J	11 D	3.7 D	0.913 J	41.1 J	2.14 D	3.01 D	5.67 D	5.7 D
Trans-1,2-Dichloroethene	156-60-5	NS	ug/m3	<0.57 U	<0.6 U	<5.9 U	<1.3 U	<0.601 U	<1.36 U	<0.317 U	<0.31 U	<0.642 U	<0.659 U
Trans-1,3-Dichloropropene	10061-02-6	NS	ug/m3	<0.65 U	<0.69 U	<6.8 U	<1.5 U	<0.688 U	<1.55 U	<0.363 U	<0.355 U	<0.735 U	<0.755 U
Trichloroethene (TCE)	79-01-6	2	ug/m3	0.31 J	0.57 J	<2 U	1.2 D	<0.204 U	<0.459 U	<0.107 U	<0.105 U	0.261 D	0.357 D
Trichlorofluoromethane	75-69-4	NS	ug/m3	1.7 D	1.5 D	<8.4 U	3.5 D	1.02 D	<1.92 U	1.62 D	1.98 D	2.91 D	2.9 D
Vinyl Acetate	108-05-4	NS	ug/m3	<0.51 U	<0.53 U	<5.3 U	<1.1 U	<0.533 U	<1.2 U	<0.282 U	<0.275 U	<0.57 U	<0.586 U
Vinyl Chloride	75-01-4	NS	ug/m3	<0.092 U	<0.097 U	<0.96 U	<0.21 U	<0.194 U	<0.437 U	<0.102 U	<0.0999 U	<0.207 U	<0.213 U

Table 5
Site Management Plan
Sub-Slab Vapor and Indoor Air Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Analyte	CAS Number	IA-2/LSV-15		IA-3/LSV-16			IA-4/LSV-17		IA-5/LSV-18		IA-6	LSV-13
		084_IA-2	085_LSV-15	086_IA-3	087_DUP-2	088_LSV-16	089_IA-4	090_LSV-17	091_IA-5	092_LSV-18	093_IA-6	080_LSV-13
		11/1/2021	11/1/2021	11/1/2021	11/1/2021	11/1/2021	11/1/2021	11/1/2021	11/1/2021	11/1/2021	11/1/2021	11/1/2021
		IA	SSV	IA	IA	SSV	IA	SSV	IA	SSV	IA	SSV
		Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Volatile Organic Compounds												
1,1,1,2-Tetrachloroethane	630-20-6	<0.517 U	<1.24 U	<0.569 U	<0.617 U	<0.997 U	<0.566 U	<1.38 U	<0.661 U	<1.03 U	<0.606 U	<1.01 U
1,1,1-Trichloroethane	71-55-6	<0.411 U	<0.986 U	<0.452 U	<0.491 U	<0.792 U	<0.45 U	<1.09 U	<0.525 U	<0.821 U	<0.482 U	11.7 D
1,1,2,2-Tetrachloroethane	79-34-5	<0.517 U	<1.24 U	<0.569 U	<0.617 U	<0.997 U	<0.566 U	<1.38 U	<0.661 U	<1.03 U	<0.606 U	<1.01 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	<0.577 U	<1.38 U	<0.635 U	<0.689 U	<1.11 U	<0.632 U	<1.54 U	0.738 D	<1.15 U	<0.677 U	<1.12 U
1,1,2-Trichloroethane	79-00-5	<0.411 U	<0.986 U	<0.452 U	<0.491 U	<0.792 U	<0.45 U	<1.09 U	<0.525 U	<0.821 U	<0.482 U	<0.8 U
1,1-Dichloroethane	75-34-3	<0.305 U	<0.731 U	<0.336 U	<0.364 U	<0.588 U	<0.334 U	<0.811 U	<0.39 U	<0.609 U	<0.357 U	<0.593 U
1,1-Dichloroethene	75-35-4	<0.149 U	<0.358 U	<0.164 U	<0.178 U	<0.288 U	<0.164 U	<0.397 U	<0.191 U	<0.298 U	<0.175 U	<0.291 U
1,2,4-Trichlorobenzene	120-82-1	<0.559 U	<1.34 U	<0.615 U	<0.667 U	<1.08 U	<0.612 U	<1.49 U	<0.715 U	<1.12 U	<0.655 U	<1.09 U
1,2,4-Trimethylbenzene	95-63-6	1.74 D	2.75 D	12.1 J	8.79 J	<0.714 U	0.811 D	32.4 D	0.473 D	2.59 D	0.738 D	6.49 D
1,2-Dibromoethane (Ethylene Dibromide)	106-93-4	<0.579 U	<1.39 U	<0.637 U	<0.691 U	<1.12 U	<0.634 U	<1.54 U	<0.74 U	<1.16 U	<0.678 U	<1.13 U
1,2-Dichlorobenzene	95-50-1	<0.453 U	<1.09 U	<0.498 U	<0.541 U	<0.873 U	<0.496 U	<1.2 U	<0.579 U	<0.905 U	<0.531 U	<0.881 U
1,2-Dichloroethane	107-06-2	<0.305 U	<0.731 U	<0.335 U	<0.364 U	<0.588 U	<0.334 U	<0.811 U	<0.39 U	<0.609 U	<0.357 U	1.19 D
1,2-Dichloropropane	78-87-5	<0.348 U	<0.835 U	<0.383 U	<0.415 U	<0.671 U	<0.381 U	<0.926 U	<0.445 U	<0.695 U	<0.408 U	<0.677 U
1,2-Dichlorotetrafluoroethane	76-14-2	<0.526 U	<1.26 U	<0.58 U	<0.628 U	<1.02 U	<0.577 U	<1.4 U	<0.673 U	<1.05 U	<0.617 U	<1.02 U
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	0.518 D	1.07 D	2.89 D	2.17 D	<0.714 U	<0.406 U	11.6 D	<0.473 U	1.11 D	<0.434 U	2.09 D
1,3-Butadiene	106-99-0	<0.5 U	<1.2 U	<0.55 U	<0.597 U	<0.964 U	<0.548 U	<1.33 U	<0.639 U	<0.999 U	<0.586 U	<0.973 U
1,3-Dichlorobenzene	541-73-1	<0.453 U	<1.09 U	<0.498 U	<0.541 U	<0.873 U	<0.496 U	<1.2 U	<0.579 U	<0.905 U	<0.531 U	<0.881 U
1,3-Dichloropropane	142-28-9	<0.348 U	<0.835 U	<0.383 U	<0.415 U	<0.671 U	<0.381 U	<0.926 U	<0.445 U	<0.696 U	<0.408 U	<0.677 U
1,4-Dichlorobenzene	106-46-7	<0.453 U	<1.09 U	<0.498 U	<0.541 U	<0.873 U	<0.496 U	<1.2 U	<0.579 U	<0.905 U	<0.531 U	<0.881 U
1,4-Dioxane (P-Dioxane)	123-91-1	<0.543 U	<1.3 U	<0.597 U	<0.648 U	<1.05 U	<0.595 U	<1.44 U	<0.694 U	<1.08 U	<0.636 U	<1.06 U
2-Hexanone (MBK)	591-78-6	<0.617 U	3.41 D	<0.679 U	<0.737 U	<1.19 U	<0.676 U	33.3 D	<0.789 U	<1.23 U	<0.723 U	<1.2 U
4-Bromofluorobenzene	460-00-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Ethyltoluene	622-96-8	1.18 D	2.31 D	7.5 J	5.08 J	<0.714 U	0.689 D	22.3 D	0.473 D	1.48 D	0.564 D	2.59 D
Acetone	67-64-1	9.68 D	187 D	15.9 D	20.3 D	8.52 D	23.2 D	1,100 D	7.87 D	35 D	18.3 D	64.3 D
Acrylonitrile	107-13-1	<0.163 U	0.431 D	<0.18 U	<0.195 U	<0.315 U	<0.179 U	<0.435 U	<0.209 U	<0.327 U	<0.192 U	<0.318 U
Allyl Chloride (3-Chloropropene)	107-05-1	<1.18 U	<2.83 U	<1.3 U	<1.41 U	<2.27 U	<1.29 U	<3.13 U	<1.51 U	<2.36 U	<1.38 U	<2.29 U
Benzene	71-43-2	0.65 D	1.67 D	0.609 D	0.546 D	<0.464 U	0.659 D	2.94 D	0.615 D	1.39 D	0.536 D	1.41 D
Benzyl Chloride	100-44-7	<0.39 U	<0.936 U	<0.429 U	<0.465 U	<0.752 U	<0.427 U	<1.04 U	<0.499 U	<0.779 U	<0.457 U	<0.759 U
Bromodichloromethane	75-27-4	<0.504 U	<1.21 U	<0.555 U	<0.602 U	3.6 D	<0.553 U	<1.34 U	<0.645 U	<1.01 U	<0.592 U	1.28 D
Bromoethene	593-60-2	<0.329 U	<0.79 U	<0.363 U	<0.393 U	<0.635 U	<0.361 U	<0.876 U	<0.421 U	<0.658 U	<0.386 U	<0.641 U
Bromoform	75-25-2	<0.778 U	<1.87 U	<0.857 U	<0.929 U	<1.5 U	<0.853 U	<2.07 U	<0.995 U	<1.56 U	<0.913 U	<1.52 U
Bromomethane	74-83-9	<0.292 U	<0.702 U	<0.322 U	<0.349 U	<0.564 U	<0.32 U	<0.778 U	<0.374 U	<0.584 U	<0.343 U	<0.569 U
Carbon Disulfide	75-15-0	<0.234 U	160 D	<0.258 U	<0.28 U	0.633 D	<0.257 U	11.7 D	<0.3 U	35.8 D	<0.275 U	2.78 D
Carbon Tetrachloride	56-23-5	0.568 D	0.455 D	0.678 D	0.679 D	0.548 D	0.675 D	0.63 D	0.606 D	0.568 D	0.556 D	0.461 D
Chlorobenzene	108-90-7	<0.347 U	<0.832 U	<0.382 U	<0.414 U	<0.668 U	<0.38 U	<0.922 U	<0.443 U	<0.693 U	<0.407 U	<0.675 U
Chloroethane	75-00-3	<0.199 U	<0.477 U	<0.219 U	<0.237 U	<0.383 U	<0.218 U	<0.528 U	<0.254 U	<0.397 U	<0.233 U	<0.387 U
Chloroform	67-66-3	1.4 D	1.94 D	2.67 D	2.9 D	44.6 D	1.77 D	2.64 D	0.752 D	1.91 D	1.64 D	7.66 D
Chloromethane	74-87-3	1.32 D	<0.373 U	1.16 D	1.52 J	<0.3 U	1.36 D	1.86 J	1.43 D	0.404 D	1.95 D	0.696 D
Cis-1,2-Dichloroethene	156-59-2	<0.149 U	0.43 D	<0.164 U	<0.178 U	<0.288 U	<0.164 U	<0.397 U	<0.191 U	<0.298 U	<0.175 U	<0.291 U
Cis-1,3-Dichloropropene	10061-01-5	<0.342 U	<0.82 U	<0.376 U	<0.408 U	<0.659 U	<0.374 U	<0.909 U	<0.437 U	<0.683 U	<0.401 U	<0.665 U
Cyclohexane	110-82-7	<0.259 U	0.746 D	0.285 D	<0.309 U	<0.5 U	<0.284 U	0.896 D	<0.331 U	<0.518 U	0.304 D	8.12 D
Dibromochloromethane	124-48-1	<0.641 U	<1.54 U	<0.706 U	<0.766 U	<1.24 U	<0.703 U	<1.71 U	<0.82 U	<1.28 U	<0.752 U	<1.25 U
Dichlorodifluoromethane	75-71-8	2.57 D	2.77 D	2.58 D	2.71 D	2.73 D	2.65 D	2.67 D	2.76 D	2.9 D	2.66 D	2.61 D
Ethyl Acetate	141-78-6	2.63 D	<1.3 U	1.46 D	1.13 D	<1.05 U	2.38 D	<1.44 U	1.56 D	<1.08 U	1.21 D	<1.06 U
Ethylbenzene	100-41-4	0.817 D	1.73 D	5.44 J	3.08 J	<0.631 U	0.466 D	3.83 D	<0.418 U	<0.654 U	0.537 D	6.62 D
Hexachlorobutadiene	87-68-3	<0.803 U	<1.93 U	<0.884 U	<0.959 U	<1.55 U	<0.88 U	<2.14 U	<1.03 U	<1.61 U	<0.942 U	<1.56 U
Isopropanol	67-63-0	22.9 D	5.91 D	23 D	21.4 D	<0.714 U	45.7 D	17.2 D	46.9 D	3.18 D	5.86 D	3.6 D
M,P-Xylene	179601-23-1	3.79 D	7.22 D	23.6 J	14.3 J	<1.26 U	1.93 D	16.4 D	1.13 D	2.16 D	2.03 D	10.9 D
Methyl Ethyl Ketone (2-Butanone)	78-93-3	1.15 D	36.7 D	2.86 D	2.47 D	1.54 D	2.43 D	45.5 D	0.824 D	5.24 D	3.8 D	5.4 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	<0.308 U	2.96 D	<0.34 U	<0.368 U	<0.595 U	<0.338 U	14.2 D	<0.394 U	<0.617 U	<0.362 U	<0.601 U
Methyl Methacrylate	80-62-6	<0.308 U	1.18 D	<0.339 UJ	0.883 J	<0.594 U	1.62 D	0.902 D	<0.394 U	1.6 D	0.904 D	0.96 D
Methylene Chloride	75-09-2	<0.523 U	<1.26 U	2.16 J	7.31 J	<1.01 U	8.86 D	<1.39 U	<0.669 U	13.2 D	6.47 D	<1.02 U
n-Heptane	142-82-5	1.02 D	2 D	1.46 D	1.47 D	<0.595 U	1.93 D	9.61 D	0.513 D	0.925 D	5.14 D	17.6 D
n-Hexane	110-54-3	0.398 D	1.27 D	0.321 D	<0.317 U	<0.512 U	0.523 D	7.62 D	0.339 D	<0.53 U	0.342 D	5.94 D
o-Xylene (1,2-Dimethylbenzene)	95-47-6	1.37 D	3.37 D	7.81 J	4.76 J	<0.63 U	0.645 D	7.13 D	0.46 D	0.849 D	0.613 D	5.28 D
Propylene	115-07-1	<0.13 U	<0.311 U	<0.143 U	<0.155 U	<0.25 U	<0.142 U	<0.345 U	<0.166 U	<0.259 U	<0.152 U	<0.252 U
Styrene	100-42-5	0.449 D	1.77 D	<0.353 U	<0.383 U	<0.619 U	<0.351 U	1.96 D	<0.41 U	<0.641 U	<0.376 U	<0.624 U
Tert-Butyl Methyl Ether	1634-04-4	<0.271 U	9.45 D	<0.299 U	<0.324 U	<0.523 U	<0.297 U	<0.722 U	<0.347 U	<0.543 U	<0.318 U	<0.529 U
Tetrachloroethene (PCE)	127-18-4	<0.511 U	1.47 D	3.37 D	3.35 D	4.14 D	0.839 D	2.99 D	<0.653 U	<1.02 U	3.35 D	1.89 D
Tetrahydrofuran	109-99-9	0.555 D	5.6 D	0.758 D	<0.53 U	1.07 D	0.73 D	10.5 D	<0.568 U	1.11 D	15 D	<0.865 U
Toluene	108-88-3	2.04 D	30.2 D	4.31 D	4.81 D	<0.547 U	6.25 D	17 D	1.45 D	2.5 D	3.59 D	18.1 D
Trans-1,2-Dichloroethene	156-60-5	<0.299 U	<0.716 U	<0.329 U	<0.356 U	<0.576 U	<0.327 U	<0.794 U	<0.382 U	<0.597 U	<0.35 U	<0.581 U
Trans-1,3-Dichloropropene	10061-02-6	<0.342 U	<0.82 U	<0.376 U	<0.408 U	<0.659 U	<0.374 U	<0.909 U	<0.437 U	<0.683 U	<0.401 U	<0.665 U
Trichloroethene (TCE)	79-01-6	<0.101 U	0.388 D	<0.111 U	<0.121 U	<0.195 U	0.177 D	0.431 D	0.155 D	<0.202 U	<0.119 U	0.315 D
Trichlorofluoromethane	75-69-4	2.2 D	6.7 D	2.61 D	2.63 D	1.63 D	3.11 D	4.61 D	1.89 D	1.78 D	13.9 D	1.81 D
Vinyl Acetate	108-05-4	<0.265 U	<0.636 U	<0.292 U	<0.317 U	<0.511 U	<0.29 U	<0.705 U	<0.339 U	<0.53 U	<0.311 U	<0.516 U
Vinyl Chloride	75-01-4	<0.0962 U	<0.231 U	<0.106 U	<0.115 U	<0.186 U	<0.105 U	<0.256 U	<0.123 U	<0.192 U	<0.113 U	<0.187 U

Table 5
Site Management Plan
Sub-Slab Vapor and Indoor Air Sample Analytical Results

550 Tenth Avenue Filling Station Site
New York, New York
NYSDEC BCP Site No.: C231148
Langan Project No.: 100674402

Notes:
AA - Ambient Air
IA - Indoor Air
SSV - Sub-slab Soil Vapor
CAS - Chemical Abstract Service
NS - No standard
ug/m3 - microgram per cubic meter
NA - Not analyzed
RL - Reporting limit
<RL - Not detected
Indoor air sample analytical results are compared to the New York State Department of Health (NYSDOH) Air Guideline Values (AGVs) as set forth in the NYSDOH October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York and subsequent updates (2013, 2015).
Ambient air sample analytical results are shown for reference only.
NYSDOH Air Guideline Values (AGVs) as set forth in the New York State Department of Health (NYSDOH) October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York and subsequent updates (2013, 2015) are shown for reference only.

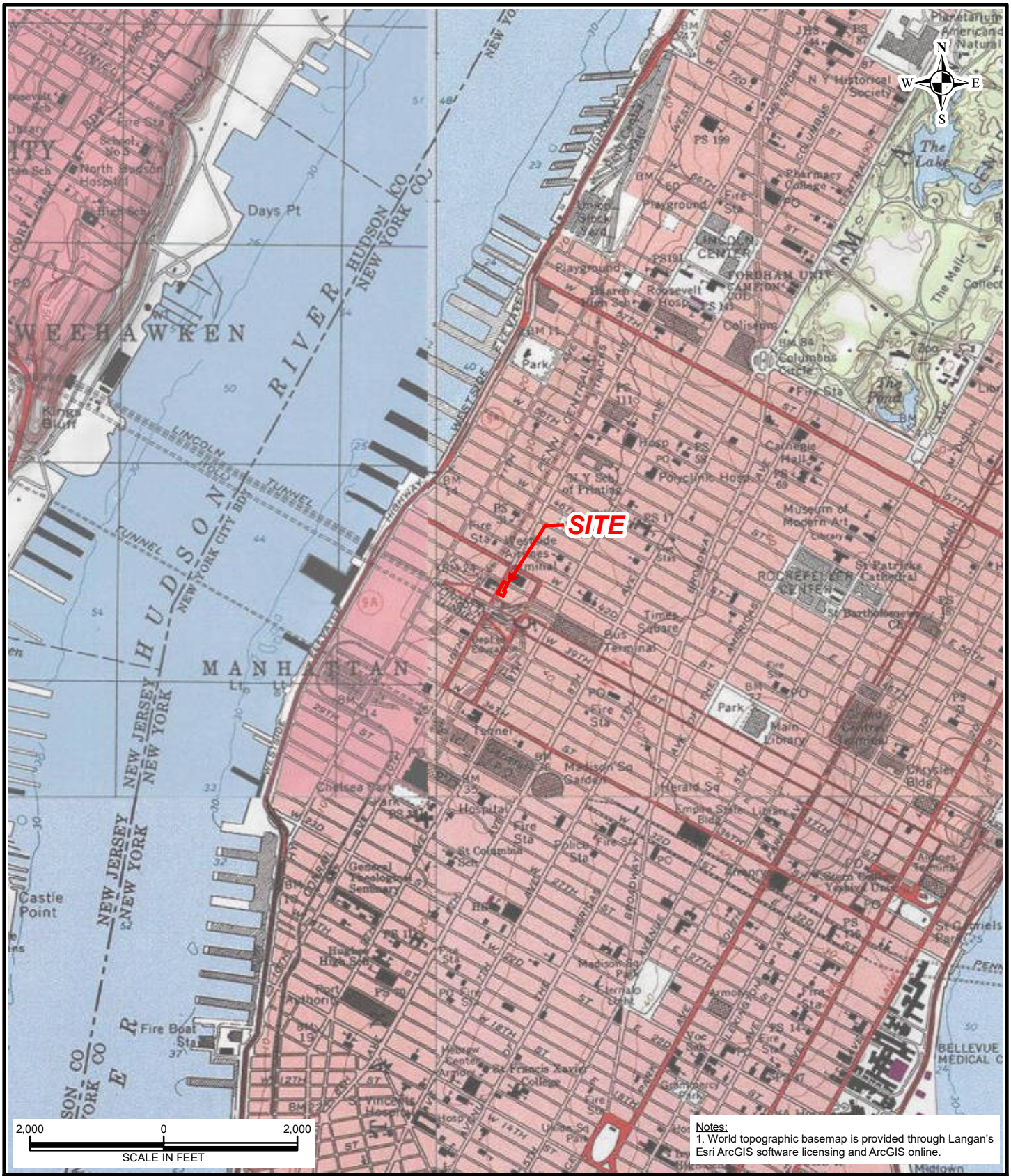
Qualifiers:
D - The concentration reported is a result of a diluted sample.
J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.

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.

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 NYSDOH AGVs

FIGURES



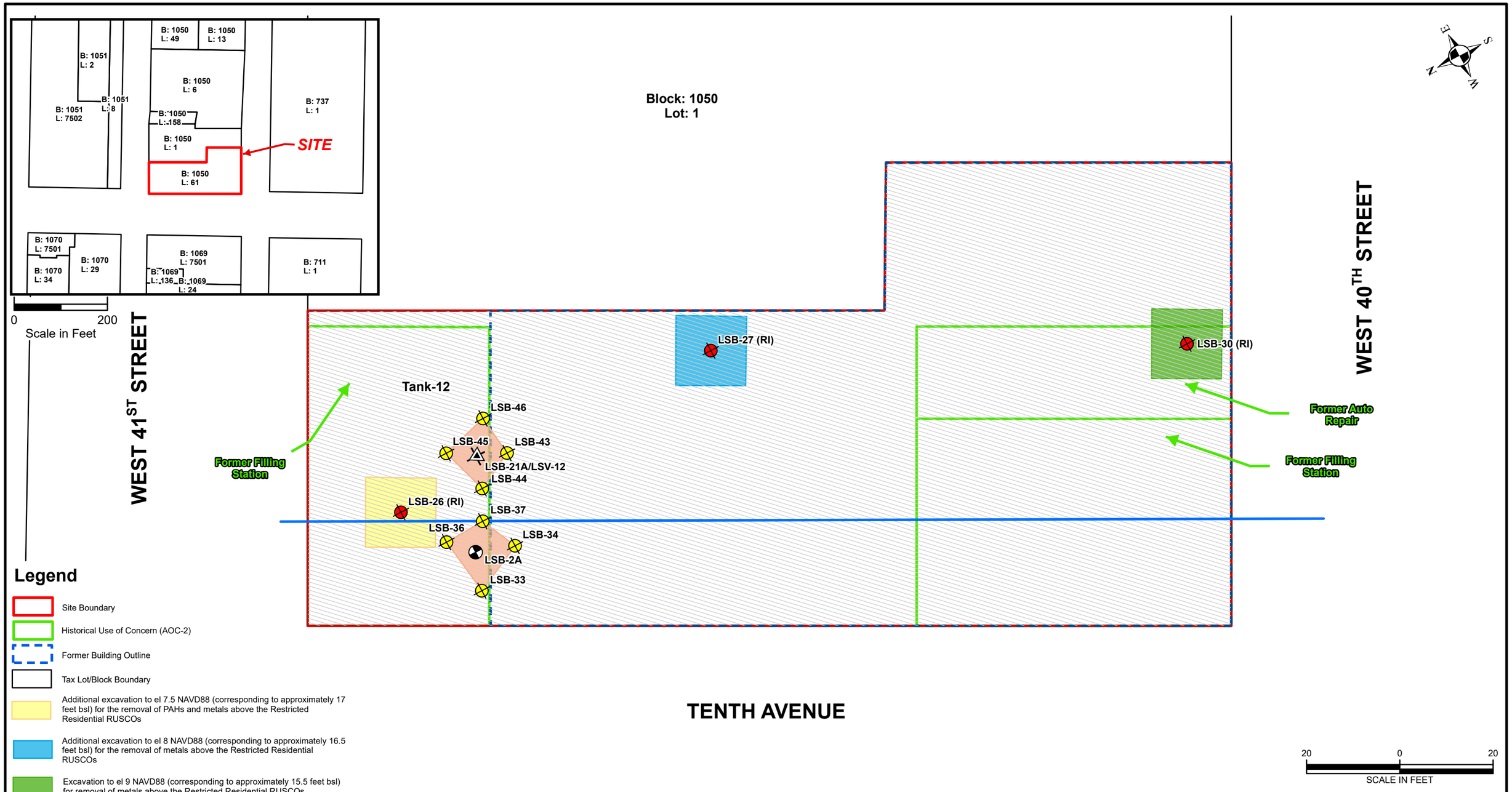
LANGAN
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Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
550 TENTH AVENUE
FILLING STATION SITE
BCP Site No. C231148
BLOCK No. 1050
LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
SITE LOCATION MAP

Project No.	100674402
Date	12/20/2021
Scale	1"=2,000'
Drawn By	IHB
Submission Date	1/7/2022
Figure	1

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Legend

- Site Boundary
- Historical Use of Concern (AOC-2)
- Former Building Outline
- Tax Lot/Block Boundary
- Additional excavation to el 7.5 NAVD88 (corresponding to approximately 17 feet bsl) for the removal of PAHs and metals above the Restricted Residential RUSCOs
- Additional excavation to el 8 NAVD88 (corresponding to approximately 16.5 feet bsl) for the removal of metals above the Restricted Residential RUSCOs
- Excavation to el 9 NAVD88 (corresponding to approximately 15.5 feet bsl) for removal of metals above the Restricted Residential RUSCOs
- Excavation to el 5.5 NAVD88 (corresponding to approximately 19 feet bsl) for removal of hazardous lead and elevated lead above the Restricted Residential RUSCOs
- Cross Section A-A'
- RI Soil Boring Location
- Soil Boring Location (February 2021)
- Soil Boring/Soil Vapor Location (February 2021)
- Hazardous Lead Delineation Soil Boring Location

Notes:
1. Tax parcel data provided by the New York City Department of City Planning, MapPLUTO 22V3.
2. Former building outline provided in Covenant House Building Massing and Stacking, 8 May 2017, by F X Fowle, Denham, Wolf and CH Phase 2 plan, 14 July 2018, by Handel Architects, LLP.
3. Historical filling station and automobile repair locations obtained from Sanborn Fire Insurance Maps provided in the Phase I Environmental Site Assessment prepared by TRC Engineers, Inc., dated September 2015.
4. AOC-1 consists of contaminated fill material, which is present throughout the site.

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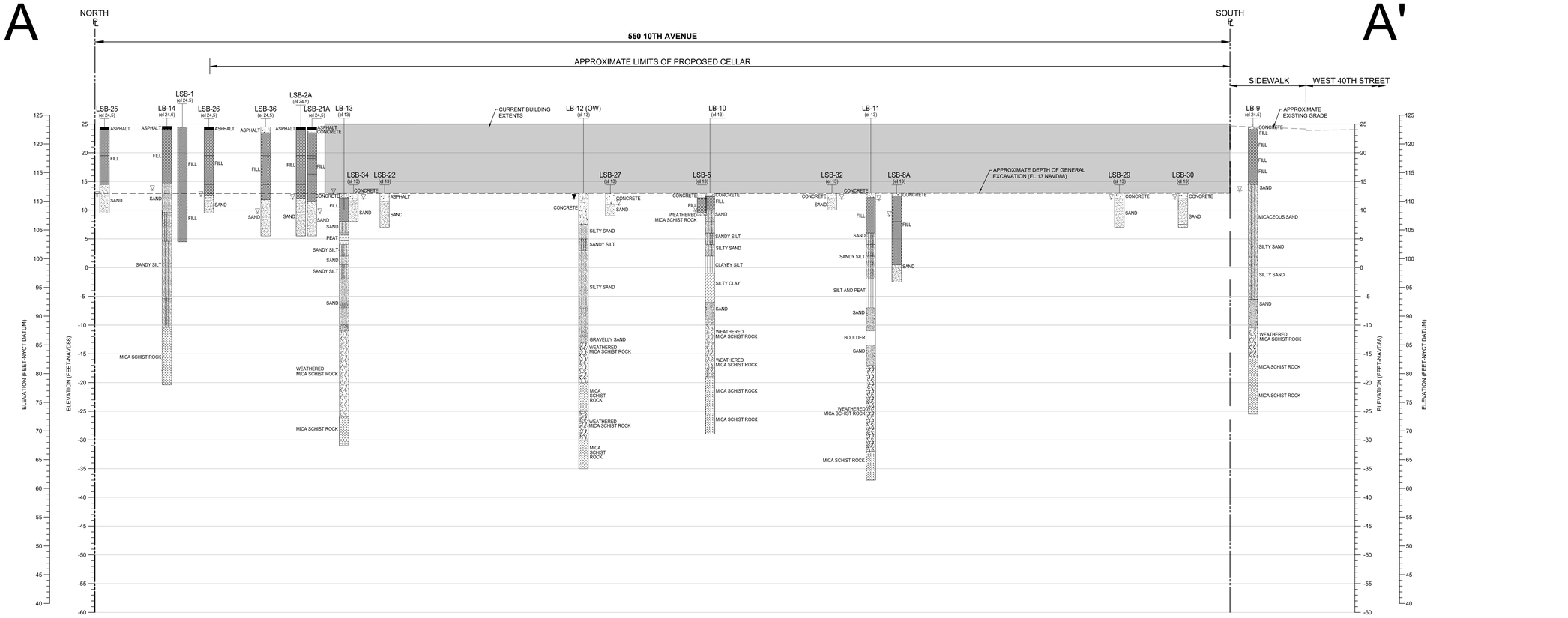
Project
550 TENTH AVENUE
FILLING STATION SITE
BCP Site No. C231148
BLOCK No. 1050,
LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
SITE PLAN

Project No.	100674402
Date	5/17/2023
Scale	1"=20'
Drawn By	IHB/PDT
Last Revised	12/11/2023
Figure	2

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Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\APRX\1A\Figure 1A.aprx



SUBSURFACE PROFILE A-A

SCALE: 1" = 8'

LEGEND:

- ASPHALT
- CONCRETE
- SANDY SILT
- SAND
- SILT
- WEATHERED MICA SCHIST ROCK
- MICA SCHIST ROCK
- FILL
- CLAY
- VOID SPACE
- PEAT

B BORING IDENTIFICATION

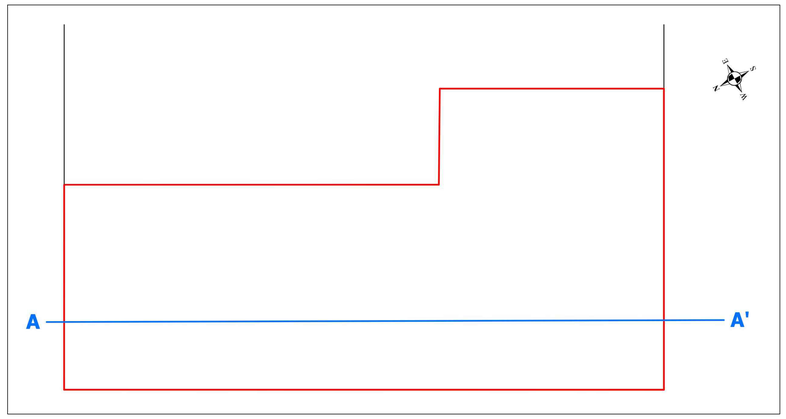
(el XX) INFERRED GROUND SURFACE ELEVATION AT THE TIME OF BORING

GROUNDWATER LEVEL OBSERVED IN GROUNDWATER LEVEL OBSERVATION WELL

GROUNDWATER LEVEL OBSERVED DURING DRILLING

NOTES:

1. THIS PROFILE REPRESENTS A GENERALIZED SOIL AND ROCK CROSS-SECTION INTERPRETED FROM WIDELY SPACED BORINGS. SOIL, ROCK, AND GROUNDWATER MAY VARY IN TYPE, LOCATION, ELEVATION, AND ENVIRONMENTAL AND ENGINEERING PROPERTIES BETWEEN POINTS OF EXPLORATION. VARIATIONS IN SUBSURFACE CONDITIONS SHOULD BE EXPECTED BETWEEN BORINGS.
2. ALL BORING LOCATIONS ARE APPROXIMATE.
3. ALL ELEVATIONS ARE APPROXIMATE AND ARE IN REFERENCE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) UNLESS OTHERWISE NOTED.



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, TO ALTER THIS ITEM IN ANY WAY.

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Langan CT, Inc.
Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
550 TENTH AVENUE FILLING STATION SITE
BCP Site No. C231148
BLOCK No. 150, LOT No. 61
MANHATTAN
NEW YORK COUNTY **NEW YORK**

Drawing Title
PRE-EXCAVATION SUBSURFACE PROFILE A-A

Project No.	Drawing No.
100674401	3
Date: 01/04/2022	
Scale: AS SHOWN	
Drawn By: PL / Checked By: NS	
Submission Date	

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Filename: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\CAD\Sheetfiles\Figure 7 - Subsurface Profile_ENV.dwg Date: 12/11/2023 Time: 13:04 User: ibaker Style Table: Langan.stb Layout: FIG 3

Location	EPB01
Sample Name	EPB01_17.5-18
Sample Date	12/12/2022
Sample Depth	17.5-18
VOCs	
Acetone	**0.061**
SVOCs	
Benzo(a)anthracene	0.783 D
Benzo(a)pyrene	0.72 D
Benzo(b)fluoranthene	0.628 D
Benzo(k)fluoranthene	0.586 D
Chrysene	0.775 D
Dibenz(a,h)anthracene	0.119 D
Indeno(1,2,3-cd)pyrene	0.451 D
Pesticides	
4,4'-DDE	<0.00195 U
PCBs	
Total PCBs	0.0254
Metals	
Chromium, Trivalent	**33.3**
Copper	34.1
Lead	**105**
Mercury	0.153
Nickel	24.3
Zinc	97

Location	EPB10
Sample Name	EPB10_13.5-14
Sample Date	12/15/2022
Sample Depth	13.5-14
VOCs	
Acetone	**0.81 J**
SVOCs	
Benzo(a)anthracene	0.306 D
Benzo(a)pyrene	0.3 D
Benzo(b)fluoranthene	0.248 D
Benzo(k)fluoranthene	0.242 D
Chrysene	0.322 D
Dibenz(a,h)anthracene	0.0852 JD
Indeno(1,2,3-cd)pyrene	0.192 D
Pesticides	
4,4'-DDE	<0.00191 U
PCBs	
Total PCBs	0.0315
Metals	
Chromium, Trivalent	25.7
Copper	31.5
Lead	**264**
Mercury	**0.22**
Nickel	20
Zinc	85.3

Location	EPB02	EPB02
Sample Name	EPB02_17.5-18	DUP02_20221213
Sample Date	12/13/2022	12/13/2022
Sample Depth	17.5-18	17.5-18
VOCs		
Acetone	**0.43 E**	**0.24**
SVOCs		
Benzo(a)anthracene	0.112 J	0.376 J
Benzo(a)pyrene	0.0994 JD	0.302 D
Benzo(b)fluoranthene	0.0826 JD	0.272 D
Benzo(k)fluoranthene	0.0801 JD	0.23 D
Chrysene	0.123 J	0.373 J
Dibenz(a,h)anthracene	<0.105 U	<0.107 U
Indeno(1,2,3-cd)pyrene	0.064 JD	0.209 D
Pesticides		
4,4'-DDE	<0.00205 U	<0.00208 U
PCBs		
Total PCBs	<0.0207 U	0.0548
Metals		
Chromium, Trivalent	25.6	23.2
Copper	22.4	**144**
Lead	24.2	**66.2**
Mercury	0.104	0.155
Nickel	24.6	16.7
Zinc	59.4	68

Location	EPB03
Sample Name	EPB03_17.5-18
Sample Date	10/28/2022
Sample Depth	17.5-18
VOCs	
Acetone	0.029 J
SVOCs	
Benzo(a)anthracene	<0.103 UJ
Benzo(a)pyrene	<0.103 UJ
Benzo(b)fluoranthene	<0.103 UJ
Benzo(k)fluoranthene	<0.103 UJ
Chrysene	<0.103 UJ
Dibenz(a,h)anthracene	<0.103 UJ
Indeno(1,2,3-cd)pyrene	<0.103 UJ
Pesticides	
4,4'-DDE	<0.00199 U
PCBs	
Total PCBs	<0.0201 U
Metals	
Chromium, Trivalent	18.1
Copper	18.3
Lead	49
Mercury	0.101
Nickel	15.6
Zinc	42.7

Location	EPB11
Sample Name	EPB11_13.5-14
Sample Date	12/12/2022
Sample Depth	13.5-14
VOCs	
Acetone	**0.17**
SVOCs	
Benzo(a)anthracene	0.549 D
Benzo(a)pyrene	0.52 D
Benzo(b)fluoranthene	0.469 D
Benzo(k)fluoranthene	0.403 D
Chrysene	0.539 D
Dibenz(a,h)anthracene	0.0944 JD
Indeno(1,2,3-cd)pyrene	0.331 D
Pesticides	
4,4'-DDE	<0.00203 U
PCBs	
Total PCBs	<0.0205 U
Metals	
Chromium, Trivalent	28.9
Copper	31.3
Lead	**136**
Mercury	**0.218**
Nickel	22.1
Zinc	**110**

Location	EPB05	EPB05
Sample Name	EPB05_11.5-12	DUP01_101922
Sample Date	10/19/2022	10/19/2022
Sample Depth	11.5-12	11.5-12
VOCs		
Acetone	0.036 J	0.024 J
SVOCs		
Benzo(a)anthracene	0.54 J	**2.01 J**
Benzo(a)pyrene	0.468 J	**1.71 J**
Benzo(b)fluoranthene	0.387 J	**1.39 J**
Benzo(k)fluoranthene	0.397 J	**1.32 J**
Chrysene	0.523 J	**1.93 J**
Dibenz(a,h)anthracene	0.0874 J	**0.402 J**
Indeno(1,2,3-cd)pyrene	0.267 J	**0.876 J**
Pesticides		
4,4'-DDE	<0.00195 U	<0.00195 U
PCBs		
Total PCBs	0.0227	<0.0197 U
Metals		
Chromium, Trivalent	**37**	30
Copper	34.9	34.2
Lead	**74.4**	**73.1**
Mercury	0.0977	0.13
Nickel	30	276
Zinc	95.9	92.4

Location	EPB06
Sample Name	EPB06_11.5-12
Sample Date	10/19/2022
Sample Depth	11.5-12
VOCs	
Acetone	0.018 J
SVOCs	
Benzo(a)anthracene	0.0942 JD
Benzo(a)pyrene	0.0973 D
Benzo(b)fluoranthene	0.078 JD
Benzo(k)fluoranthene	0.0818 JD
Chrysene	0.0973 D
Dibenz(a,h)anthracene	<0.0966 U
Indeno(1,2,3-cd)pyrene	0.0509 JD
Pesticides	
4,4'-DDE	<0.00188 U
PCBs	
Total PCBs	0.0214
Metals	
Chromium, Trivalent	**30.4**
Copper	41.2
Lead	44.9
Mercury	0.11
Nickel	24.3
Zinc	74.2

Location	EPB07
Sample Name	EPB07_11.5-12
Sample Date	10/19/2022
Sample Depth	11.5-12
VOCs	
Acetone	0.017 J
SVOCs	
Benzo(a)anthracene	**2.45 D**
Benzo(a)pyrene	**2.55 D**
Benzo(b)fluoranthene	**2.19 D**
Benzo(k)fluoranthene	**1.75 D**
Chrysene	**2.34 D**
Dibenz(a,h)anthracene	**0.564 D**
Indeno(1,2,3-cd)pyrene	**1.32 D**
Pesticides	
4,4'-DDE	<0.00189 U
PCBs	
Total PCBs	<0.0191 U
Metals	
Chromium, Trivalent	**32.2**
Copper	36.9
Lead	58.6
Mercury	0.156
Nickel	24.9
Zinc	89.5

Location	EPB08
Sample Name	EPB08_16-16.5
Sample Date	10/19/2022
Sample Depth	16-16.5
VOCs	
Acetone	0.016 J
SVOCs	
Benzo(a)anthracene	0.0808 JD
Benzo(a)pyrene	0.0846 JD
Benzo(b)fluoranthene	0.0732 JD
Benzo(k)fluoranthene	0.0617 JD
Chrysene	0.0846 JD
Dibenz(a,h)anthracene	<0.0953 U
Indeno(1,2,3-cd)pyrene	0.0587 JD
Pesticides	
4,4'-DDE	<0.0019 U
PCBs	
Total PCBs	<0.0192 U
Metals	
Chromium, Trivalent	19.2
Copper	21.5
Lead	52.9
Mercury	0.0927
Nickel	18.1
Zinc	85.7

Location	EPB13
Sample Name	EPB13_11.5-12
Sample Date	10/19/2022
Sample Depth	11.5-12
VOCs	
Acetone	0.023 J
SVOCs	
Benzo(a)anthracene	0.659 D
Benzo(a)pyrene	0.628 D
Benzo(b)fluoranthene	0.553 D
Benzo(k)fluoranthene	0.47 D
Chrysene	0.625 D
Dibenz(a,h)anthracene	0.145 D
Indeno(1,2,3-cd)pyrene	0.362 D
Pesticides	
4,4'-DDE	<0.00196 U
PCBs	
Total PCBs	0.023
Metals	
Chromium, Trivalent	26.5
Copper	40.5
Lead	54.2
Mercury	0.166
Nickel	22.2
Zinc	109

Location	EPB09	EPB09
Sample Name	EPB09_13.5-14	EPB09_16.5-17
Sample Date	12/15/2022	1/3/2023
Sample Depth	13.5-14	16.5-17
VOCs		
Acetone	**0.08**	**0.072**
SVOCs		
Benzo(a)anthracene	0.286 D	<0.101 U
Benzo(a)pyrene	0.289 D	<0.101 U
Benzo(b)fluoranthene	0.232 D	<0.101 U
Benzo(k)fluoranthene	0.251 D	<0.101 U
Chrysene	0.313 D	<0.101 U
Dibenz(a,h)anthracene	<0.102 U	<0.101 U
Indeno(1,2,3-cd)pyrene	0.181 D	<0.101 U
Pesticides		
4,4'-DDE	**0.00334 D**	<0.00199 U
PCBs		
Total PCBs	0.0312	<0.0201 U
Metals		
Chromium, Trivalent	27.5	14.9
Copper	32.2	13.3
Lead	**789**	17.1
Mercury	**0.317**	0.0443
Nickel	17.6	15
Zinc	96.1	39.6

Location	EPB14
Sample Name	EPB14_18-18.5
Sample Date	10/28/2022
Sample Depth	18-18.5
VOCs	
Acetone	0.043 J
SVOCs	
Benzo(a)anthracene	<0.1 UJ
Benzo(a)pyrene	<0.1 UJ
Benzo(b)fluoranthene	<0.1 UJ
Benzo(k)fluoranthene	<0.1 UJ
Chrysene	<0.1 UJ
Dibenz(a,h)anthracene	<0.1 UJ
Indeno(1,2,3-cd)pyrene	<0.1 UJ
Pesticides	
4,4'-DDE	<0.002 U
PCBs	
Total PCBs	<0.0202 U
Metals	
Chromium, Trivalent	14.8
Copper	17.4
Lead	38.6
Mercury	0.125
Nickel	17.1
Zinc	41

Location	EPB15	EPB15
Sample Name	EPB15_13.5-14	EPB15_16.5-17
Sample Date	12/15/2022	1/3/2023
Sample Depth	13.5-14	16.5-17
VOCs		
Acetone	**0.096**	0.038
SVOCs		
Benzo(a)anthracene	0.407 D	<0.0987 U
Benzo(a)pyrene	0.35 D	<0.0987 U
Benzo(b)fluoranthene	0.291 D	<0.0987 U
Benzo(k)fluoranthene	0.313 D	<0.0987 U
Chrysene	0.437 D	<0.0987 U
Dibenz(a,h)anthracene	0.0665 JD	<0.0987 U
Indeno(1,2,3-cd)pyrene	0.26 D	<0.0987 U
Pesticides		
4,4'-DDE	<0.00199 U	<0.00195 U
PCBs		
Total PCBs	<0.0201 U	<0.0197 U
Metals		
Chromium, Trivalent	**30.5**	13.2
Copper	36.8	16.4
Lead	**700**	33.3
Mercury	**0.302**	**0.233**
Nickel	20.3	14.6
Zinc	91	42.8

Location	EPB16	EPB16
Sample Name	EPB16_13.5-14	EPB16_16.5-17
Sample Date	12/15/2022	1/3/2023
Sample Depth	13.5-14	16.5-17
VOCs		
Acetone	**0.2**	0.028
SVOCs		
Benzo(a)anthracene	0.169 D	<0.1 U
Benzo(a)pyrene	0.187 D	<0.1 U
Benzo(b)fluoranthene	0.149 D	<0.1 U
Benzo(k)fluoranthene	0.151 D	<0.1 U
Chrysene	0.163 D	<0.1 U
Dibenz(a,h)anthracene	<0.0963 U	<0.1 U
Indeno(1,2,3-cd)pyrene	0.0924 JD	<0.1 U
Pesticides		
4,4'-DDE	<0.00194 U	<0.00199 U
PCBs		
Total PCBs	<0.0196 U	<0.0201 U
Metals		
Chromium, Trivalent	**44.5**	16.4
Copper	**69.3 J**	35.7
Lead	**169**	**145**
Mercury	**0.937**	**0.57**
Nickel	27.6	14.3
Zinc	102	**118**

Location	EPB04
Sample Name	EPB04_11.5-12
Sample Date	10/19/2022
Sample Depth	11.5-12
VOCs	
Acetone	0.012 J
SVOCs	
Benzo(a)anthracene	0.321 D
Benzo(a)pyrene	0.291 D
Benzo(b)fluoranthene	0.263 D
Benzo(k)fluoranthene	0.224 D
Chrysene	0.288 D
Dibenz(a,h)anthracene	<0.0947 U
Indeno(1,2,3-cd)pyrene	0.184 D
Pesticides	
4,4'-DDE	<0.00187 U
PCBs	
Total PCBs	**0.137**
Metals	
Chromium, Trivalent	22.8
Copper	31 J
Lead	57.3 J
Mercury	0.0773
Nickel	18.6
Zinc	88.5

Location	EPB17
Sample Name	EPB17_17-17.5
Sample Date	11/22/2022
Sample Depth	17-17.5
VOCs	
Acetone	0.018
SVOCs	
Benzo(a)anthracene	0.0573 JD
Benzo(a)pyrene	<0.101 U
Benzo(b)fluoranthene	<0.101 U
Benzo(k)fluoranthene	<0.101 U
Chrysene	0.0548 JD
Dibenz(a,h)anthracene	<0.101 U
Indeno(1,2,3-cd)pyrene	<0.101 U
Pesticides	
4,4'-DDE	<0.00197 U
PCBs	
Total PCBs	<0.0199 U
Metals	
Chromium, Trivalent	20.5
Copper	32.3
Lead	**652**
Mercury	**0.334**
Nickel	15.9
Zinc	88.3

Location	EPB12
Sample Name	EPB12_25.5-26
Sample Date	11/22/2022
Sample Depth	25.5-26
VOCs	
Acetone	0.026
SVOCs	
Benzo(a)anthracene	<0.163 U
Benzo(a)pyrene	<0.163 U
Benzo(b)fluoranthene	<0.163 U
Benzo(k)fluoranthene	<0.163 U
Chrysene	<0.163 U
Dibenz(a,h)anthracene	<0.163 U
Indeno(1,2,3-cd)pyrene	<0.163 U
Pesticides	
4,4'-DDE	<0.00216 U
PCBs	
Total PCBs	<0.0218 U
Metals	
Chromium, Trivalent	17.3
Copper	33.3 J
Lead	31.9
Mercury	0.0744
Nickel	16.9
Zinc	39.6

Location	EPB18
Sample Name	EPB18_11.5-12
Sample Date	10/19/2022
Sample Depth	11.5-12
VOCs	
Acetone	0.018 J
SVOCs	
Benzo(a)anthracene	0.0758 JD
Benzo(a)pyrene	0.071 JD
Benzo(b)fluoranthene	0.0537 JD
Benzo(k)fluoranthene	0.0616 JD
Chrysene	0.0876 JD
Dibenz(a,h)anthracene	<0.0987 U
Indeno(1,2,3-cd)pyrene	<0.0987 U
Pesticides	
4,4'-DDE	<0.00194 U
PCBs	
Total PCBs	<0.0196 U
Metals	
Chromium, Trivalent	**67.6**
Copper	**66.9**
Lead	**208**
Mercury	0.0673
Nickel	**34.6**
Zinc	**147**

Analyte	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs
VOCs		
Acetone	0.05	100
SVOCs		
Benzo(a)anthracene	1	1
Benzo(a)pyrene	1	1
Benzo(b)fluoranthene	1	1
Benzo(k)fluoranthene	0.8	3.9
Chrysene	1	3.9
Dibenz(a,h)anthracene	0.33	0.33
Indeno(1,2,3-cd)pyrene	0.5	0.5
Pesticides		
4,4'-DDE	0.0033	8.9
PCBs		
Total PCBs	0.1	1
Metals		
Chromium, Trivalent	30	180
Copper	50	270
Lead	63	400
Mercury	0.18	0.81
Nickel	30	310
Zinc	109	10000

Notes:
CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
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 and Restricted Use Restricted-Residential Soil Cleanup Objectives
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 and Restricted Use Restricted-Residential Guidance 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.
E - The result is estimated and cannot be accurately reported due to levels encountered or interferences.
B - The analyte was found in the associated analysis batch blank.
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 Restricted Use Restricted-Residential SCOs

Legend

- Site Boundary
- Site-Wide Excavation Base Confirmation Soil Sample
- Lead Hotspot - Sidewall Confirmation Soil Sample
- Lead Hotspot - Excavation Base Confirmation Soil Sample

Notes:
1. Tax parcel data provided by the New York City Department of City Planning, MapPLUTO 22V3.
2. The excavation base confirmation soil sample locations presented on this drawing are based on visual observation in the field by a Langan representative and field-taping measurements.
3. All sample depths provided are in depth below sidewalk level (bsl).
4. Material represented by confirmation endpoint soil samples EPB09_13.5-4, EPB15_13.5-14, and EPB16_13.5-14 was over-excavated based on the analytical results. These sample locations were removed by excavation and are no longer present on site.

20 0 20
SCALE IN FEET

WEST 41ST STREET

TENTH AVENUE

WEST 40TH STREET

EPB01 EPB02 EPB03 EPB04 EPB05 EPB06 EPB07 EPB08 EPB09 EPB10 EPB11 EPB12 EPB13 EPB14 EPB15 EPB16 EPB17 EPB18 EPS20 EPS21 EPS22 EPS23 EPS25 EPS26 EPS27 EPS28 EPB19 EPB24

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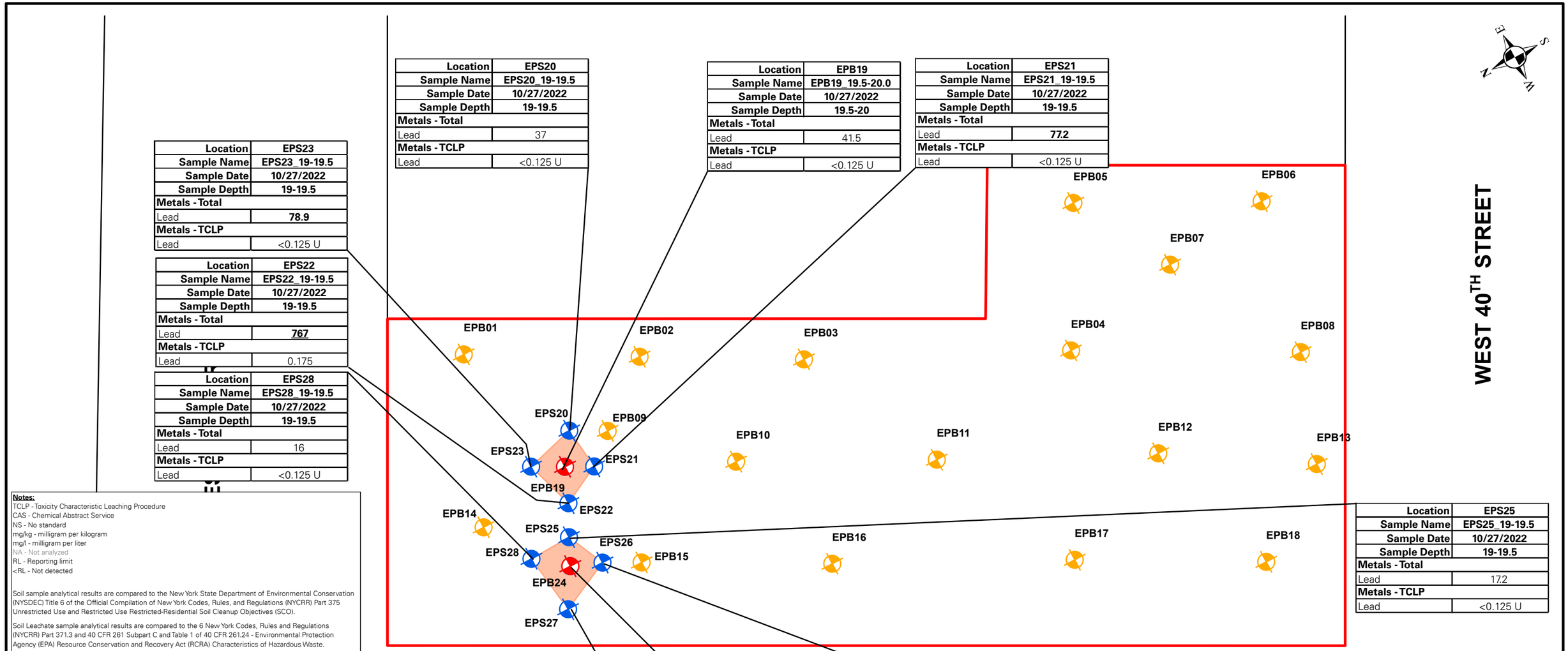
Project
550 TENTH AVENUE
FILLING STATION SITE
BCP Site No. C231148
BLOCK No. 1050,
LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
EXCAVATION BASE CONFIRMATION SAMPLE LOCATION AND ANALYTICAL RESULTS MAP

Project No. 100674402
Date 12/11/2023
Scale 1"=20'
Drawn By IHB/PDT
Last Revised 12/11/2023
Figure 4

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Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\APRX\1A\Figure 1A.aprx



Location	EPS20
Sample Name	EPS20_19-19.5
Sample Date	10/27/2022
Sample Depth	19-19.5
Metals - Total	
Lead	37
Metals - TCLP	
Lead	<0.125 U

Location	EPB19
Sample Name	EPB19_19.5-20.0
Sample Date	10/27/2022
Sample Depth	19.5-20
Metals - Total	
Lead	41.5
Metals - TCLP	
Lead	<0.125 U

Location	EPS21
Sample Name	EPS21_19-19.5
Sample Date	10/27/2022
Sample Depth	19-19.5
Metals - Total	
Lead	**77.2**
Metals - TCLP	
Lead	<0.125 U

Location	EPS23
Sample Name	EPS23_19-19.5
Sample Date	10/27/2022
Sample Depth	19-19.5
Metals - Total	
Lead	**78.9**
Metals - TCLP	
Lead	<0.125 U

Location	EPS22
Sample Name	EPS22_19-19.5
Sample Date	10/27/2022
Sample Depth	19-19.5
Metals - Total	
Lead	**767**
Metals - TCLP	
Lead	0.175

Location	EPS28
Sample Name	EPS28_19-19.5
Sample Date	10/27/2022
Sample Depth	19-19.5
Metals - Total	
Lead	16
Metals - TCLP	
Lead	<0.125 U

Location	EPS25
Sample Name	EPS25_19-19.5
Sample Date	10/27/2022
Sample Depth	19-19.5
Metals - Total	
Lead	17.2
Metals - TCLP	
Lead	<0.125 U

Location	EPS27
Sample Name	EPS27_19-19.5
Sample Date	10/27/2022
Sample Depth	19-19.5
Metals - Total	
Lead	61.7
Metals - TCLP	
Lead	0.147

Location	EPB24
Sample Name	EPB24_19.5-20.0
Sample Date	10/27/2022
Sample Depth	19.5-20
Metals - Total	
Lead	39.3
Metals - TCLP	
Lead	<0.125 U

Location	EPS26
Sample Name	EPS26_19-19.5
Sample Date	10/27/2022
Sample Depth	19-19.5
Metals - Total	
Lead	**187**
Metals - TCLP	
Lead	0.459

Notes:
TCLP - Toxicity Characteristic Leaching Procedure
CAS - Chemical Abstract Service
NS - No standard
mg/kg - milligram per kilogram
mg/l - milligram per liter
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 and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCO).

Soil Leachate sample analytical results are compared to the 6 New York Codes, Rules and Regulations (NYCRR) Part 371.3 and 40 CFR 261 Subpart C and Table 1 of 40 CFR 261.24 - Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) Characteristics of Hazardous Waste.

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.

Analyte	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	RCRA Characteristics of Hazardous Waste
Metals - Total			
Lead	63	400	NS
Metals - TCLP			
Lead	NS	NS	5

Exceedance Summary:
10 Result exceeds Unrestricted Use SCOs
10 - Result exceeds Restricted Use Restricted-Residential SCOs
10 - Result exceeds the RCRA Maximum Concentration of Contaminants for the Toxicity Characteristic

Legend

- Site Boundary
- Site-Wide Excavation Base Confirmation Soil Sample
- Lead Hotspot - Sidewall Confirmation Soil Sample
- Lead Hotspot - Excavation Base Confirmation Soil Sample
- Excavation to el 5.5 NAVD88 (corresponding to approximately 19 feet bsl) for removal of hazardous lead and elevated lead above the Restricted Residential RUSCOs

Notes:
1. Tax parcel data provided by the New York City Department of City Planning, MapPLUTO 22V3.
2. The excavation base confirmation soil sample locations presented on this drawing are based on visual observation in the field by a Langan representative and field-taping measurements.
3. All sample depths provided are in depth below sidewalk level (bsl).
4. Lead hotspot confirmation samples were only analyzed for total and TCLP lead in accordance with the RAWP.

20 0 20
SCALE IN FEET

LANGAN
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Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
550 TENTH AVENUE FILLING STATION SITE
BCP Site No. C231148
BLOCK No. 1050, LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
HAZARDOUS LEAD HOTSPOT CONFIRMATION ENDPOINT SAMPLE LOCATION AND ANALYTICAL RESULTS MAP

Project No. 100674402
Date 5/18/2023
Scale 1"=20'
Drawn By IHB/PDT
Last Revised 12/18/2023
Figure 5

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Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\APRX\1A\Figure 1A.aprx

Location	LMW-11	LMW-11	LMW-11	LMW-11
Sample Name	LMW-11_20210212	DUP-1_20210212	093_LMW-11	094_DUP-1
Sample Date	2/12/2021	2/12/2021	11/1/2021	11/1/2021
VOCs				
1,2,3-Trichloropropane	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2-Dibromo-3-Chloropropane	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2-Dichloroethane	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Acetone	4.83	4.37	<1 U	1.33 J
SVOCs				
Benzo(a)anthracene	<0.0606 U	<0.0556 U	<0.0588 U	<0.0541 U
Benzo(a)pyrene	<0.0606 U	<0.0556 U	<0.0588 U	<0.0541 U
Benzo(b)fluoranthene	<0.0606 U	<0.0556 U	<0.0588 U	<0.0541 U
Benzo(k)fluoranthene	<0.0606 U	<0.0556 U	<0.0588 U	<0.0541 U
Chrysene	<0.0606 U	<0.0556 U	<0.0588 U	<0.0541 U
Indeno(1,2,3-cd)pyrene	<0.0606 U	<0.0556 U	<0.0588 U	<0.0541 U
Metals - Dissolved				
Barium	217	208	84	84.3
Beryllium	<0.333 U	<0.333 UJ	<0.333 U	<0.333 U
Iron	<278 U	<278 U	<278 U	**2,290**
Lead	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Magnesium	17,100	16,200	5,560	5,560
Manganese	**938**	**786**	203	217
Mercury	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Selenium	<1.11 U	<1.11 U	1.59	2.14
Sodium	**273,000**	**271,000**	**71,400**	**70,400**
Metals - Total				
Barium	274 J	526 J	91	74.9
Beryllium	<0.333 U	0.423 J	<0.333 U	<0.333 U
Iron	**6,790 J**	**40,400 J**	**1,000**	**375**
Lead	**49.7 J**	**472 J**	7.31	<5.56 U
Magnesium	18,300	22,900	5,240	3,520
Manganese	**1,210**	**1,590**	220	15.5
Mercury	<0.2 UJ	**1 J**	<0.2 U	<0.2 U
Selenium	<1.14 U	<3.19 U	<1.11 U	<1.11 U
Sodium	**282,000 J**	**277,000 J**	**68,400**	**55,300**
PFAS				
Perfluorooctanesulfonic Acid (PFOS)	0.0675	NA	0.181	0.18
Perfluorooctanoic Acid (PFOA)	0.0454	NA	0.031	0.0284

Location	LMW-10	LMW-10	LMW-10
Sample Name	LMW-10_120718	LMW-10_20210212	100_LMW-10
Sample Date	12/7/2018	2/12/2021	11/2/2021
VOCs			
1,2,3-Trichloropropane	<0.2 U	<0.2 U	<0.2 U
1,2-Dibromo-3-Chloropropane	<0.2 U	<0.2 U	<0.2 U
1,2-Dichloroethane	<0.2 U	<0.2 U	<0.2 U
Acetone	<1 UJ	<1 U	<2 U
SVOCs			
Benzo(a)anthracene	<0.0541 U	<0.05 U	<0.0513 U
Benzo(a)pyrene	<0.0541 U	<0.05 U	<0.0513 U
Benzo(b)fluoranthene	<0.0541 U	<0.05 U	<0.0513 U
Benzo(k)fluoranthene	<0.0541 U	<0.05 U	<0.0513 U
Chrysene	<0.0541 U	<0.05 U	<0.0513 U
Indeno(1,2,3-cd)pyrene	<0.0541 U	<0.05 U	<0.0513 U
Metals - Dissolved			
Barium	285	425	50.7
Beryllium	<0.333 U	<0.333 U	<0.333 U
Iron	<278 U	<278 U	285
Lead	<5.56 U	<5.56 U	<5.56 U
Magnesium	17,000	28,400	2,010
Manganese	**684**	**1,660**	50.5
Mercury	<0.2 U	<0.2 U	<0.2 U
Selenium	5.81	<1.11 U	<1.11 U
Sodium	**1,480,000 D**	**1,000,000**	**302,000**
Metals - Total			
Barium	314	463	53.5
Beryllium	<0.333 U	<0.333 U	<0.333 U
Iron	**1,630**	**2,500**	**432**
Lead	<5.56 U	<5.56 U	<5.56 U
Magnesium	17,500	28,700	1,930
Manganese	**808**	**1,710**	51.2
Mercury	<0.2 U	<0.2 U	<0.2 U
Selenium	8.23	<3.34 U	1.31
Sodium	**1,660,000 E**	**988,000 J**	**288,000**
PFAS			
Perfluorooctanesulfonic Acid (PFOS)	NA	NA	0.189
Perfluorooctanoic Acid (PFOA)	NA	NA	0.0497

Location	TW-3
Sample Name	TW-3_112117
Sample Date	11/21/2017
VOCs	
1,2,3-Trichloropropane	<0.2 U
1,2-Dibromo-3-Chloropropane	<0.2 U
1,2-Dichloroethane	<0.2 U
Acetone	**65.2 J**

Sample Name	095_LMW-12
Sample Date	11/1/2021
VOCs	
1,2,3-Trichloropropane	**3.47**
1,2-Dibromo-3-Chloropropane	**29.9**
1,2-Dichloroethane	**0.66**
Acetone	1.03 J
SVOCs	
Benzo(a)anthracene	<0.0571 U
Benzo(a)pyrene	<0.0571 U
Benzo(b)fluoranthene	<0.0571 U
Benzo(k)fluoranthene	<0.0571 U
Chrysene	<0.0571 U
Indeno(1,2,3-cd)pyrene	<0.0571 U
Metals - Dissolved	
Barium	121
Beryllium	<0.333 U
Iron	<278 U
Lead	<5.56 U
Magnesium	9,930
Manganese	16.3
Mercury	<0.2 U
Selenium	2.69
Sodium	**504,000**
Metals - Total	
Barium	154
Beryllium	<0.333 UJ
Iron	**1,600**
Lead	**59.4**
Magnesium	9,250
Manganese	42.3
Mercury	<0.2 U
Selenium	1.89
Sodium	**468,000**
PFAS	
Perfluorooctanesulfonic Acid (PFOS)	0.0658
Perfluorooctanoic Acid (PFOA)	0.0475

Location	LMW-8	LMW-8
Sample Name	LMW-8_120718	101_LMW-8
Sample Date	12/7/2018	11/2/2021
VOCs		
1,2,3-Trichloropropane	<0.2 U	<0.2 U
1,2-Dibromo-3-Chloropropane	<0.2 U	<0.2 U
1,2-Dichloroethane	<0.2 U	<0.2 U
Acetone	1.57 J	<1 U
SVOCs		
Benzo(a)anthracene	**0.0556**	<0.0556 U
Benzo(a)pyrene	<0.0556 U	<0.0556 U
Benzo(b)fluoranthene	<0.0556 U	<0.0556 U
Benzo(k)fluoranthene	<0.0556 U	<0.0556 U
Chrysene	<0.0556 U	<0.0556 U
Indeno(1,2,3-cd)pyrene	<0.0556 U	<0.0556 U
Metals - Dissolved		
Barium	104	123
Beryllium	<0.333 U	<0.333 UJ
Iron	<278 U	<278 U
Lead	<5.56 U	<5.56 U
Magnesium	13,500	8,960
Manganese	**745**	<5.56 U
Mercury	<0.2 U	<0.2 U
Selenium	7.92	**31.6 J**
Sodium	**312,000**	**113,000**
Metals - Total		
Barium	132	130
Beryllium	<0.333 U	<0.333 UJ
Iron	**2,440**	<278 U
Lead	**151**	7.01
Magnesium	11,900	8,870
Manganese	**726**	6
Mercury	<0.2 U	<0.2 U
Selenium	9.29	**35.1 J**
Sodium	**299,000**	**102,000**
PFAS		
Perfluorooctanesulfonic Acid (PFOS)	NA	0.158
Perfluorooctanoic Acid (PFOA)	NA	0.0668

Location	TW-2	TW-2
Sample Name	TW-2_112117	DUP-2_112117
Sample Date	11/21/2017	11/21/2017
VOCs		
1,2,3-Trichloropropane	<0.2 U	<0.2 U
1,2-Dibromo-3-Chloropropane	<0.2 U	<0.2 U
1,2-Dichloroethane	<0.2 U	<0.2 U
Acetone	<2 U	<2.41 U
SVOCs		
Benzo(a)anthracene	**0.115 J**	**0.0615 J**
Benzo(a)pyrene	**0.0615**	<0.0385 U
Benzo(b)fluoranthene	**0.0385**	<0.0385 U
Benzo(k)fluoranthene	**0.0385**	<0.0385 U
Chrysene	**0.108 J**	**0.0538 J**
Indeno(1,2,3-cd)pyrene	<0.0385 U	<0.0385 U
Metals - Total		
Barium	**1,930 D**	**1,700 D**
Beryllium	**4.81 J**	**4.54**
Iron	**93,100 D**	**80,100 D**
Lead	**92.8 D**	**78.9 D**
Magnesium	27,100 D	23,200 D
Manganese	**7,470 D**	**6,490 D**
Mercury	<0.2 U	<0.2 U
Selenium	**28.7 J**	**23.1 J**
Sodium	**779,000 BD**	**718,000 BD**

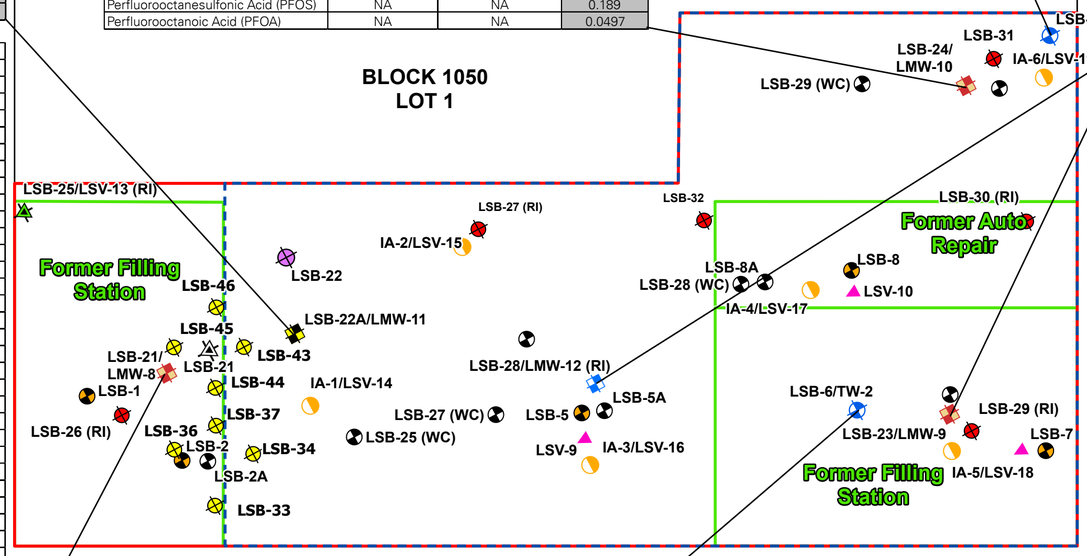
Location	LMW-9	LMW-9	LMW-9	LMW-9
Sample Name	LMW-9_120718	DUP-7_120718	LMW-9_20210212	099_LMW-9
Sample Date	12/7/2018	12/7/2018	2/12/2021	11/2/2021
VOCs				
1,2,3-Trichloropropane	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2-Dibromo-3-Chloropropane	<0.2 U	<0.2 U	<0.2 U	<0.2 U
1,2-Dichloroethane	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Acetone	<1 UJ	<1 UJ	<1 U	<2 U
SVOCs				
Benzo(a)anthracene	**0.0947 J**	**0.227 J**	<0.0541 U	<0.0588 U
Benzo(a)pyrene	**0.0842 J**	**0.238 J**	<0.0541 U	<0.0588 U
Benzo(b)fluoranthene	**0.0842 J**	**0.162 J**	<0.0541 U	<0.0588 U
Benzo(k)fluoranthene	**0.0737 J**	**0.205 J**	<0.0541 U	<0.0588 U
Chrysene	**0.0947 J**	**0.27 J**	<0.0541 U	<0.0588 U
Indeno(1,2,3-cd)pyrene	**0.0526 J**	**0.141 J**	<0.0541 U	<0.0588 U
Metals - Dissolved				
Barium	204	204	188	98.9
Beryllium	<0.333 U	<0.333 U	<0.333 U	<0.333 U
Iron	<278 U	<278 U	<278 U	<278 U
Lead	<5.56 U	<5.56 U	<5.56 U	<5.56 U
Magnesium	15,200	15,600	16,100	7,410
Manganese	191	232	**441**	105
Mercury	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Selenium	**10.2**	8.21	<1.11 U	<1.11 U
Sodium	**1,380,000**	**1,370,000**	**678,000**	**530,000**
Metals - Total				
Barium	471	523	207	104
Beryllium	0.718	0.718	<0.333 U	<0.333 U
Iron	**51,000**	**64,400**	**1,280**	<278 U
Lead	**313**	**335**	<5.56 U	<5.56 U
Magnesium	20,100	22,300	16,500	7,180
Manganese	**1,050**	**1,190**	**455**	106
Mercury	<0.2 U	<0.2 U	<0.2 U	<0.2 U
Selenium	**60**	**71.4**	<1.11 U	1.65
Sodium	**1,320,000**	**1,310,000**	**717,000 J**	**521,000**
PFAS				
Perfluorooctanesulfonic Acid (PFOS)	NA	NA	NA	0.0747
Perfluorooctanoic Acid (PFOA)	NA	NA	NA	0.0437

Notes:
NS - No standard
ug/l - microgram per liter
NA - Not analyzed
RL - Reporting limit
nRL - Not detected
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 therein collectively referenced as 'NYSDEC SGVs').
Groundwater 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) (June 2021) and the 1,4-Dioxane value reflects the drinking water maximum contaminant level (MCL) adopted by New York State for public water systems (July 2020). Pursuant to Part 375-1.7(f)(2), the NYSDEC will treat the MCL as relevant and appropriate and will consider this value in remedy selection.
The criteria comparison for dissolved total chromium is provided for reference. The promulgated SGVs shown is for hexavalent chromium.

Qualifiers:
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E - The result is estimated and cannot be accurately reported due to levels encountered or interferences.
B - The analyte was found in the associated analysis batch blank.
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 reporting limit (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
100 Result exceeds NYSDEC Guidance Values

Analyte	NYSDEC SGVs	NYSDEC Guidance Values
VOCs		
1,2,3-Trichloropropane	0.04	NS
1,2-Dibromo-3-Chloropropane	0.04	NS
1,2-Dichloroethane	0.6	NS
Acetone	50	NS
SVOCs		
Benzo(a)anthracene	0.002	NS
Benzo(a)pyrene	0	NS
Benzo(b)fluoranthene	0.002	NS
Benzo(k)fluoranthene	0.002	NS
Chrysene	0.002	NS
Indeno(1,2,3-cd)pyrene	0.002	NS
Metals - Dissolved		
Barium	1000	NS
Beryllium	3	NS
Iron	300	NS
Lead	25	NS
Magnesium	35000	NS
Manganese	300	NS
Mercury	0.7	NS
Selenium	10	NS
Sodium	20000	NS
Metals - Total		
Barium	1000	NS
Beryllium	3	NS
Iron	300	NS
Lead	25	NS
Magnesium	35000	NS
Manganese	300	NS
Mercury	0.7	NS
Selenium	10	NS
Sodium	20000	NS
PFAS		
Perfluorooctanesulfonic Acid (PFOS)	NS	0.01
Perfluorooctanoic Acid (PFOA)	NS	0.01



Legend

- Site Boundary
- Historical Use of Concern
- Existing Building Outline
- Tax Lot/Block Boundary

October/November 2021 RI Sampling Locations

- Indoor Air Sample/Sub-Slab Soil Vapor Point Location
- Soil Boring Location
- Soil Boring/Permanent Monitoring Well Location
- Soil Boring/Exterior Soil Vapor Point Location
- Delineation Soil Boring

Historical Sampling Locations

- Soil Boring Location (February 2021)
- Soil Boring/Permanent Monitoring Well Location (February 2021)
- Soil Boring/Soil Vapor Location (February 2021)
- Soil Vapor Location (2019)
- Soil Boring Location (2018)
- Soil Boring/Permanent Monitoring Well Location (2018)
- Soil Boring Location (2017)
- Soil Boring/Temporary Well Point Location (2017)

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Notes:
1. Property boundary digitized from basemap and measurements provided on the New York City Digital Tax Map maintained online by the Department of Finance
2. Building outline provided in Covenant House Building Massing & Stacking, 8 May 2017, by F X Fowle, Denham, Wolf and CH Phase 2 plan, 14 July 2018, by Handel Architects, LLP.
3. Soil boring, temporary monitoring well, and soil vapor sampling locations based on field measurements. Permanent monitoring well locations based on survey data.
4. Historical filling station and automobile repair locations obtained from Sanborn Fire Insurance Maps provided in the Phase I Environmental Site Assessment prepared by TRC Engineers, Inc., dated September 2015.
5. AOC-1 consists of historic fill, which is present throughout the Site.

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Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

Project
550 10TH AVENUE REDEVELOPMENT
BCP Site No. C231148
BLOCK No. 1050, LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
GROUNDWATER ANALYTICAL RESULTS

Project No.	100674402
Date	12/11/2023
Scale	1:240
Drawn By	IHB
Submission Date	12/11/2023
Figure	6

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Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\APRX\1A\Figure 1A.aprx Date: 12/11/2023 User: ibaker Time: 12:18 PM

Location	LSV-13
Sample Name	080_LSV-13_20211101
Sample Date	11/1/2021
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	11.7 D
1,1,2-Trichloro-1,2,2-Trifluoroethane	<1.12 U
1,2,4-Trimethylbenzene	6.49 D
1,2-Dichloroethane	1.19 D
1,3,5-Trimethylbenzene (Mesitylene)	2.09 D
1,4-Dioxane (P-Dioxane)	<1.06 U
2-Hexanone (MBK)	<1.2 U
4-Bromofluorobenzene	NA
4-Ethyltoluene	2.59 D
Acetone	64.3 D
Acrylonitrile	<0.318 U
Benzene	1.41 D
Bromodichloromethane	1.28 D
Carbon Disulfide	2.78 D
Carbon Tetrachloride	0.461 D
Chloroform	7.66 D
Chloromethane	0.696 D
Cis-1,2-Dichloroethene	<0.291 U
Cyclohexane	8.12 D
Dichlorodifluoromethane	2.61 D
Ethyl Acetate	<1.06 U
Ethylbenzene	6.62 D
Isopropanol	3.6 D
M,P-Xylene	10.9 D
Methyl Ethyl Ketone (2-Butanone)	5.4 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.601 U
Methyl Methacrylate	0.96 D
Methylene Chloride	<1.02 U
n-Heptane	17.6 D
n-Hexane	5.94 D
o-Xylene (1,2-Dimethylbenzene)	5.28 D
Styrene	<0.624 U
Tert-Butyl Methyl Ether	<0.529 U
Tetrachloroethene (PCE)	1.89 D
Tetrahydrofuran	<0.865 U
Toluene	18.1 D
Trichloroethene (TCE)	0.315 D
Trichlorofluoromethane	1.81 D

Location	IA-1	LSV-14	LSV-14
Sample Name	081_IA-1_20211101	082_LSV-14_20211101	083_DUP-1_20211101
Sample Date	11/1/2021	11/1/2021	11/1/2021
Sample Type	IA	SSV	SSV
VOCs			
1,1,1-Trichloroethane	<0.427 U	<0.883 U	<0.907 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	<0.599 U	<1.24 U	<1.27 U
1,2,4-Trimethylbenzene	1.15 D	1.99 D	1.63 D
1,2-Dichloroethane	<0.316 U	<0.655 U	<0.673 U
1,3,5-Trimethylbenzene (Mesitylene)	0.384 D	<0.796 U	<0.818 U
1,4-Dioxane (P-Dioxane)	<0.564 U	1.81 D	1.56 D
2-Hexanone (MBK)	<0.641 U	<1.33 U	<1.36 U
4-Bromofluorobenzene	NA	NA	NA
4-Ethyltoluene	0.884 D	1.75 D	1.47 D
Acetone	14.8 D	105 D	101 D
Acrylonitrile	<0.17 U	<0.351 U	<0.361 U
Benzene	0.824 D	6.05 D	6.11 D
Bromodichloromethane	<0.524 U	<1.08 U	<1.11 U
Carbon Disulfide	<0.244 U	76.8 D	82.1 D
Carbon Tetrachloride	0.541 D	0.509 D	0.523 D
Chloroform	1.11 D	4.11 D	4.06 D
Chloromethane	1.34 D	1.17 J	0.859 J
Cis-1,2-Dichloroethene	<0.155 U	<0.321 U	<0.33 U
Cyclohexane	<0.269 U	<0.557 U	<0.572 U
Dichlorodifluoromethane	2.55 D	2.8 D	2.71 D
Ethyl Acetate	2.09 D	<1.17 U	<1.2 U
Ethylbenzene	0.543 D	1.34 D	1.3 D
Isopropanol	175 D	17 D	17.1 D
M,P-Xylene	2.65 D	5.55 D	5.34 D
Methyl Ethyl Ketone (2-Butanone)	1.22 D	15.8 D	15.1 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.32 U	0.73 D	<0.681 U
Methyl Methacrylate	<0.32 UJ	0.795 D	<0.681 U
Methylene Chloride	10.5 D	<1.12 U	<1.16 U
n-Heptane	0.801 D	3.52 D	3.2 D
n-Hexane	0.827 D	2.91 D	2.99 D
o-Xylene (1,2-Dimethylbenzene)	1.02 D	2.53 D	2.46 D
Styrene	<0.333 U	1.66 D	1.56 D
Tert-Butyl Methyl Ether	<0.282 U	<0.584 U	<0.6 U
Tetrachloroethene (PCE)	0.583 D	1.76 D	1.92 D
Tetrahydrofuran	0.669 D	8.64 D	795 D
Toluene	3.01 D	5.67 D	5.7 D
Trichloroethene (TCE)	<0.105 U	0.261 D	0.357 D
Trichlorofluoromethane	1.98 D	2.91 D	2.9 D

Location	AMBIENT-1
Sample Name	079_AMBIENT-1_20211101
Sample Date	11/1/2021
Sample Type	AA
VOCs	
1,1,1-Trichloroethane	<0.437 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	<0.613 U
1,2,4-Trimethylbenzene	0.472 D
1,2-Dichloroethane	<0.324 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.393 U
1,4-Dioxane (P-Dioxane)	<0.577 U
2-Hexanone (MBK)	<0.655 U
4-Ethyltoluene	0.433 D
Acetone	5.93 D
Acrylonitrile	<0.174 U
Benzene	0.588 D
Bromodichloromethane	<0.536 U
Carbon Disulfide	<0.249 U
Carbon Tetrachloride	0.554 D
Chloroform	<0.391 U
Chloromethane	1.47 D
Cis-1,2-Dichloroethene	<0.159 U
Cyclohexane	<0.275 U
Dichlorodifluoromethane	2.69 D
Ethyl Acetate	1.84 D
Ethylbenzene	<0.347 U
Isopropanol	3.85 D
M,P-Xylene	1.18 D
Methyl Ethyl Ketone (2-Butanone)	0.92 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.328 U
Methyl Methacrylate	1.02 D
Methylene Chloride	10.3 D
n-Heptane	0.59 D
n-Hexane	0.338 D
o-Xylene (1,2-Dimethylbenzene)	0.382 D
Styrene	<0.341 U
Tert-Butyl Methyl Ether	<0.288 U
Tetrachloroethene (PCE)	<0.543 U
Tetrahydrofuran	<0.472 U
Toluene	2.14 D
Trichloroethene (TCE)	<0.107 U
Trichlorofluoromethane	1.62 D

Location	LSV-12	LSV-12
Sample Name	LSV-12_20210212	DUP-1_20210212
Sample Date	5/9/2019	5/9/2019
Sample Type	SV	SV
VOCs		
1,1,1-Trichloroethane	<0.827 U	<1.87 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	<1.16 U	<2.62 U
1,2,4-Trimethylbenzene	<0.745 U	<1.68 U
1,2-Dichloroethane	<0.613 U	<1.38 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.745 U	<1.68 U
1,4-Dioxane (P-Dioxane)	<1.09 U	<2.46 U
2-Hexanone (MBK)	<1.24 U	<2.8 U
4-Bromofluorobenzene	NA	NA
4-Ethyltoluene	<0.745 U	<1.68 U
Acetone	3.49 J	9.34 J
Acrylonitrile	<0.329 U	<0.742 U
Benzene	0.92 J	80.4 J
Bromodichloromethane	<1.01 U	<2.29 U
Carbon Disulfide	<0.472 U	<1.07 U
Carbon Tetrachloride	0.286 D	<0.538 U
Chloroform	<0.74 UJ	6.35 J
Chloromethane	1.06 D	<0.706 U
Cis-1,2-Dichloroethene	<0.3 U	<0.678 U
Cyclohexane	<0.521 UJ	12.2 J
Dichlorodifluoromethane	2.1 D	1.69 D
Ethyl Acetate	<1.09 UJ	8.38 J
Ethylbenzene	<0.658 U	<1.49 U
Isopropanol	2.68 J	11.3 J
M,P-Xylene	<1.32 U	<2.97 U
Methyl Ethyl Ketone (2-Butanone)	0.491 D	1.21 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.621 U	<1.4 U
Methyl Methacrylate	<0.62 U	<1.4 U
Methylene Chloride	2.26 J	10.1 J
n-Heptane	<0.621 UJ	25.5 J
n-Hexane	2.24 J	212 J
o-Xylene (1,2-Dimethylbenzene)	<0.658 U	<1.48 U
Styrene	<0.645 U	<1.46 U
Tert-Butyl Methyl Ether	<0.546 U	<1.23 U
Tetrachloroethene (PCE)	<1.03 U	<2.32 U
Tetrahydrofuran	<0.894 U	<2.02 U
Toluene	0.913 J	41.1 J
Trichloroethene (TCE)	<0.204 U	<0.459 U
Trichlorofluoromethane	1.02 D	<1.92 U

Location	IA-2	LSV-15
Sample Name	084_IA-2_20211101	085_LSV-15_20211101
Sample Date	11/1/2021	11/1/2021
Sample Type	IA	SSV
VOCs		
1,1,1-Trichloroethane	<0.411 U	<0.986 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	<0.577 U	<1.38 U
1,2,4-Trimethylbenzene	1.14 D	2.75 D
1,2-Dichloroethane	<0.305 U	<0.731 U
1,3,5-Trimethylbenzene (Mesitylene)	0.518 D	1.07 D
1,4-Dioxane (P-Dioxane)	<0.543 U	<1.3 U
2-Hexanone (MBK)	<0.617 U	3.41 D
4-Bromofluorobenzene	NA	NA
4-Ethyltoluene	1.18 D	2.31 D
Acetone	9.68 D	187 D
Acrylonitrile	<0.163 U	0.431 D
Benzene	0.65 D	1.67 D
Bromodichloromethane	<0.504 U	<1.21 U
Carbon Disulfide	<0.234 U	160 D
Carbon Tetrachloride	0.568 D	0.455 D
Chloroform	1.4 D	1.94 D
Chloromethane	1.32 D	<0.373 U
Cis-1,2-Dichloroethene	<0.149 U	0.43 D
Cyclohexane	<0.259 U	0.746 D
Dichlorodifluoromethane	2.57 D	2.77 D
Ethyl Acetate	2.63 D	<1.3 U
Ethylbenzene	0.817 D	1.73 D
Isopropanol	22.9 D	5.91 D
M,P-Xylene	3.79 D	7.22 D
Methyl Ethyl Ketone (2-Butanone)	1.15 D	36.7 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.308 U	2.96 D
Methyl Methacrylate	<0.308 U	1.18 D
Methylene Chloride	<0.523 U	<1.26 U
n-Heptane	1.02 D	2 D
n-Hexane	0.398 D	1.27 D
o-Xylene (1,2-Dimethylbenzene)	1.37 D	3.37 D
Styrene	0.449 D	1.77 D
Tert-Butyl Methyl Ether	<0.271 U	9.45 D
Tetrachloroethene (PCE)	<0.511 U	1.47 D
Tetrahydrofuran	0.555 D	5.6 D
Toluene	2.04 D	30.2 D
Trichloroethene (TCE)	<0.101 U	0.388 D
Trichlorofluoromethane	2.2 D	6.7 D

Location	IA-4	LSV-17
Sample Name	089_IA-4_20211101	090_LSV-17_20211101
Sample Date	11/1/2021	11/1/2021
Sample Type	IA	SSV
VOCs		
1,1,1-Trichloroethane	<0.45 U	<1.09 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	<0.632 U	<1.54 U
1,2,4-Trimethylbenzene	0.811 D	32.4 D
1,2-Dichloroethane	<0.334 U	<0.811 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.406 U	11.6 D
1,4-Dioxane (P-Dioxane)	<0.595 U	<1.44 U
2-Hexanone (MBK)	<0.676 U	33.3 D
4-Bromofluorobenzene	NA	NA
4-Ethyltoluene	0.689 D	22.3 D
Acetone	23.2 D	1,100 D
Acrylonitrile	<0.179 U	<0.435 U
Benzene	0.659 D	2.94 D
Bromodichloromethane	<0.553 U	<1.34 U
Carbon Disulfide	<0.257 U	11.7 D
Carbon Tetrachloride	0.675 D	0.63 D
Chloroform	1.77 D	2.64 D
Chloromethane	1.36 D	1.86 J
Cis-1,2-Dichloroethene	<0.164 U	<0.397 U
Cyclohexane	<0.284 U	0.896 D
Dichlorodifluoromethane	2.65 D	2.67 D
Ethyl Acetate	2.38 D	<1.44 U
Ethylbenzene	0.466 D	3.83 D
Isopropanol	45.7 D	172 D
M,P-Xylene	1.93 D	16.4 D
Methyl Ethyl Ketone (2-Butanone)	2.43 D	45.5 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.338 U	14.2 D
Methyl Methacrylate	1.62 D	0.902 D
Methylene Chloride	8.86 D	<1.39 U
n-Heptane	1.93 D	9.61 D
n-Hexane	0.523 D	7.62 D
o-Xylene (1,2-Dimethylbenzene)	0.645 D	7.13 D
Styrene	<0.351 U	1.96 D
Tert-Butyl Methyl Ether	<0.297 U	<0.722 U
Tetrachloroethene (PCE)	0.839 D	2.99 D
Tetrahydrofuran	0.73 D	10.5 D
Toluene	6.25 D	17 D
Trichloroethene (TCE)	0.177 D	0.431 D
Trichlorofluoromethane	3.11 D	4.61 D

Location	LSV-10
Sample Name	003 LSV-10_20190508
Sample Date	5/9/2019
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<8.2 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	<11 U
1,2,4-Trimethylbenzene	72 D
1,2-Dichloroethane	<6.1 U
1,3,5-Trimethylbenzene (Mesitylene)	26 D
1,4-Dioxane (P-Dioxane)	<11 U
2-Hexanone (MBK)	19 D
4-Bromofluorobenzene	9.3 BD
4-Ethyltoluene	32 D
Acetone	1,500 D
Acrylonitrile	<3.3 U
Benzene	<4.8 U
Bromodichloromethane	<10 U
Carbon Disulfide	53 D
Carbon Tetrachloride	<2.4 U
Chloroform	13 D
Chloromethane	<3.1 U
Cis-1,2-Dichloroethene	<1.5 U
Cyclohexane	6.2 D
Dichlorodifluoromethane	<7.4 U
Ethyl Acetate	<11 U
Ethylbenzene	<6.5 U
Isopropanol	66 D
M,P-Xylene	<13 U
Methyl Ethyl Ketone (2-Butanone)	45 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	29 D
Methyl Methacrylate	<6.1 U
Methylene Chloride	11 D
n-Heptane	<6.1 U
n-Hexane	740 D
o-Xylene (1,2-Dimethylbenzene)	<6.5 U
Styrene	<6.4 U
Tert-Butyl Methyl Ether	<5.4 U
Tetrachloroethene (PCE)	4.1 D
Tetrahydrofuran	<8.8 U
Toluene	11 D
Trichloroethene (TCE)	<2 U
Trichlorofluoromethane	<8.4 U

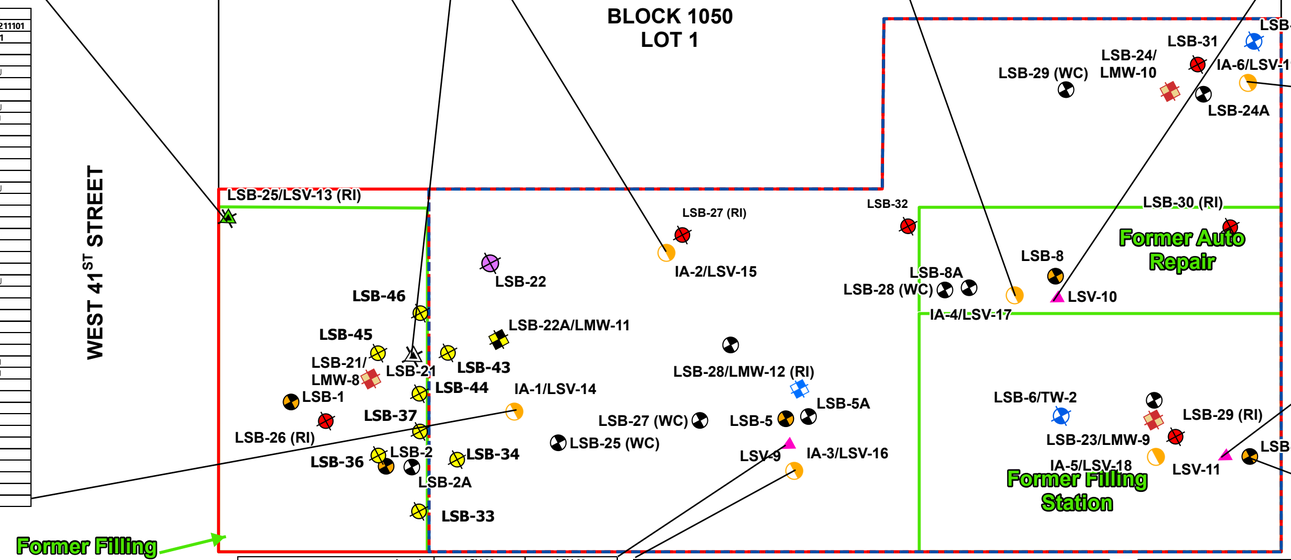
Location	IA-6
Sample Name	093_IA-6_20211101
Sample Date	11/1/2021
Sample Type	IA
VOCs	
1,1,1-Trichloroethane	<0.482 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	<0.677 U
1,2,4-Trimethylbenzene	0.738 D
1,2-Dichloroethane	<0.357 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.434 U
1,4-Dioxane (P-Dioxane)	<0.636 U
2-Hexanone (MBK)	<0.723 U
4-Bromofluorobenzene	NA
4-Ethyltoluene	0.564 D
Acetone	18.3 D
Acrylonitrile	<0.192 U
Benzene	0.536 D
Bromodichloromethane	<0.592 U
Carbon Disulfide	<0.275 U
Carbon Tetrachloride	0.556 D
Chloroform	1.64 D
Chloromethane	1.95 D
Cis-1,2-Dichloroethene	<0.175 U
Cyclohexane	0.304 D
Dichlorodifluoromethane	2.66 D
Ethyl Acetate	1.21 D
Ethylbenzene	0.537 D
Isopropanol	5.86 D
M,P-Xylene	2.03 D
Methyl Ethyl Ketone (2-Butanone)	3.8 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.362 U
Methyl Methacrylate	0.904 D
Methylene Chloride	6.47 D
n-Heptane	5.14 D
n-Hexane	0.342 D
o-Xylene (1,2-Dimethylbenzene)	0.613 D
Styrene	<0.376 U
Tert-Butyl Methyl Ether	<0.318 U
Tetrachloroethene (PCE)	3.35 D
Tetrahydrofuran	15 D
Toluene	3.59 D
Trichloroethene (TCE)	<0.119 U
Trichlorofluoromethane	13.9 D

Location	LSV-11
Sample Name	004 LSV-11_20190508
Sample Date	5/9/2019
Sample Type	SV
VOCs	
1,1,1-Trichloroethane	<1.8 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	<2.5 U
1,2,4-Trimethylbenzene	2.1 D
1,2-Dichloroethane	<1.3 U
1,3,5-Trimethylbenzene (Mesitylene)	<1.6 U
1,4-Dioxane (P-Dioxane)	<2.3 U
2-Hexanone (MBK)	<2.6 U
4-Bromofluorobenzene	9.1 BD
4-Ethyltoluene	1.6 D
Acetone	560 D
Acrylonitrile	<0.7 U
Benzene	<1 U
Bromodichloromethane	<2.2 U
Carbon Disulfide	2.1 D
Carbon Tetrachloride	0.81 D
Chloroform	<1.6 U
Chloromethane	1.7 D
Cis-1,2-Dichloroethene	<0.32 U
Cyclohexane	3.3 D
Dichlorodifluoromethane	2.7 J
Ethyl Acetate	<2.3 U
Ethylbenzene	<1.4 U
Isopropanol	21 D
M,P-Xylene	3.2 D
Methyl Ethyl Ketone (2-Butanone)	3.7 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<1.3 U
Methyl Methacrylate	<1.3 U
Methylene Chloride	8.3 D
n-Heptane	<1.2 U
n-Hexane	350 D
o-Xylene (1,2-Dimethylbenzene)	<1.4 U
Styrene	<1.4 U
Tert-Butyl Methyl Ether	<1.2 U
Tetrachloroethene (PCE)	1.8 D
Tetrahydrofuran	1.9 D
Toluene	3.7 D
Trichloroethene (TCE)	1.2 D
Trichlorofluoromethane	3.5 D

Location	LSV-09	LSV-09
Sample Name	002 LSV-9_20190509	005 DUP-1_20190509
Sample Date	5/9/2019	5/9/2019
Sample Type	SV	SV
VOCs		
1,1,1-Trichloroethane	<0.79 U	<0.82 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	<1.1 U	<1.2 U
1,2,4-Trimethylbenzene	4.2 J	1.9 J
1,2-Dichloroethane	<0.58 U	<0.61 U
1,3,5-Trimethylbenzene (Mesitylene)	1.1 D	<0.74 U
1,4-Dioxane (P-Dioxane)	<1 U	<1.1 U
2-Hexanone (MBK)	<1.2 U	<1.2 U
4-Bromofluorobenzene	9.3 BD	8.8 BD
4-Ethyltoluene	2.5 J	1.3 J
Acetone	18 J	4.2 J
Acrylonitrile	<0.31 U	<0.33 U
Benzene	<0.46 U	<0.48 U
Bromodichloromethane	2.3 J	3.3 J
Carbon Disulfide	7.6 J	12 J
Carbon Tetrachloride	0.64 D	0.57 D
Chloroform	44 D	52 D
Chloromethane	0.51 D	<0.31 U
Cis-1,2-Dichloroethene	<0.14 U	<0.15 U
Cyclohexane	<0.5 U	<0.52 U
Dichlorodifluoromethane	2.4 J	2.3 J
Ethyl Acetate	<1 U	<1.1 U
Ethylbenzene	1.4 J	0.72 J
Isopropanol	3.8 J	<0.74 UJ
M,P-Xylene	5.9 J	3.1 J
Methyl Ethyl Ketone (2-Butanone)	1.6 J	<0.45 UJ
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.59 U	<0.62 U
Methyl Methacrylate	<0.59 U	<0.62 U
Methylene Chloride	4.4 J	<1 UJ
n-Heptane	0.77 D	<0.62 U
n-Hexane	3.8 J	2 J
o-Xylene (1,2-Dimethylbenzene)	2.1 J	1.1 J
Styrene	<0.61 U	<0.64 U
Tert-Butyl Methyl Ether	<0.52 U	<0.54 U
Tetrachloroethene (PCE)	6.2 D	6.1 D
Tetrahydrofuran	<0.85 U	<0.89 U
Toluene	2.9 J	1.7 J
Trichloroethene (TCE)	0.31 J	0.57 J
Trichlorofluoromethane	1.7 D	1.5 D

Location	IA-3	IA-3	LSV-16
Sample Name	086_IA-3_20211101	087_DUP-2_20211101	088_LSV-16_20211101
Sample Date	11/1/2021	11/1/2021	11/1/2021
Sample Type	IA	AI	SSV
VOCs			
1,1,1-Trichloroethane	<0.452 U	<0.491 U	<0.792 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	<0.635 U	<0.689 U	<1.11 U
1,2,4-Trimethylbenzene	12.1 J	8.79 J	<0.714 U
1,2-Dichloroethane	<0.335 U	<0.364 U	<0.588 U
1,3,5-Trimethylbenzene (Mesitylene)	2.89 D	2.17 D	<0.714 U
1,4-Dioxane (P-Dioxane)	<0.597 U	<0.648 U	<1.05 U
2-Hexanone (MBK)	<0.679 U	<0.737 U	<1.19 U
4-Bromofluorobenzene	NA	NA	NA
4-Ethyltoluene	75 J	5.08 J	<0.714 U
Acetone	15.9 D	20.3 D	8.52 D
Acrylonitrile	<0.18 U	<0.195 U	<0.315 U
Benzene	0.609 D	0.546 D	<0.464 U
Bromodichloromethane	<0.555 U	<0.602 U	3.6 D
Carbon Disulfide	<0.258 U	<0.28 U	0.633 D
Carbon Tetrachloride	0.678 D	0.679 D	0.548 D
Chloroform	2.67 D	2.9 D	44.6 D
Chloromethane	1.16 D	1.52 J	<0.3 U
Cis-1,2-Dichloroethene	<0.164 U	<0.178 U	<0.288 U
Cyclohexane	0.285 D	<0.309 U	<0.5 U
Dichlorodifluoromethane	2.58 D	2.71 D	2.73 D
Ethyl Acetate	1.46 D	1.13 D	<1.05 U
Ethylbenzene	5.44 J	3.08 J	<0.631 U
Isopropanol	23 D	21.4 D	<0.714 U
M,P-Xylene	23.6 J	14.3 J	<1.26 U
Methyl Ethyl Ketone (2-Butanone)	2.86 D	2.47 D	1.54 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.34 U	<0.368 U	<0.595 U
Methyl Methacrylate	<0.339 UJ	0.883 J	<0.594 U
Methylene Chloride	2.16 J	7.31 J	<1.01 U
n-Heptane	1.46 D	1.47 D	<0.595 U
n-Hexane	0.321 D	<0.317 U	<0.512 U
o-Xylene (1,2-Dimethylbenzene)	7.81 J	4.76 J	<0.63 U
Styrene	<0.353 U	<0.383 U	<0.619 U
Tert-Butyl Methyl Ether	<0.299 U	<0.324 U	<0.523 U
Tetrachloroethene (PCE)	3.37 D	3.35 D	4.14 D
Tetrahydrofuran	0.758 D	<0.53 U	1.07 D
Toluene	4.31 D	4.81 D	<0.547 U
Trichloroethene (TCE)	<0.111 U	<0.121 U	<0.195 U
Trichlorofluoromethane	2.61 D	2.63 D	1.63 D

Location	IA-5	LSV-18
Sample Name	091_IA-5_20211101	092_LSV-18_20211101
Sample Date	11/1/2021	11/1/2021
Sample Type	IA	SSV
VOCs		
1,1,1-Trichloroethane	<0.525 U	<0.821 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.738 D	<1.15 U
1,2,4-Trimethylbenzene	0.473 D	2.59 D
1,2-Dichloroethane	<0.39 U	<0.609 U
1,3,5-Trimethylbenzene (Mesitylene)	<0.473 U	1.11 D
1,4-Dioxane (P-Dioxane)	<0.694 U	<1.08 U
2-Hexanone (MBK)	<0.789 U	<1.23 U
4-Bromofluorobenzene	NA	NA
4-Ethyltoluene	0.473 D	1.48 D
Acetone	787 D	35 D
Acrylonitrile	<0.209 U	<0.327 U
Benzene	0.615 D	1.39 D
Bromodichloromethane	<0.645 U	<1.01 U
Carbon Disulfide	<0.3 U	35.8 D
Carbon Tetrachloride	0.606 D	0.568 D
Chloroform	0.752 D	1.91 D
Chloromethane	1.43 D	0.404 D
Cis-1,2-Dichloroethene	<0.191 U	<0.298 U
Cyclohexane	<0.331 U	<0.518 U
Dichlorodifluoromethane	2.76 D	2.9 D
Ethyl Acetate	1.56 D	<1.08 U
Ethylbenzene	<0.418 U	<0.654 U
Isopropanol	46.9 D	3.18 D
M,P-Xylene	1.13 D	2.16 D
Methyl Ethyl Ketone (2-Butanone)	0.824 D	5.24 D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	<0.394 U	<0.617 U
Methyl Methacrylate	<0.394 U	1.6 D
Methylene Chloride	<0.669 U	13.2 D
n-Heptane	0.513 D	0.925 D
n-Hexane	0.339 D	<0.53 U
o-Xylene (1,2-Dimethylbenzene)	0.46 D	0.849 D
Styrene	<0.41 U	<0.641 U
Tert-Butyl Methyl Ether	<0.347 U	<0.543 U
Tetrachloroethene (PCE)	<0.653 U	<1.02 U
Tetrahydrofuran	<0.568 U	1.11 D
Toluene	1.45 D	2.5 D
Trichloroethene (TCE)	0.155 D	<0.202 U
Trichlorofluoromethane	1.89 D	1.78 D



0 20 40
SCALE IN FEET

Notes:
1. Property boundary digitized from basemap and measurements provided on the New York City Digital Tax Map maintained online by the Department of Finance
2. Building outline provided in Covenant House Building Massing & Stacking, 8 May 2017, by F X Fowle, Denham, Wolf and CH Phase 2 plan, 14 July 2018, by Handel Architects, LLP.
3. Soil boring, temporary monitoring well, and soil vapor sampling locations based on field measurements. Permanent monitoring well locations based on survey data.
4. Historical filling station and automobile repair locations obtained from Sanborn Fire Insurance Maps provided in the Phase I Environmental Site Assessment prepared by TRC Engineers, Inc., dated September 2015.
5. AOC-1 consists of historic fill, which is present throughout the Site.

Legend

- Site Boundary
- Historical Use of Concern
- Existing Building Outline
- Tax Lot/Block Boundary

October/November 2021 RI Sampling Locations

- Indoor Air Sample/Sub-Slab Soil Vapor Point Location
- Soil Boring Location
- Soil Boring/Permanent Monitoring Well Location
- Soil Boring/Exterior Soil Vapor Point Location
- Delineation Soil Boring

Historical Sampling Locations

- Soil Boring Location (February 2021)
- Soil Boring/Permanent Monitoring Well Location (February 2021)
- Soil Boring/Soil Vapor Location (February 2021)
- Soil Vapor Location (2019)
- Soil Boring Location (2018)
- Soil Boring/Permanent Monitoring Well Location (2018)
- Soil Boring Location (2017)
- Soil Boring/Temporary Well Point Location (2017)

Notes:
NA - Ambient Air
IA - Indoor Air
SV - Soil Vapor
SSV - Sub-slab Soil Vapor
ug/m3 - microgram per cubic meter
RL - Reporting limit
- - Not detected

Indoor air sample analytical results are compared to the New York State Department of Health (NYSDOH) Air Guideline Values (AGVs) as set forth in the NYSDOH October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York and subsequent updates (2013, 2015).
Ambient air sample analytical results are shown for reference only.
NYSDOH Air Guideline Values (AGVs) as set forth in the New York State Department of Health (NYSDOH) October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York and subsequent updates (2013, 2015) are shown for reference only.

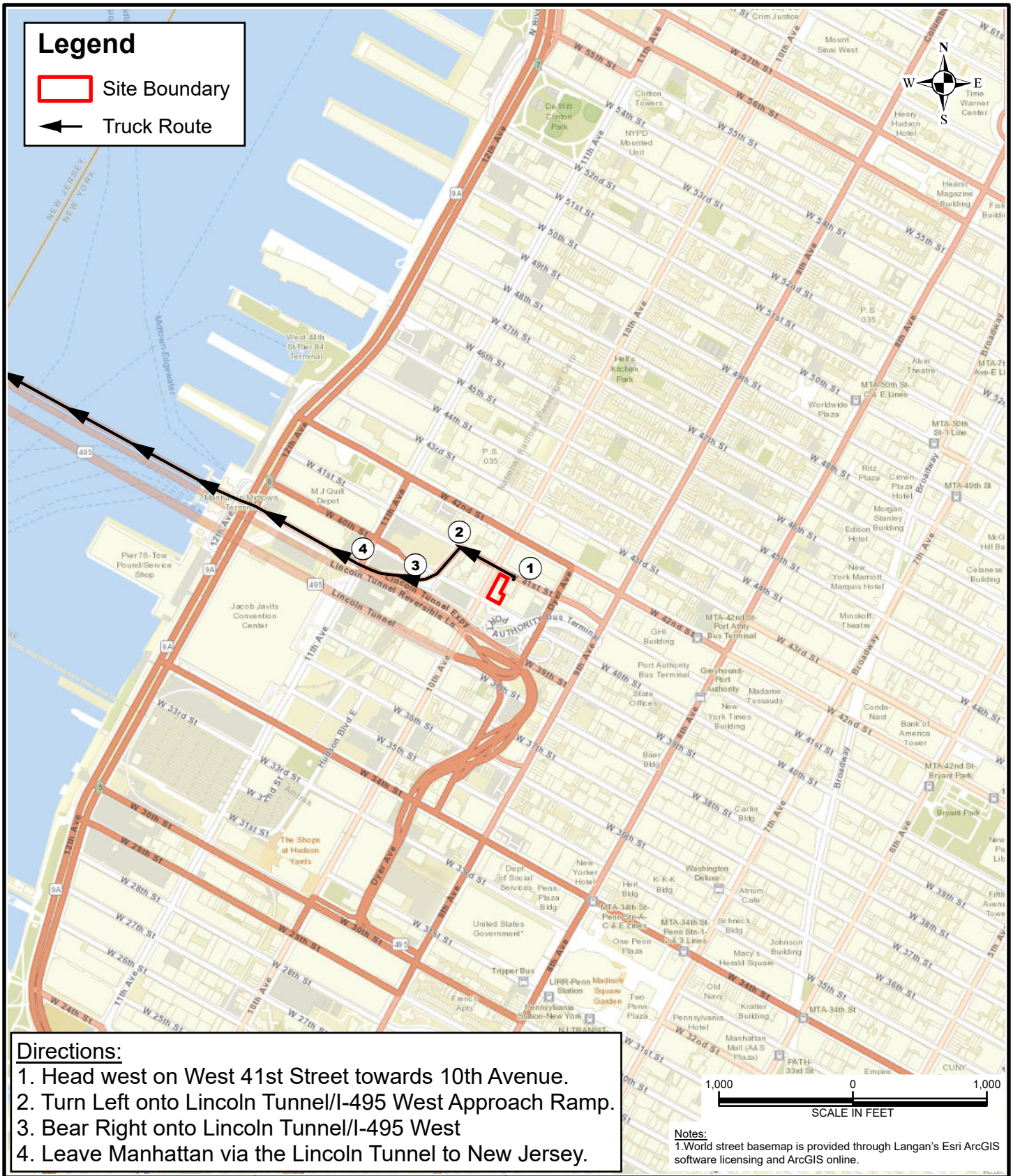
Qualifiers:
D - The concentration reported is a result of a diluted sample.
J - The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
UJ - The analyte was not detected at a level greater than or equal to the RL; however, the reported RL is approximate and may be inaccurate or imprecise.
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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NEW JERSEY NEW YORK VIRGINIA CALIFORNIA PENNSYLVANIA CONNECTICUT FLORIDA
ABU DHABI ATHENS DOHA DUBAI ISTANBUL
Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

Project	550 10TH AVENUE REDEVELOPMENT BCP Site No. C231148 BLOCK No. 1050, LOT No. 61 MANHATTAN NEW YORK COUNTY NEW YORK
Drawing Title	SOIL VAPOR AND INDOOR AIR SAMPLE ANALYTICAL RESULTS
Project No.	100674402
Figure	7
Date	12/11/2023
Scale	1:240
Drawn By	IHB
Submission Date	12/11/2023

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Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\APRX\1A\Figure 1A.aprx Date: 12/11/2023 User: ibaker Time: 12:17 PM



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Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
550 TENTH AVENUE
FILLING STATION SITE
BCP Site No. C231148
BLOCK No. 1050,
LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
TRUCK
ROUTE MAP

Project No. 100674401	Figure 8
Date 12/28/2021	
Scale 1"=2,000'	
Drawn By IHB	
Submission Date 12/11/2023	

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APPENDIX A

Environmental Easement

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

THIS INDENTURE made this 17th day of November, 2023 between Owner, GO Covenant LLC, having an office at c/o Gotham Organization Inc., 432 Park Avenue South, 2nd Floor, New York, NY 10016 (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, is the owner of real property located at the address of 550 Tenth Avenue, in the City of New York, County of New York and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 1050 Lot 61, being the same as that property conveyed to Grantor by deed dated November 12, 2021, and recorded in the City Register of the City of New York as CRFN # 2021000468114. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.365 +/- acres, and is hereinafter more fully described in the Land Title Survey dated September 15, 2017 and updated August 3, 2021 and October 5, 2021 prepared by John J. Vida of True North Surveyors, P.C., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; 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 Index Number: C231148-09-21, as amended by Amendment #1 on September 15, 2023, 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: C231148
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 has caused this instrument to be signed in its name.

GO Covenant LLC:

By: _____

Print Name: David Picket

Title: Authorized Signatory Date: 10/25/23

Grantor's Acknowledgment

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

On the 25th day of October, in the year 2023, before me, the undersigned, personally appeared David Picket, 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

LISA GERECITANO
NOTARY PUBLIC, STATE OF NEW YORK
Registration No. 01GE6350245
Qualified in Kings County
Commission Expires November 7, 2024

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: Andrew Guglielmi
Andrew O. Guglielmi, Director
Division of Environmental Remediation

Grantee's Acknowledgment

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

On the 17th day of November in the year 2023 before me, the undersigned, personally appeared Andrew O. Guglielmi, 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

DEED DESCRIPTION/ LEGAL DESCRIPTION OF BROWNFIELD CLEANUP PROGRAM SITE ENVIRONMENTAL EASEMENT AREA

BLOCK 1050 LOT 61

ALL THAT CERTAIN PLOT, PIECE OR PARCEL OF LAND, SITUATE, LYING AND BEING IN THE BOROUGH OF MANHATTAN, COUNTY, CITY AND STATE OF NEW YORK, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT THE CORNER FORMED BY THE INTERSECTION OF THE SOUTHERLY SIDE OF WEST 41ST STREET WITH THE EASTERLY SIDE OF 10TH AVENUE;

RUNNING THENCE EASTERLY ALONG THE SAID SOUTHERLY SIDE OF WEST 41ST STREET, 69.00 FEET TO A POINT;

RUNNING THENCE SOUTHERLY ALONG A LINE PERPENDICULAR TO THE SOUTHERLY SIDE OF WEST 41ST STREET AND PARALLEL WITH THE EASTERLY SIDE OF 10TH AVENUE, 123.75 FEET TO A POINT;

RUNNING THENCE EASTERLY ALONG A LINE PERPENDICULAR TO THE EASTERLY SIDE OF 10TH AVENUE AND PARALLEL WITH THE SOUTHERLY SIDE OF WEST 41ST STREET, 31.00 FEET TO A POINT;

RUNNING THENCE SOUTHERLY ALONG A LINE PERPENDICULAR TO THE SOUTHERLY SIDE OF WEST 41ST STREET AND PARALLEL WITH THE EASTERLY SIDE OF 10TH AVENUE, 73.75 FEET TO A POINT IN THE NORTHERLY SIDE OF WEST 40TH STREET;

RUNNING THENCE WESTERLY ALONG THE NORTHERLY SIDE OF WEST 40TH STREET, 100.00 FEET TO THE CORNER FORMED BY THE INTERSECTION WITH THE EASTERLY SIDE OF 10TH AVENUE;

RUNNING THENCE NORTHERLY ALONG THE EASTERLY SIDE OF 10TH AVENUE, 197.50 FEET TO THE CORNER FORMED BY THE INTERSECTION WITH THE SOUTHERLY SIDE OF WEST 41ST STREET, THE POINT OR PLACE OF BEGINNING.

LOT 61 LOT AREA: 15,913.75 SQ. FT./ 0.365 ACRES±

APPENDIX B

List of Site Contacts

LIST OF SITE CONTACTS

550 TENTH AVENUE FILLING STATION SITE, NEW YORK, NEW YORK
BROWNFIELD CLEANUP PROGRAM SITE NO. C231148

Key contacts for this project are as follows:

Site Owner and Remedial Party:

GO Covenant LLC
Bryan Kelly
Telephone: (212) 716-2502
E-mail: bkelly@gothamorg.com

Remedial Party's Consultant:

Langan Engineering Project Manager
Amanda Forsburg, CHMM
Telephone: (973) 560-4900
E-mail: aforsburg@langan.com

Langan Engineering Remedial Engineer
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APPENDIX C

Boring and Well Logs

LANGAN

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LOG OF BORING LSB-1 **SHEET** 1 **OF** 2

PROJECT 550 10th Avenue	PROJECT NO. 100674.40
LOCATION New York, New York	ELEVATION AND DATUM ~EL +24.5 Feet NAVD 88
DRILLING AGENCY COASTAL ENVIRONMENTAL	DATE STARTED 11/20/17 — DATE FINISHED 11/20/17
DRILLING EQUIPMENT Geoprobe 6610 DT	COMPLETION DEPTH 20' — ROCK DEPTH NA
SIZE AND TYPE OF BIT 2 1/2" DIA x 5'L MACROCORE	NO. SAMPLES — DIST. — UNDIST. 4' — CORE —
CASING 2 1/2" DIA x 5'L MACROCORE	WATER LEVEL — FIRST 17.5' — COMPL. — — 24 HR. —
CASING HAMMER — WEIGHT — DROP —	FOREMAN COASTAL / MARK MORGENSTERN
SAMPLER 2" DIA x 5'L ACETATE LINED MACROCORE	LOGGED BY LANGAN / MATT OLESKE
SAMPLER HAMMER — WEIGHT — DROP —	

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLG/6 IN. (ppm)	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	4" ASPHALT PAVEMENT. 0-15" Dark Br f→C SAND, tr. Asphalt, tr. f→m Gravel, tr. Plastic Debris (dry). 15-32" M. Br f-C SAND, some Concrete, tr. f→m Gravel. 0-9" Cored through Red BRICK. 9-27" Lt to M. Br f→C SAND, some Red Brick, tr. f→m Gravel, tr. Concrete. (DRY). 0-24" Lt. to M. Br f→C SAND, tr. f→M Gravel, tr. weathered Mica Schist, tr. Red Brick, tr. brown Silt. (Dry).	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	1 2 3	DIRECT PUSH DIRECT PUSH DIRECT PUSH	32" 27" 24"	0.0 0.0 0.0	

LANGAN

JOB NO. 100674402
DATE 11/20/17

LOG OF BORING NO. LSB-1

SHEET 2 OF 2

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/	PID ppm.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	0-16" Grayish Brown Silty SAND, tr. Red Brick (moist). 16-29" Same as above 0-16" (WET).	16 17 18 19 20	4	Direct Push	29"	0.0		Collect Sample LSB-1 (15-17') VOC @ 16.5-17'
		21 22 23 24 25						END of boring @ 20' bgs.

LANGAN

LOG OF BORING LSB-2 **SHEET** 1 **OF** 2

PROJECT 550 10th Avenue	PROJECT NO. 100674462
LOCATION New York, New York	ELEVATION AND DATUM ~EL +24.5 feet NAVD 88
DRILLING AGENCY Coastal Environmental	DATE STARTED 11/20/17 — DATE FINISHED 11/20/17
DRILLING EQUIPMENT Geoprobe 6610 DT	COMPLETION DEPTH 20' — ROCK DEPTH NA
SIZE AND TYPE OF BIT 2 1/2" Dia x 5'L Macrocore	NO. SAMPLES DIST. — UNDIST. 4 CORE —
CASING 2 1/2" Dia x 5'L Macrocore	WATER LEVEL FIRST 17.5 COMPL. — 24 HR. —
CASING HAMMER WEIGHT — DROP —	FOREMAN Coastal / Mark Morgenstern
SAMPLER 2" Dia x 5'L Acetate Lined Macrocore	LOGGED BY Langan / Matt Oleske
SAMPLER HAMMER WEIGHT — DROP —	

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLG/6"	PID (ppm)	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	6" Asphalt Pavement. 0-7" Dark Br. f→C SAND, tr. f-m Gravel, tr. Red Brick, tr. Asphalt. (DRY). 7-28" Grayish Brown f→C SAND, some f→C Gravel, tr. Red Brick, tr. Concrete. (DRY).	1 2 3 4 5	1	Direct Push	28"	0.0		
	0-18" Br. f→C SAND, some Red Brick, tr. f→m Gravel, tr. weathered Mica Schist Rock. (DRY).	6 7 8 9 10	2	Direct Push	18"	0.0		
NATIVE	0-10" Brown f→C SAND, tr. Br Silt, tr. f→M Gravel, tr. Red Brick. 10-12" Weathered Mica SCHIST 12-24" Lt to M. Br f→C SAND, some Gray Silt, tr. f→m Gravel (DRY).	11 12 13 14 15	3	Direct Push	24"	0.0		

LANGAN

JOB NO. 100674402
DATE 11/20/17

LOG OF BORING NO. LSB-2
SHEET 2 OF 2

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLS/6in.	PID (ppm)	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
NATIVE	0-16" Grayish Brown Silty SAND, tr. f→m Gravel (moist). 16-37" Same as above 0-16" (WET).	16 17 18 19 20	4	DIRECT PUSH	37"	0.0	NIL	Collect Sample LSB-2(15-17') VOC@ 16-16.5'
		21 22 23 24 25						E.O.B. @ 20' bgs.

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Log of Boring **LSB-2A** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx el 24.5 -feet NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 2/11/21 / Date Finished: 2/11/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 18 ft / Rock Depth: ---
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 / Undisturbed 6 / Core 0
Casing Diameter (in): 2 / Casing Depth (ft): NA	Water Level (ft.): First 12.5 / Completion --- / 24 HR. ---
Casing Hammer: NA / Weight (lbs): NA / Drop (in): NA	Drilling Foreman: Tom Seickel
Sampler: 3' x 2" Acetate Lined Macrocore	Field Engineer: Michael Au
Sampler Hammer: NA / Weight (lbs): NA / Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5								
FILL	+24.3	[ASPHALT]	0	M-1A					Started drilling at 2/11/2021 6:40 PM. M-1 at 0ft
		Brown coarse SAND, trace fine gravel, brick (dry) [FILL]	1		Macrocore	20		0.0	Collected sample LSB-2A_0-2_20210211 from 0 to 2ft. VOCs collected from 0.5 to 1ft. 7:00 PM. Added 0- to 9-foot interval to composite sample WC-1A. VOCs for WC-1A collected from 1 to 1.5ft.
			2	M-1B				0.0	
		No Recovery	3	M-2	Macrocore	0			M-2 at 3ft
			4						
			5						
		Brown coarse SAND, some fine gravel, brick (dry) [FILL]	6	M-3A					M-3 at 6ft
		Brick [FILL]	7		Macrocore	12		0.0	
			8	M-3B				0.0	
		Brick [FILL]	9	M-4A				0.0	M-4 at 9ft
NATIVE		Brown medium SAND, trace coarse sand (moist)	10	M-4B	Macrocore	14		0.0	
		Brown silty fine SAND, trace fine gravel (moist)	11	M-4C				0.0	Collected sample LSB-2A_11-13_20210211 and DUP01_20210211 from 11 to 13ft. 7:15 PM. Added 9- to 18-foot interval to composite sample WC-1B.
		Brown fine SAND, trace fine gravel (moist)	12	M-5A				0.0	M-5 at 12ft
		Brown silty fine SAND, trace coarse sand (wet)	13		Macrocore	20		0.0	
			14	M-5B				0.0	
		Brown silty fine SAND (wet)	15					0.0	M-6 at 15ft
			16	M-6A	Macrocore	30		0.0	
		Dark brown silty fine SAND (wet)	17					0.0	
			18	M-6B				0.0	Bottom of boring at 2/11/2021 7:20 PM.
			19						
			20						

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LOG OF BORING LSB-5 **SHEET** 1 **OF** 1

PROJECT 550 10th Avenue	PROJECT NO. 100674402
LOCATION New York, New York	ELEVATION AND DATUM ~CL +14 feet NAVD 88
DRILLING AGENCY Coastal Environmental.	DATE STARTED 11/21/17 — DATE FINISHED 11/21/17
DRILLING EQUIPMENT Geoprobe Pneumatic Hammer Limited Access	COMPLETION DEPTH 3.5 — ROCK DEPTH 3.5
SIZE AND TYPE OF BIT 2½" Dia x 3'L Macrocore	NO. SAMPLES DIST. — UNDIST. 2 CORE —
CASING 2½" DIA x 3'L Macrocore	WATER LEVEL FIRST — COMPL. — 24 HR. —
CASING HAMMER WEIGHT — DROP —	FOREMAN Coastal / Mark Morgenstern
SAMPLER 2" Dia x 3'L Acetate Lined Macrocore	LOGGED BY Langan / Matt Oleske
SAMPLER HAMMER WEIGHT — DROP —	

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	10" Concrete Floor Slab. 0-6" CONCRETE, some F→M Gravel (DRY). 6-30" Lt Br. F→C SAND, tr. Red Brick, tr. f-M Gravel (DRY)	1 2 3	1	Direct Push	30"	0.0	Collected LSB-5(1-3) VOC @ 2.5-3'
NATIVE	0-6" Weathered Mica SCHIST (dry).		N		6"	0.0	
		4					END of Boring @ 3.5' bgs. Refusal on Mica Schist Rock.
		5					
		6					
		7					
		8					
		9					
		10					
		11					
		12					
		13					
		14					

LANGAN

Log of Boring **LSB-5A** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx el 14 -feet NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 2/10/21 — Date Finished: 2/10/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 10 ft — Rock Depth: ---
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 3 — Core 0
Casing Diameter (in): 2 — Casing Depth (ft): NA	Water Level (ft.): First ▽ 1 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Tom Seickel
Sampler: 3' x 2" Acetate Lined Macrocore	Field Engineer: Michael Au
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

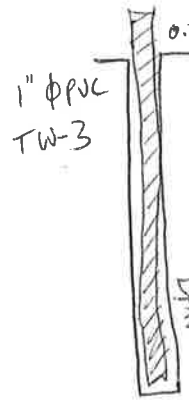
Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+14.0	Concrete	0						Started drilling at 2/10/2021 12:15 PM.
	+13.0	Concrete	1						
FILL		Brownish gray fine SAND, trace fine gravel (moist) [FILL]		M-1A				0.0	M-1 at 1ft
			2	M-1B	Macrocore	29		0.0	
		Brick [FILL]						0.0	Collected sample LSB-5A_2-4_20210210 from 2 to 4ft. 12:45 PM. Added 0- to 6.5- foot interval to composite sample WC-3. VOCs for WC-3 collected from 2 to 2.5ft.
			3	M-1C				0.0	
		Brown fine SAND, some brick, some weathered micha schist (moist) [FILL]	4					0.0	M-2 at 4ft
		Dark brown fine SAND, trace fine gravel (wet) [FILL]		M-2A				0.0	
			5		Macrocore	18		0.0	
				M-2B				0.0	
			6						
		Brown fine SAND, some fine gravel, brick (wet) [FILL]	7					0.0	M-3 at 7ft
								0.0	
			8	M-3A				0.0	
NATIVE		Brown silty fine SAND (wet)			Macrocore	36		0.0	
			9	M-3B				0.0	
			10					0.0	Bottom of boring at 2/10/2021 1:00 PM.
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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LANGAN

LOG OF BORING LSB-6 **SHEET** 1 **OF** 1

PROJECT 550 10th Avenue	PROJECT NO. 100674402
LOCATION New York, New York	ELEVATION AND DATUM ~EL + 13 feet NAVD 88
DRILLING AGENCY COASTAL ENVIRONMENTAL	DATE STARTED 11/21/17 — DATE FINISHED 11/21/17
DRILLING EQUIPMENT Geoprobe 420M	COMPLETION DEPTH 5.25' — ROCK DEPTH 5.25'
SIZE AND TYPE OF BIT 2 1/2" DIA x 3'L MACROCORE	NO. SAMPLES — DIST. — UNDIST. 2 — CORE —
CASING 2 1/2" DIA x 3'L MACROCORE	WATER LEVEL FIRST 4.5 — COMPL. — — 24 HR. —
CASING HAMMER — WEIGHT — DROP —	FOREMAN COASTAL / MARK MORGENSTERN
SAMPLER 2"DIA x 3'L ACETATE LINED MACROCORE	LOGGED BY LANGAN / MATT OLESKE
SAMPLER HAMMER — WEIGHT — DROP —	

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLG/6"	PID (ppm)	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	CORE DRILL THROUGH 10" CONCRETE 0-12" Light to medium Brown f→C SAND, tr. f→M Gravel, tr Red Brick. (Dry). 12-36" Dark Brown f→C SAND, tr. f→M Gravel, tr Red Brick (Dry).	1	1	DIRECT PUSH	36"	0.0 0.0 32.0 67.0 97.0 104.0 82.0 15.0		Odor @ 1' to 3' bgs. Collect Sample LSB-6 (1-3) from 1'-3' bgs VOC grab @ 2'-2.5' bgs.
NATIVE	0-6" Lt to M Brown f→C SAND, tr. f-m Gravel, tr Red Brick, tr. Gray Silt (moist). 6-20" Lt to M. Brown f→C SAND, some Gray Silt, tr. f. Gravel. (wet @ 18" to 20").	2 3 4 5	N	DIRECT PUSH	20"	3.0 1.8 0.0 0.0 0.0 0.0		▽
		6 7 8 9 10 11 12 13 14						END OF BORING @ 5.25' bgs. Refusal on Mica Schist Rock 

LANGAN

LOG OF BORING LSB-7 **SHEET** 1 **OF** 1

PROJECT 550 10th Avenue	PROJECT NO. 100674462
LOCATION New York, New York	ELEVATION AND DATUM ~EL +13 feet NAVD 88
DRILLING AGENCY Coastal Environmental	DATE STARTED 11/20/17 / DATE FINISHED 11/20/17
DRILLING EQUIPMENT Geoprobe 420 M	COMPLETION DEPTH 2.5' / ROCK DEPTH 2.5'
SIZE AND TYPE OF BIT 2½ Dia x 3'L Macrocore	NO. SAMPLES DIST. — UNDIST. 1 CORE —
CASING 2½" DIA x 3'L Macrocore	WATER LEVEL FIRST — COMPL. — 24 HR. —
CASING HAMMER WEIGHT — DROP —	FOREMAN Coastal / Mark Morgenstern
SAMPLER 2" Dia x 3'L Acetate Lined Macrocore	LOGGED BY Langan / Matt Oleske
SAMPLER HAMMER WEIGHT — DROP —	

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6in.	PID (ppm)	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	7" Thick Concrete Slab 0-20" M. Br. f→C SAND, tr. f-m Gravel, tr. Concrete, tr. Weathered Mica Schist Rock (DRY).	1 2	—	Direct Push	20"	0.0		Collect Sample LSB-7(0-2) VOC @ 1.5-2'
		3 4 5 6 7 8 9 10 11 12 13 14						Refusal on Mica Schist Rock @ 2.5' bgs.

LANGAN

LOG OF BORING LSB-8 **SHEET** 1 **OF** 1

PROJECT 550 10th Avenue	PROJECT NO. 100674402
LOCATION New York, New York	ELEVATION AND DATUM ~EL +13 feet NAVD 88
DRILLING AGENCY Coastal Environmental	DATE STARTED 11/20/17 — DATE FINISHED 11/20/17
DRILLING EQUIPMENT Geoprobe 420M	COMPLETION DEPTH 2.5 — ROCK DEPTH 2.5
SIZE AND TYPE OF BIT 2½" Dia x 3'L Macrocore	NO. SAMPLES DIST. — UNDIST. 1 CORE —
CASING 2½" Dia x 3'L Macrocore	WATER LEVEL FIRST — COMPL. — 24 HR. —
CASING HAMMER WEIGHT — DROP —	FOREMAN Coastal / Mark Morgenstern
SAMPLER 2" Dia x 3'L Acetate Lined Macrocore	LOGGED BY Langan / Matt Oleske
SAMPLER HAMMER WEIGHT — DROP —	

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLS/6in.	PID (ppm)	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	6" Concrete Slab. 0-16" Lt Br. f-C SAND, tr. Red Brick tr. f-m Gravel, tr. Granite (Dry).	1 2	–	Direct Push	16"	8		Collect LSB-8 (0-2) VOC @ 1.5-2'
		3 4 5 6 7 8 9 10 11 12 13 14						E.O.B. @ 2.5' bgs. Refusal on Granite.

LANGAN

Log of Boring **LSB-8A** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx el 13 -feet NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 2/11/21 — Date Finished: 2/11/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 16 ft — Rock Depth: ---
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 5 — Core 0
Casing Diameter (in): 2 — Casing Depth (ft): NA	Water Level (ft.): First ▽ 4 — Completion ▼ --- — 24 HR. ▼ ---
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Tom Seickel
Sampler: 3' x 2" Acetate Lined Macrocore	Field Engineer: Michael Au
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
FILL	+13.0	Concrete	0						Started drilling at 2/11/2021 2:30 PM.
	+12.0	Concrete Grayish brown fine SAND, wood (moist) [FILL]	1	M-1A	Macrocore	7		0.0 48.2	Collected sample LSB-8A_0-2_20210211 from 0 to 2ft. 4:40 PM. Added 0- to 6.5-foot interval to composite sample WC-2. VOCs for WC-2 taken from 0.5 to 1ft.
			2						
			3	M-1B					M-1 at 1ft Slight odor observed
		Brown coarse SAND, trace fine gravel (wet) [FILL]	4 ▽	M-2A	Macrocore	24		0.0 0.0	M-2 at 4ft
		Brownish gray silty fine SAND (moist) [FILL]	5					0.0 0.0	
			6					0.0 0.0	
		Brown coarse SAND, trace fine gravel (wet) [FILL]	7	M-3A				0.0	M-3 at 7ft
		Brownish gray silty fine SAND (wet) [FILL]	8	M-2B	Macrocore	12		0.0 0.0	
			9	M-3B					
		Brown silty fine SAND, trace brick, trace fine gravel (wet) [FILL]	10	M-4	Macrocore	18		0.0 0.0	M-4 at 10ft
			11					0.0 0.0	
			12					0.0 0.0	
NATIVE		Brown silty fine SAND (wet)	13					0.0 0.0	M-5 at 13ft. Added 6.5- to 16-foot interval to composite sample WC-5. VOCs for WC-5 taken from 13 to 13.5ft.
			14	M-5A	Macrocore	36		0.0 0.0	
		Dark brown silty fine SAND (moist)	15					0.0 0.0	
			16	M-5B				0.0	Bottom of boring at 2/11/2021 3:15 PM.
			17						
			18						
			19						
			20						

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LANGAN

LOG OF BORING LSB-9 **SHEET** 1 **OF** 1

PROJECT 550 10th Avenue	PROJECT NO. 100674402
LOCATION New York, New York	ELEVATION AND DATUM ~EL +9.5 feet NAVD 88
DRILLING AGENCY Coastal Environmental	DATE STARTED 11/20/17 — DATE FINISHED 11/20/17
DRILLING EQUIPMENT Geoprobe 420 M	COMPLETION DEPTH 9' — ROCK DEPTH 9'
SIZE AND TYPE OF BIT 2 1/2" DIA x 3'L Macrocore	NO. SAMPLES — DIST. — UNDIST. 3 — CORE —
CASING 2 1/2" DIA x 3'L Macrocore	WATER LEVEL — FIRST 1' — COMPL. — — 24 HR. 1'
CASING HAMMER — WEIGHT — — DROP —	FOREMAN Coastal / Mark Morgenstern
SAMPLER 2" Dia x 3'L Acetate Lined Macrocore	LOGGED BY Langan / Matt Oleske
SAMPLER HAMMER — WEIGHT — — DROP —	

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PID Reading (PPM)	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	6" Reinforced Concrete Slab 0-3" Grayish Brown Sandy SILT, tr. F-M Gravel, tr. Red Brick (moist). 3-12" Dark Br. f-C SAND, tr. f-m Gravel, tr. Gray Silt, tr Red Brick (WET)	1 2 3	C	Direct Push	12"	0.0 0.0 0.0 0.0 0.0 0.0	COLLECT SAMPLE LSB-9 (0-2) VOC @ 0.5-1'
NATIVE	0-36" Grayish Brown Sandy SILT, tr. Wood, tr. f-m Gravel (wet)	4 5 6	N	Direct Push	36"	0.0 0.0 0.0 0.0 0.0 0.0	1" ϕ PVC. 2' Stickup — Completed with Temp Well TW-2. 3' 6' backfilled w/ cuttings and Sand to 6' 9'
	0-36" Same as above 0-36"	7 8 9	M	Direct Push	36"	0.0 0.0 0.0 0.0 0.0	EOB @ 9' bgs (basement floor slab), Refusal on Mica Schist at top of Macrocore.
		10 11 12 13 14					

LANGAN

Log of Boring **LSB-21** Sheet 1 of 2

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el +24 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 12/5/18 / Date Finished: 12/5/18
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 20 ft / Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0, Undisturbed 4, Core 0
Casing Diameter (in): 2 / Casing Depth (ft): NA	Water Level (ft.): First ▽ 15, Completion ▼ NA, 24 HR. ▼ NA
Casing Hammer: NA / Weight (lbs): NA / Drop (in): NA	Drilling Foreman: Sharohn Dixon
Sampler: 2' x 2" Acetate Lined Macrocore	Field Engineer: Allyson Kritzer
Sampler Hammer: NA / Weight (lbs): NA / Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
FILL		Dark black GRAVEL, some concrete (dry)[ASPHALT]	0						Started Drilling at 12/5/2018 11:05 AM. M-1 at 0ft
			1	M-1A					PID not on site
		Dark brown f-m SAND, some brick, some concrete, some f-c gravel, trace silt (dry)[FILL]	2		Macrocore	28			
			3						
			4	M-1B					
		Brown f-m SAND, some brick, some silt, some f-m gravel, trace concrete, trace coarse sand (dry)[FILL]	5						M-2 at 5ft
			6	M-2A					
		Brownish gray SILT, some clay, some c-f sand, trace fine gravel (moist)	7		Macrocore	28			
			8						
			9	M-2B					
		Dark brown sandy SILT, trace brick, trace clay, trace fine gravel (moist)[FILL]	10	M-3A					M-3 at 10ft
NATIVE		Brown SILT, some f-c gravel, trace clay, trace f-c sand, some crushed/weathered mica schist (moist)	11		Macrocore	32			
			12						
			13						Grab sample LSB-21 from 13'-15'. VOC from 14.5'-15'. 1213 PM
			14	M-3B					
		Dark brownish gray silty CLAY, some f-c sand, trace m-c gravel (wet)	15 ▽						M-4 at 15ft
			16						
			17	M-4	Macrocore	33			
			18						
			19						Bottom of boring at 12/5/2018 1140 AM. LMW-8 installed to 20-feet bgs. 10 foot screen, 10 foot riser.
			20						

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Log of Boring **LSB-21A** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx el 24.5 -feet NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 2/11/21 / Date Finished: 2/11/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 18 ft / Rock Depth: ---
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 / Undisturbed 6 / Core 0
Casing Diameter (in): 2 / Casing Depth (ft): NA	Water Level (ft.): First ▽ 15 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: NA / Weight (lbs): NA / Drop (in): NA	Drilling Foreman: Tom Seickel
Sampler: 3' x 2" Acetate Lined Macrocore	Field Engineer: Michael Au
Sampler Hammer: NA / Weight (lbs): NA / Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5								
FILL	+24.3	Asphalt	0						Started drilling at 2/11/2021 5:30 PM. M-1 at 0ft
		Brownish gray medium sand, some fine gravel, concrete (dry) [FILL]	1	M-1B				0.0	
				M-1A	Macrocore	16		0.0	
			2	M-1C				0.0	Collected sample LSB-21A_0-2_20210211 from 0 to 2ft. VOCs taken from 0.5 to 1.0ft. 6:25 PM. Added 0- to 9- foot interval to composite sample WC-1A.
		Gray fine GRAVEL, some coarse sand (dry) [FILL]	3					0.0	M-2 at 3ft
		Brown medium SAND, brick, concrete (dry) [FILL]		M-2A				0.0	
			4		Macrocore	15		0.0	
								0.0	
			5	M-2B				0.0	
								0.0	
		Brown coarse SAND, brick (dry) [FILL]	6					0.0	M-3 at 6ft
		Light gray medium SAND, some coarse sand (dry) [FILL]		M-3A				0.0	
		Black medium-fine SAND [moist) [FILL]	7	M-3B				8.2	
		Brick [FILL]		M-3C	Macrocore	20		4.3	Collected sample LSB-21A_7-8_20210211 (HOLD) from 7 to 8ft. VOCs taken from 7 to 7.5ft. 6:15 PM. Coal-like odor observed
			8					0.0	
				M-3D				0.0	
		Dark brown coarse SAND, some brick, some concrete (dry) [FILL]	9	M-4A				0.0	M-4 at 9ft. Added 9- to 18- foot interval to composite sample WC-1B. VOCs for WC-1B collected from 14 to 14.5ft.
		Brown silty fine SAND, some weahtered micha schist (moist) [FILL]						0.0	
		Dark brown sandy SILT, trace brick, trace clay, trace fine gravel (moist)[FILL]	10					0.0	
					Macrocore	15		0.0	
			11					0.0	
				M-4B				0.0	
		Brick [FILL]	12	M-5A				0.0	M-5 at 12ft
		Brownish gray silty fine SAND (moist)						0.0	
			13					0.0	
					Macrocore	8		0.0	
			14					0.0	
				M-5B				0.0	
		▽	15					0.0	
NATIVE		Brownish gray silty CLAY, some fine sand (wet)						0.0	
			16					0.0	M-6 at 16ft
				M-6A	Macrocore	36		0.0	
			17					0.0	
								0.0	
			18					0.0	
			19						Bottom of boring at 2/11/2021 6:30 PM.
			20						

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Log of Boring **LSB-22** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el +14 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 12/6/18 / Date Finished: 12/6/18
Drilling Equipment: Portable Electric Rig	Completion Depth: 6 ft / Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0, Undisturbed 3, Core 0
Casing Diameter (in): 2 / Casing Depth (ft): NA	Water Level (ft.): First ▽ 3 ft, Completion ▼ NA, 24 HR. ▼ NA
Casing Hammer: NA / Weight (lbs): NA / Drop (in): NA	Drilling Foreman: Sharohn Dixon
Sampler: 2' x 2" Acetate Lined Macrocore	Field Engineer: Allyson Kritzer
Sampler Hammer: NA / Weight (lbs): NA / Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
CONCRETE		Concrete	0						Started Drilling at 12/6/2018 11:54 AM
NATIVE		Dark brown f-m SAND, some silt, some coarse sand, trace fine gravel (moist)	1					0.3	
		Dark brown f-m SAND, some silt, trace coarse sand, trace fine gravel (moist)	2	M-1A / M-1B	Macrocore	12		0.2 / 0.4	Concrete Core bit refusal at 2'. Move to option 2 location at 1400 PM. M-1 at 1.5ft.
		Dark brown f-m SAND, some silt, some fine gravel, trace coarse sand, trace weathered mica schist (wet)	3					0.3	Grab sample LSB-22 taken from 1.5 to 3.5 ft. VOC from 2.5 to 3 ft. 1520 PM
			4	M-2	Macrocore	15		0.2 / 0.1 / 0.2	M-2 at 3ft
		Dark brown f-m SAND, some silt, some fine gravel, trace coarse sand, trace weathered mica schist (wet)	5	M-3	Macrocore	2		0.1 / 0.1	M-3 at 5ft
			6						Bottom of boring at 12/6/2018 3:26 PM. Refusal encountered at 6.0ft
			7						
			8						
			9						
			10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-22A** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx el 14 -feet NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 2/10/21 / Date Finished: 2/10/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 10.5 ft / Rock Depth: ---
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0, Undisturbed 4, Core 0
Casing Diameter (in): 2 / Casing Depth (ft): NA	Water Level (ft.): First ▽ 3, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: NA / Weight (lbs): NA / Drop (in): NA	Drilling Foreman: Tom Seickel
Sampler: 3' x 2" Acetate Lined Macrocore	Field Engineer: Michael Au
Sampler Hammer: NA / Weight (lbs): NA / Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Number	Sample Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+14.0		0						
	+13.5	Concrete							Started drilling at 2/10/2021 8:54 AM.
FILL		Concrete							M-1 at 0.5ft
		Brown fine SAND, trace coarse sand (moist)[FILL]	1	M-1A	Macrocore	20		0.0	
			2	M-1B				0.2	
								0.0	
								0.0	
			3					0.0	
NATIVE		Brown silty fine SAND, trace fine gravel (wet)		M-2A				0.0	M-2 at 3ft
		Grayish brown silty fine SAND (wet)	4		Macrocore	24		0.0	
								1.8	Collected sample LSB-22A_4-6_20210210 from 4 to 6ft. VOCs from 4 to 4.5ft. 10:00 AM. Added 0- to 7.5-foot interval to composite sample WC-2.
			5	M-2B				1.2	
								0.0	
		Grayish brown silty fine SAND, trace fine gravel (wet)	6					0.0	M-3 at 6ft
								0.0	
			7					0.0	
								0.0	
			8	M-3A	Macrocore	36		0.0	
								0.0	
				M-3B				0.0	
		Dark gray CLAY, some coarse sand, trace gravel (wet)	9					0.0	M-4 at 9ft. Organic-like odor observed.
				M-4	Macrocore	18		0.0	
			10					0.0	
								0.0	
			11						Refusal at 10.5 feet at 2/10/2021 10:30 AM.
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-23** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el +13 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 12/6/18 / Date Finished: 12/6/18
Drilling Equipment: Portable Electric Rig	Completion Depth: 5 ft / Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 / Undisturbed 2 / Core 0
Casing Diameter (in): 2 / Casing Depth (ft): NA	Water Level (ft.): First ▽ 1 ft / Completion ▼ NA / 24 HR. ▼ NA
Casing Hammer: NA / Weight (lbs): NA / Drop (in): NA	Drilling Foreman: Sharohn Dixon
Sampler: 2' x 2" Acetate Lined Macrocore	Field Engineer: Allyson Kritzer
Sampler Hammer: NA / Weight (lbs): NA / Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
CONCRETE		Concrete	0						Started Drilling at 12/6/2018 10:27 AM
NATIVE		Brown silty f-m SAND, some coarse sand (wet)	1	M-1A	Macrocore	19		0.4	M-1 at 1ft. Composite sample LSB-23 and DUP-6 from 1 to 3 ft. VOC 1 to 1.5 ft. 1130 and 1135 AM
		Dark gray silty f-m SAND, trace clay, trace coarse sand, trace fine gravel (wet)	2	M-1B				0.4	
		Dark gray silty f-m SAND, trace clay, trace coarse sand, trace fine gravel (wet)	3	M-2	Macrocore	9		0.4	M-2 at 3ft
			4					0.3	
			5					0.3	Bottom of boring at 12/6/2018 11:30 AM LMW-9 installed
			6						
			7						
			8						
			9						
			10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-23A** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx el 13 -feet NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 2/11/21 / Date Finished: 2/11/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 10 ft / Rock Depth: ---
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 / Undisturbed 3 / Core 0
Casing Diameter (in): 2 / Casing Depth (ft): NA	Water Level (ft.): First ▽ 4 / Completion ▼ --- / 24 HR. ▼ ---
Casing Hammer: NA / Weight (lbs): NA / Drop (in): NA	Drilling Foreman: Tom Seickel
Sampler: 3' x 2" Acetate Lined Macrocore	Field Engineer: Michael Au
Sampler Hammer: NA / Weight (lbs): NA / Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
CONCRETE	+13.0	Concrete	0						Started drilling at 2/11/2021 1:54 PM.
	+12.0	Concrete	1	M-1A	Macrocore	22		0.0	Collected sample LSB-23A_0-2_20210211 from 0 to 2ft. 2:05 PM. Added 0- to 7.5- foot interval to composite sample WC-3.
NATIVE		Brownish gray silty fine SAND (moist)	2					0.4	
			3	M-1B				0.2	M-1 at 1ft
								2.8	
								0.0	Slight odor observed
			▽ 4					0.0	Collected sample LSB-23A_3-5_20210211 from 3 to 5ft. VOCs from 4.5 to 5ft. 2:15 PM.
		Brownish gray clayey SAND (wet)						0.0	
				M-2	Macrocore	16		0.6	M-2 at 4ft. Slight odor observed.
			5					0.0	
			6					0.0	
								0.0	
								0.0	
		Dark brown silty fine SAND, trace fine gravel, some weathered micha schist (wet)	7					0.0	M-3 at 7ft
								0.0	
			8	M-3	Macrocore	27		0.0	
								0.0	
			9					0.0	
								0.0	
			10					0.0	Bottom of boring at 2/11/2021 2:25 PM.
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-24** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el +9.5 NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 12/6/18 / Date Finished: 12/6/18
Drilling Equipment: Portable Electric Rig	Completion Depth: 5 ft / Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0, Undisturbed 2, Core 0
Casing Diameter (in): 2 / Casing Depth (ft): NA	Water Level (ft.): First ▽ 1 ft, Completion ▼ NA, 24 HR. ▼ NA
Casing Hammer: NA / Weight (lbs): NA / Drop (in): NA	Drilling Foreman: Sharohn Dixon
Sampler: 2' x 2" Acetate Lined Macrocore	Field Engineer: Allyson Kritzer
Sampler Hammer: NA / Weight (lbs): NA / Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Concrete	0						Started Drilling at 12/6/2018 8:30 AM
FILL		Dark gray silty f-m SAND, some fine gravel, trace wood, trace brick, trace coarse sand (wet)[FILL]	1	M-1	Macrocore	6		0.2	M-1 at 1ft. Plastic liner encountered at 1.0ft. Grab sample LSB-24 from 1 to 3 ft. VOC from 1 to 1.5. 1000 AM
			2					0.3	
								0.4	
			3					0.3	
NATIVE		Dark gray silty fine SAND, trace medium sand, trace f-c gravel (wet)						0.2	M-2 at 3ft
			4	M-2	Macrocore	3		0.3	
								0.2	
								0.2	
			5						Bottom of boring at 12/6/2018 10:11 AM
									LMW-10 installed
			6						
			7						
			8						
			9						
			10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-24A** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx el + 9.5 -feet NAVD88
Drilling Company: AARCO Environmental Services, Corp.	Date Started: 2/11/21 / Date Finished: 2/11/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 10 ft / Rock Depth: ---
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0, Undisturbed 3, Core 0
Casing Diameter (in): 2 / Casing Depth (ft): NA	Water Level (ft.): First ▽ 1, Completion ▼ ---, 24 HR. ▼ ---
Casing Hammer: NA / Weight (lbs): NA / Drop (in): NA	Drilling Foreman: Tom Seickel
Sampler: 3' x 2" Acetate Lined Macrocore	Field Engineer: Michael Au
Sampler Hammer: NA / Weight (lbs): NA / Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
CONCRETE	+9.5	Concrete	0						Started drilling at 2/11/2021 9:47 AM. Geoprobe 420M was switched out with a portable drill rig at 11:00 AM due to an equipment failure.
	+8.5	▽	1						
NATIVE		Dark brown medium SAND, some coarse sand, trace fine gravel (moist)	2	M-1	Macrocore	11		0.0	Collected sample LSB-24A_0-2_20210211 from 0 to 2ft. 11:15 AM. Added 0- to 6.5-foot interval to composite sample WC-4.
			3					0.0	
		Dark brown coarse SAND, some fine gravel (wet)	4					0.0	M-1 at 1ft
				M-2A				0.0	Collected sample LSB-24A_3-5_20210211 from 3 to 5ft. VOCs from 4 to 4.5ft. 11:22 AM. VOCs for WC-4 collected from 4.5 to 5ft.
		Black coarse SAND, some fine gravel (wet)		M-2B				392.8	
		Dark brownish black fine SAND (wet)	5	M-2C	Macrocore	24		44.5	
		Dark brown silty fine SAND (wet)	6	M-2D				10.2	M-2 at 4ft
								0.0	Collected sample LSB-24A_5-7_20210211 from 5 to 7ft. VOCs from 5 to 5.5ft. 11:30 AM.
		Dark brown coarse SAND, some medium sand (wet)	7					0.0	
				M-3A				0.0	Odor and heavy staining observed
		Dark brown fine SAND (moist)	8		Macrocore	36		0.0	
			9	M-3B				0.0	M-3 at 7ft. Odor and staining observed
								0.0	
			10					0.0	Bottom of boring at 2/11/2021 11:45 AM.
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-21A** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 24.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/14/21 — Date Finished: 10/14/21
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 19 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 4 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 15 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: ShaRohn Dixon
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Number	Sample Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5		0					0.0	Started Drilling on 10/14/2021.
	+24.0	ASPHALT						0.0	
	+23.5	CONCRETE	1					0.0	
		Dark brown fine-coarse SAND, trace gravel (dry)						0.0	
			2	M-1	Macrocore	40		0.0	
								0.0	
			3					0.0	
								0.0	
			4					0.0	
								0.0	
	+19.5		5					0.0	
		Dark brown fine-coarse SAND, trace gravel (dry)						0.0	
	+19.0	Dark brown to black SAND, wood fragments (dry)	6					0.1	
								0.3	
			7	M-2	Macrocore	60		1.3	
								0.5	
			8					0.3	
	+16.3							0.1	Collected 006_LSB-21A_2-3_20211014 from 2.0-3.0' bgs.
		Dark brown fine-coarse SAND, trace gravel (dry)	9					0.1	Collected 007_LSB-21A_8-9_20211014 from 8.0-9.0' bgs.
								0.1	
			10					0.0	
								0.0	
			11					0.0	
								0.0	
			12	M-3	Macrocore	40		0.0	
								0.0	
	+11.5		13					0.0	
		Dark olive to gray SAND, trace silt (moist)						0.0	
			14					0.0	
								0.0	
	+9.5	▽	15					0.0	
		Dark olive to gray SAND, trace silt, trace organics (wet)						0.0	
			16					0.0	
								0.0	
			17	M-4	Macrocore	48		0.0	
								0.0	
			18					0.0	
								0.0	Collected 008_LSB-21A_18-19_20211014 from 18.0-19.0' bgs.
	+5.5		19						Bottom of boring.
			20						

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Log of Boring **LSB-25** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 24.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/26/21 — Date Finished: 10/26/21
Drilling Equipment: Geoprobe 7822DT	Completion Depth: 15 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 3 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 12 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Sergio Magana
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Mattern
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5		0					0.0	Started Drilling on 10/26/2021.
	+24.0	ASPHALT						0.0	
		Tannish brown to brown fine-medium SAND, trace concrete, trace brick, trace f-m gravel (dry)	1					0.0	
			2					0.0	Collected 075_LSB-25_0.0-2.0 from 0-2' bgs. VOCs collected from 1.0-1.5' bgs.
			3	M-1	MACROCORE	48		0.0	
			4					0.0	
	+19.5		5					0.0	
		Tannish brown to dark brown fine-medium SAND, trace brick, trace fine gravel (dry)	6					0.0	
			7	M-2	MACROCORE	42		0.0	
			8					0.0	
			9					0.0	
	+14.5		10					0.0	Collected 076_LSB-25_10.0-12.0 from 10-12' bgs. VOCs collected from 10.0-10.5' bgs.
		Tannish brown to brown fine-medium SAND, trace silt, trace fine gravel (moist)	11					0.0	
	+12.5	▽	12					0.0	Collected 077_LSB-25_12.0-14.0 from 12-14' bgs. VOCs collected from 12.0-12.5' bgs.
		Tannish brown to brown fine-medium SAND, trace silt, trace fine gravel (wet)	13	M-3	MACROCORE	48		0.0	
			14					0.0	
	+9.5		15					0.0	Bottom of boring.
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-26** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 24.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/26/21 — Date Finished: 10/26/21
Drilling Equipment: Geoprobe 7822DT	Completion Depth: 15 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 3 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 12 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Sergio Magana
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Molly Mattern
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5		0					0.0	Started Drilling on 10/26/2021.
	+24.0	ASPHALT							
		Tannish brown to brown fine-medium SAND, trace concrete, trace brick, trace f-m gravel (dry)	1					0.0	
			2					0.0	Collected 072_LSB-26_0.0-2.0 from 0.0-2.0' bgs. VOCs collected from 1.0-1.5' bgs.
			3	M-1	MACROCORE	48		0.0	
			4					0.0	
	+19.5		5					0.0	
		Tannish brown to brown fine-medium SAND, trace brick, trace fine gravel (dry)	6					0.0	
			7	M-2	MACROCORE	42		0.0	
			8					0.0	
			9					0.0	
	+14.5		10					0.0	Collected 073_LSB-26_10.0-12.0 from 10.0-12.0' bgs. VOCs collected from 10.0-10.5' bgs.
		Tannish brown to brown fine-medium SAND, trace brick, trace fine gravel (moist)	11					0.0	
	+12.5	▽	12					0.0	
		Tannish brown to brown fine-medium SAND, trace silt, trace fine gravel (wet)	13	M-3	MACROCORE	48		0.0	Collected 074_LSB-26_13.0-15.0 from 13.0-15.0' bgs.
	+9.5		14					0.0	
			15						Bottom of boring.
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-27** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 12.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/26/21 — Date Finished: 10/26/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 4 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 1 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 2 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Sergio Magana
Sampler: 1.75" x 3' Long Acetate Lined Macrocore	Field Engineer: Molly Mattern
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+12.5	CONCRETE	0						Started Drilling on 10/26/2021. Predrilled through concrete slab using hammer drill attachment. Collected 071_LSB-27_0.0-2.0 from 2.0-4.0' below top of slab. VOCs collected from 2.0-2.5' bgs.
	+10.5	Brown fine-medium SAND, trace silt, trace fine gravel (wet) ▽	2	M-1	MACROCORE	12		0.0 0.0 0.0 0.0	
	+8.5		4						Bottom of boring.
			20						

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Log of Boring **LSB-28/LMW-12** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: el + 13.08 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/26/21 — Date Finished: 10/26/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 3 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 1 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 1 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Sergio Magana
Sampler: 1.75" x 3' Long Acetate Lined Macrocore	Field Engineer: Molly Mattern
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+13.1		0						
	+12.1	CONCRETE	1						Started Drilling on 10/26/2021. Predrilled through concrete slab using hammer drill attachment.
		Dark brown to brown fine-medium SAND, trace silt, trace fine gravel (wet)	2	M-1	Macrocore	24		0.0 0.0 0.0 0.0	Collected 063_LSB-28_0.0-2.0 from 1.0-3.0' below top of slab.
	+10.1		3						Bottom of boring.
			4						
			5						
			6						
			7						
			8						
			9						
			10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-29** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 12.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/26/21 — Date Finished: 10/26/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 6 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 2 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 1 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Sergio Magana
Sampler: 1.75" x 3' Long Acetate Lined Macrocore	Field Engineer: Molly Mattern
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+12.5	CONCRETE	0						Started Drilling on 10/26/2021. Predrilled through concrete slab using hammer drill attachment.
	+11.5	Brown to grayish brown fine-medium SAND, some silt, trace fine gravel (wet)	1	M-1	Macrocore	24		0.0	Collected 069_LSB-29_0.0-2.0 from 1.0-2.0' below top of slab.
			2					0.0	
			3					0.0	Collected 070_LSB-29_2.5-4.5 from 2.5-4.5' below top of slab.
			4	M-2	Macrocore	36		0.0	
			5					0.0	
	+6.5		6					0.0	Bottom of boring.
			7						
			8						
			9						
			10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-2A** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 24.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/14/21 — Date Finished: 10/14/21
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 19 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 4 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 15 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: ShaRohn Dixon
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5		0					0.1	Started Drilling on 10/15/2021.
	+24.0	ASPHALT						0.1	
		Dark brown to black fine-coarse SAND, some gravel (dry)	1					0.3	Collected 042_LSB-2A_0-2_20211015 from 0.0-2.0' bgs.
			2	M-1	Macrocore	40		0.5	
			3					1.2	
			4					1.0	
								0.6	
								0.3	
								0.2	
	+19.5		5					0.0	
		Dark brown to black fine-coarse SAND, some brick, some gravel (dry)						0.0	
			6					0.0	
			7	M-2	Macrocore	40		0.0	
			8					0.0	
								0.0	
								0.0	
			9					0.0	Collected 043_LSB-2A_8-9_20211015 from 8.0-9.0' bgs.
	+14.5		10					0.0	
		Dark brown to black fine-coarse SAND, trace gravel (dry)						0.0	
			11					0.0	
			12	M-3	Macrocore	42		0.0	
	+12.0							0.0	
		Dark brown to black fine-medium SAND, trace gravel (moist)	13					0.0	
								0.0	
			14					0.0	
								0.0	
	+9.5	▽	15					0.0	
		Dark brown to black fine-medium SAND, trace gravel (wet)						0.0	
			16					0.0	
								0.0	
			17	M-4	Macrocore	42		0.0	
								0.0	
			18					0.0	Collected 044_LSB-2A_18-19_20211015 from 18.0-19.0' bgs.
	+5.5		19					0.0	Bottom of boring.
			20						

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Log of Boring **LSB-30** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 12.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/26/21 — Date Finished: 10/26/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 6 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 2 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 1 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Sergio Magana
Sampler: 1.75" x 3' Long Acetate Lined Macrocore	Field Engineer: Molly Mattern
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+12.5	CONCRETE	0						Started Drilling on 10/26/2021. Predrilled through concrete slab using hammer drill attachment.
	+11.5	Grayish brown to brown fine-medium SAND, some silt, trace fine gravel (wet)	1	M-1	Macrocore	18		0.0	Collected 067_LSB-30_1.0-3.0 from 1.0-3.0' below top of slab. VOCs collected from 1.0-1.5' bgs.
			2					0.0	
			3					0.0	
	+9.5	Dark brown to brown fine-medium SAND, some silt, trace fine gravel (wet)	4	M-2	Macrocore	36		0.0	Collected 068_LSB-30_3.0-5.0 from 3.0-5.0' below top of slab. VOCs collected from 3.0-3.5' bgs.
			5					0.0	
	+7.0	Dark brown to gray fine SAND, some silt (moist)	6					0.0	Bottom of boring.
	+6.5		7						
			8						
			9						
			10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-32** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 10.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/26/21 — Date Finished: 10/26/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 3 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 1 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 1 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Sergio Magana
Sampler: 1.75" x 3' Long Acetate Lined Macrocore	Field Engineer: Molly Mattern
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+10.5		0						Started Drilling on 10/26/2021. Predrilled through concrete slab using hammer drill attachment. Collect 066_LSB-32_0.0-2.0 from 1.0-3.0' below top of slab. VOCs collected from 1.0-1.5' bgs.
		CONCRETE							
	+9.5	Dark brown to brown fine-medium SAND, trace silt, trace fine gravel (wet)	1	M-1	MACROCORE	24		0.0	
			2					0.0	
								0.0	
	+7.5		3					0.0	Bottom of boring.
			4						
			5						
			6						
			7						
			8						
			9						
			10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-33** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 24.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/15/21 — Date Finished: 10/15/21
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 19 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 4 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 15 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: ShaRohn Dixon
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5		0					0.0	Started Drilling on 10/15/2021.
	+24.0	ASPHALT						0.0	
	+23.5	CONCRETE	1					0.0	
		Dark brown to black fine-coarse SAND, some gravel (dry)						0.0	
			2	M-1	Macrocore	40		0.0	
			3					0.0	
								0.0	
			4					0.0	
								0.0	
	+19.5		5					0.0	
		Dark brown to black fine-coarse SAND, some gravel, brick fragments (dry)						0.0	
			6					0.0	
								0.0	
			7	M-2	Macrocore	40		0.0	
								0.0	
			8					0.0	
								0.0	
			9					0.0	Collected 046_LSB-33_9-18_20211015 from 9.0-18.0' bgs.
	+14.5		10					0.0	
		Dark brown to black fine-coarse SAND, some gravel, brick fragments (dry)						0.0	
			11					0.0	
								0.0	
			12	M-3	Macrocore	40		0.0	
								0.0	
	+11.5		13					0.0	
		Dark brown to black fine-coarse SAND, trace gravel (moist)						0.0	
			14					0.0	
								0.0	
	+9.5		15 ▽					0.0	
		Dark brown to black fine-coarse SAND, trace silt, trace gravel (wet)						0.0	
			16					0.0	
								0.0	
			17	M-4	Macrocore	40		0.0	
								0.0	
			18					0.0	
								0.0	
	+5.5		19						Bottom of boring.
			20						

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Log of Boring **LSB-34** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 14.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/25/21 — Date Finished: 10/25/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 5 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 2 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 1 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Sergio Magana
Sampler: 1.75" x 3' Long Acetate Lined Macrocore	Field Engineer: Molly Mattern
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+14.5	CONCRETE	0						Started Drilling on 10/25/2021. Predrilled through concrete slab using hammer drill attachment.
	+13.5	Dark gray fine-medium SAND, some silt, some f-m gravel (wet)	1	M-1	Macrocore	18		0.0	
			2					0.0	
								0.0	
	+11.5	Dark gray to dark brown fine SAND, some silt, trace clay, trace fine gravel (wet)	3					0.0	Collect 056_LSB-34_0.0-3.5 from 1.0-3.5' below top of slab.
				M-2	Macrocore	24		0.0	
	+9.5		4					0.0	
			5						Bottom of boring.
			6						
			7						
			8						
			9						
			10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

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Log of Boring **LSB-36** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 24.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/15/21 — Date Finished: 10/15/21
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 19 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 4 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 15 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: ShaRohn Dixon
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Number	Sample Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5	ASPHALT	0					0.0	Started Drilling on 10/15/2021.
	+23.5	Dark brown to black fine-coarse SAND, some gravel, brick fragments (dry)	1	M-1	MACROCORE	38		0.0	
			2					0.0	
			3					0.0	
			4					0.0	
	+19.5	Dark brown to black fine-coarse SAND, some gravel, brick fragments (dry)	5	M-2	MACROCORE	38		0.0	
			6					0.0	
			7					0.0	
			8					0.0	
			9					0.0	Collected 049_LSB-36_9-18_20211015 from 9.0-18.0' bgs.
	+14.5	Dark brown to black fine-coarse SAND, some gravel, brick fragments (dry)	10	M-3	MACROCORE	42		0.0	
			11					0.0	
			12					0.0	
	+11.8	Dark gray to olive fine-medium SAND, trace silt (moist)	13					0.0	
			14					0.0	
	+9.5	Dark gray to olive fine-medium SAND, some silt (wet) ▽	15	M-4	MACROCORE	40		0.0	
			16					0.0	
			17					0.0	
			18					0.0	
	+5.5		19					0.0	Bottom of boring.
			20						

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Log of Boring **LSB-37** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 24.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/14/21 — Date Finished: 10/14/21
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 19 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 4 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 15 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: ShaRohn Dixon
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5		0						Started Drilling on 10/14/2021.
	+23.8	ASPHALT						0.1	
		Dark brown to black fine-coarse SAND, some gravel, brick fragments (dry)	1					0.1	
			2	M-1	Macrocore	36		0.0	
			3					0.0	
			4					0.0	
			5					0.0	
	+19.5	Dark brown to black fine-coarse SAND, some gravel, brick fragments (dry)						0.0	
			6					0.0	
			7	M-2	Macrocore	38		0.0	
			8					0.1	
								1.2	
			9					2.3	
								0.8	Collected 023_LSB-37_9-18_20211014 from 9.0-18.0' bgs.
	+14.5	Dark brown to black fine SAND, trace silt, trace gravel (dry)	10					0.7	
								0.0	
			11					0.0	
			12	M-3	Macrocore	36		0.0	
			13					0.0	
			14					0.0	
								0.0	
	+9.5	▽	15					0.0	
		Dark gray to olive fine SAND, trace silt (wet)	16					0.0	
			17	M-4	Macrocore	38		0.0	
			18					0.0	
								0.0	
	+5.5		19						Bottom of boring.
			20						

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Log of Boring **LSB-43** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 12.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/25/21 — Date Finished: 10/25/21
Drilling Equipment: Geoprobe 420M	Completion Depth: 9 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 3 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 3 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: Sergio Magana
Sampler: 1.75" x 3' Long Acetate Lined Macrocore	Field Engineer: Molly Mattern
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+12.5	CONCRETE	0						Started Drilling on 10/25/2021. Predrilled through concrete slab using hammer drill attachment.
	+11.5	Brown fine-medium SAND, some fine gravel, trace silt (moist)	1	M-1	MACROCORE	12		0.0	
			2					0.0	
			3					0.0	
	+9.5	Dark brown to grayish brown fine SAND, some silt, trace clay (wet)	4	M-2	MACROCORE	30		0.0	Collected 061_LSB-43_0.0-7.5 from 1.0-7.5' below top of slab.
			5					0.0	
			6					0.0	
	+6.5	Dark brown to grayish brown fine SAND, some silt, trace clay (wet)	7	M-3	MACROCORE	36		0.0	
			8					0.0	
	+4.3	Brown to dark grayish brown fine SAND, some silt, trace fine gravel (moist)	9					0.0	Bottom of boring.
	+3.5		10						
			11						
			12						
			13						
			14						
			15						
			16						
			17						
			18						
			19						
			20						

▽ Water level at first encountered

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Log of Boring **LSB-44** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 24.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/14/21 — Date Finished: 10/14/21
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 19 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 4 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 13 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: ShaRohn Dixon
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5		0					0.5	Started Drilling on 10/14/2021.
	+24.0	ASPHALT						0.2	
		Grayish black fine-coarse SAND, some gravel (dry)	1					0.8	Collected 009_LSB-44_0-2_20211014 from 0.0-2.0' bgs.
	+23.0	Dark brown to light brown fine-coarse SAND, brick fragments (dry)	2	M-1	MACROCORE	38		0.1	
			3					0.0	
			4					0.0	
								0.0	
								0.0	
								0.0	
								0.0	
	+19.5	Dark brown to light brown fine-coarse SAND, brick fragments (dry)	5					0.0	
			6					0.0	
			7	M-2	MACROCORE	30		0.0	
								0.0	
								0.0	
			8					1.2	
								3.6	
			9					7.0	
								8.2	Collected 012_LSB-44_9-18_20211014 from 9.0-18.0' bgs.
	+14.5	Dark brown to light brown fine-coarse SAND, brick fragments (dry)	10					0.0	
			11					0.0	
								0.0	
			12					0.0	
				M-3	MACROCORE	42		0.0	
	+11.5	▽	13					0.0	
		Dark gray to olive fine-medium SAND, trace silt (wet)						0.0	
			14					0.0	
								0.0	
			15					0.0	
								0.0	
			16					0.0	
				M-4	MACROCORE	36		0.0	
			17					0.0	
								0.0	
			18					0.0	
								0.0	
	+5.5		19						Bottom of boring.
			20						

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Log of Boring **LSB-45** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 24.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/15/21 — Date Finished: 10/15/21
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 19 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 4 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 15 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: ShaRohn Dixon
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5		0					0.0	Started Drilling on 10/15/2021.
	+23.9	ASPHALT						0.0	
		CONCRETE	1					0.0	Collected 032_LSB-45_0-2_20211015 from 0.0-2.0' bgs.
	+23.0	Dark brown to black fine-coarse SAND, trace gravel (dry)	2	M-1	MACROCORE	30		0.0	
			3					0.0	
			4					0.0	
			5					0.0	
			6	M-2	MACROCORE	38		0.0	
			7					0.0	
			8					0.0	
			9					0.0	Collected 035_LSB-45_9-18_20211015 from 9.0-18.0' bgs.
			10					0.0	
	+12.0	Dark brown to black fine-medium SAND, trace silt, trace gravel (moist)	11	M-3	MACROCORE	38		0.0	
			12					0.0	
			13					0.0	
			14					0.0	
	+9.5	▽ Dark brown to black fine-medium SAND, trace silt (wet)	15					0.0	
			16	M-4	MACROCORE	38		0.0	
			17					0.0	
			18					0.0	
	+5.5		19					0.0	Bottom of boring.
			20						

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Log of Boring **LSB-46** Sheet 1 of 1

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation and Datum: Approx. el + 24.5 NAVD88
Drilling Company: AARCO Environmental Services Corp.	Date Started: 10/14/21 — Date Finished: 10/14/21
Drilling Equipment: Geoprobe 7822 DT	Completion Depth: 19 ft — Rock Depth: NA
Size and Type of Bit: 2in Direct Push	Number of Samples: Disturbed 0 — Undisturbed 4 — Core 0
Casing Diameter (in): NA — Casing Depth (ft): NA	Water Level (ft.): First ▽ 12 — Completion ▼ NA — 24 HR. ▼ NA
Casing Hammer: NA — Weight (lbs): NA — Drop (in): NA	Drilling Foreman: ShaRohn Dixon
Sampler: 1.75" x 5' Long Acetate Lined Macrocore	Field Engineer: Esther Arthur
Sampler Hammer: NA — Weight (lbs): NA — Drop (in): NA	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	PID Reading (ppm)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+24.5		0					0.0	Started Drilling on 10/14/2021.
	+24.0	ASPHALT						0.0	
	+23.5	CONCRETE	1					0.0	Collected 001_LSB-46_0-2_20211014 from 0.0-2.0' bgs.
	+23.3	Dark brown to black sandy GRAVEL (dry)						0.0	
		CONCRETE	2					0.0	
	+21.8	Dark brown fine-coarse SAND, trace gravel (dry)		M-1	Macrocore	30		0.0	
			3					0.0	
			4					0.0	
			5					0.0	
			6					0.0	
			7	M-2	Macrocore	30		0.0	
			8					0.0	
			9					0.0	Collected 004_LSB-46_9-18_20211014 from 9.0-18.0' bgs.
	+14.5	Brown to light fine-coarse SAND, trace gravel (dry)	10					0.0	
			11					0.0	
	+12.5	Brown to light gray fine-coarse SAND, trace gravel (wet) ▽	12	M-3	Macrocore	40		0.0	
			13					0.0	
			14					0.0	
	+9.5	Brown to light gray fine-coarse SAND (wet)	15					0.0	
			16					0.0	
			17	M-4	Macrocore	46		0.0	
			18					0.0	
	+5.5		19					0.0	Bottom of boring.
			20						

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WELL CONSTRUCTION SUMMARY

Well No. LMW-12

Project: 550 10th Avenue	Project No.: 100674402
Location: New York, New York	Elevation And Datum: el + 13.08 NAVD88
Drilling Agency: AARCO Environmental Services Corp.	Date Started: 10/26/2021 / Date Finished: 10/26/2021
Drilling Equipment: Geoprobe 420M	Driller: Sergio Magana
Size And Type of Bit: 2in Direct Push	Inspector: Molly Mattern

Method of Installation

A Geoprobe 420M was used to advance LSB-28 to approximately 10-feet below basement slab. A one-inch Sch. 40 PVC well was installed consisting of approximately 9.9-feet of No. 10 (0.010-inch) screen packed with No. 2 sand. The well was finished with a flush mount manhole cover and concrete pad.

Method of Well Development

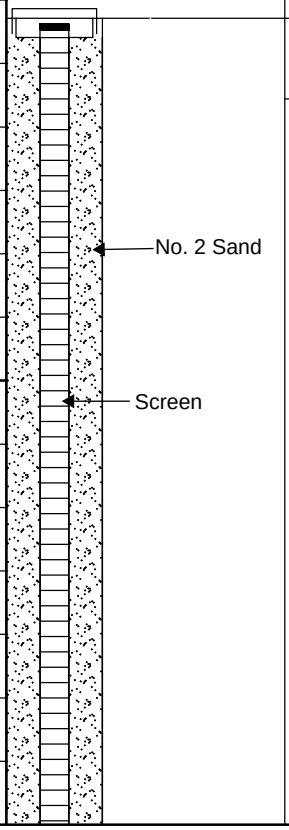
LMW-12 was developed with a check-valve and developed until the water ran free of fines. Approximately 5 gallons were purged.

Type of Casing: --	Diameter: --	Type of Backfill Material: No. 2 Sand	
Type of Screen: Schedule 40 No. 0.010	Diameter: 1-inch	Type of Seal Material: --	
Borehole Diameter: 2-inch		Type of Filter Material: No. 2 Sand	

	Elevation	Depth
Top of Casing	12.98'	0.1' bgs
Top of Seal		
Top of Filter	12.83'	0.25' bgs
Top of Screen	12.93'	0.15' bgs
Bottom of Filter	3.08'	10' bgs
Bottom of Well	3.08'	10' bgs
Screen Length: 9.9'		Slot Size: 0.010

GROUNDWATER ELEVATIONS (ft)
(Measured from the Top of Casing)

Elevation	DTW	Date
12.03'	0.95'	11/1/2021



Soil / Rock Classification	Depth (ft)
FILL	0.1
NATIVE	
	10

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APPENDIX D

Excavation Work Plan

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EXCAVATION WORK PLAN (EWP)

1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's cover system, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table 1, below, includes contact information for the above notification. 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.

Table 1: Notifications*

NYSDEC Section Chief	Andre Obligado Telephone: (718) 482-6412 Email: andre.obligado@dec.ny.gov
NYSDOH Project Manager	Mark Sergott Telephone: (518) 402-7860 Email: beei@health.ny.gov
NYSDEC Project Manager	Steven Wu Telephone: (718) 482-6725 E-mail: steven.wu@dec.ny.gov
NYSDEC Site Control	Kelly Lewandowski Telephone: (518) 402-0193 Email: kelly.lewandowski@dec.ny.gov
Project Manager	Amanda Forsburg Telephone: (973) 560-4900 Email: aforsburg@langan.com
Qualified Environmental Professional	Christopher McMahon, CHMM Telephone: (973) 560-4900 E-mail: cmcmahon@langan.com
Remedial Engineer	Ronald Boyer, P.E. Telephone: (973) 560-4900 E-mail: rboyer@langan.com

Owner Representative	GO Covenant LLC Bryan Kelly Telephone: (212) 716-2502 E-mail: bkelly@gothamorg.com

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

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work, and submittals (e.g., reports) to the NYSDEC documenting the completed intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix E of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g., photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional 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 will perform the screening. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections 6 and 7 of this Appendix.

3 SOIL STAGING METHODS

Stockpiles will be placed on and kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional 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 will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional and/or contractor. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements). Trucks transporting contaminated soil must have either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides.

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional or field staff under their supervision will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes are shown on Figure 6 of the SMP. All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e., clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-site

management of materials from this site will not occur without formal NYSDEC project manager approval.

The following documentation will be obtained and reported by the QEP for each off-site disposal location used to fully demonstrate and document that the disposal of material derived from the site conforms to applicable laws:

1) A letter from the QEP or BCP Volunteer to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation site in New York State. The letter will provide the project identity and the name and phone number of the QEP. The letter will include as an attachment a summary of chemical data for the material being transported (including site characterization data); and

2) A letter from each receiving facility stating it is in receipt of the correspondence (above) and is approved to accept the material.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g., hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility). Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 360-15 registered or permitted facility).

7 MATERIALS REUSE ON-SITE

The qualified environmental professional, as defined in 6 NYCRR Part 375, will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e., contaminated) does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within the cover system or within landscaping berms. Contaminated on-site material may only be used beneath the site cover as backfill for subsurface utility lines with prior approval from the DEC project manager.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (dated April 2023) guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in Sections 2 and 3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed off-site at a permitted facility in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e., a local pond, stream or river) will be performed under a SPDES permit.

9 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

Material from industrial sites, spill sites, other environmental remediation sites, or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for Restricted-Residential Use. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 1 in the SMP. Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

10 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

11 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The NYSDEC project manager will be promptly notified of the discovery.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes [TAL metals, TCL volatiles and semi-volatiles (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within two hours to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

12 COMMUNITY AIR MONITORING PLAN

Community air monitoring will be conducted in compliance with the NYSDOH Generic CAMP outlined below and as provided in Appendix G of the SMP.

The CAMP will include real-time monitoring for VOCs and particulates at the upwind and downwind perimeter of each designated work area when ground-intrusive work is in progress. Continuous monitoring will be required for all ground-intrusive work. Ground-intrusive work includes, but is not limited to, soil/fill excavation and handling and utility trenching. Periodic monitoring for VOCs may be required during non-intrusive work such as the collection of soil samples. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location and taking a reading prior to leaving a sample location.

CAMP monitoring of total VOC levels will be conducted using PIDs, and monitoring for particulates will be conducted using particulate sensors equipped with filters that can detect airborne particulates less than 10 microns in diameter (PM10). Monitoring for particulates and odors will be conducted during ground-intrusive work by a field engineer, scientist, or geologist under the supervision of the RE. The work zone is defined as the general area in which machinery is operating in support of remediation. A portable PID will be used to monitor the work zone and

for periodic monitoring of total VOC levels during work such as soil sampling. The Site perimeter will be visually monitored for fugitive dust emissions.

The following actions will be taken based on total VOC levels measured:

- If total VOC levels exceed 5 ppm above background for the 15-minute average at the perimeter, work will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work will resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the work zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work will resume provided that the total VOC level 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, work will be shut down.

The following actions will be taken based on dust levels measured or visual dust observations:

- If the downwind particulate level is 100 µg/m³ 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 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 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.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the daily report. In addition, a map showing the location of the downwind and upwind CAMP stations will be included in the daily report.

13 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site and on-site, if there are residents or tenants on the property. Specific odor control methods to be used on a routine basis may include the application of foam suppressants or tarps over the odorous material or VOC source areas. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

13A SPECIAL REQUIREMENTS FOR WORK WITHIN 20 FEET OF POTENTIALLY EXPOSED INDIVIDUALS OR STRUCTURES

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 part-per-million, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 micrograms per cubic meter, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 micrograms per cubic meter or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

13B SPECIAL REQUIREMENTS FOR INDOOR WORK WITH CO-LOCATED RESIDENCES OR FACILITIES

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under "Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures" except that in this instance "nearby/occupied structures" would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

14 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Section 13. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved using a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

15 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

HEALTH AND SAFETY PLAN

for

550 TENTH AVENUE FILLING STATION SITE
550 Tenth Avenue
New York, New York
NYSDEC BCP Site No. C231148

Prepared For:

GO Covenant LLC
432 Park Avenue South, 2nd Floor
New York, New York 10016

Prepared By:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, New Jersey 07054

July 2023
100674402

LANGAN

APPENDIX E

Health and Safety Plan

LANGAN

ENVIRONMENTAL HEALTH AND SAFETY PLAN

Client:	**GO Covenant LLC**
Project:	**Annual Site Inspection**
Location:	**550 Tenth Avenue, New York**
Chemical Hazards:	**Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), Pesticides, Metals (including hazardous lead), Per- and polyfluoroalkyl substances (PFAS)**
Prepared By:	**Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.**
Version:	**1**
Date:	**July 2023**

Client Contact:	**Bryan Kelly**	**(212) 716-2502**
Langan Project Manager (PM):	**Amanda Forsburg**	**(973) 560-4900**
Langan Health & Safety Manager (HSM):	**Tony Moffa, CHMM**	**(215) 491-6545**
Langan Health and Safety Officer (HSO):	**Field Personnel**	
WorkCare:		**1-888-449-7787**
Langan Incident/Injury Hotline:		**(973) 560-4699**

LANGAN ENGINEERING, ENVIRONMENTAL, SURVEYING, LANDSCAPE ARCHITECTURE AND GEOLOGY, D.P.C. (LANGAN), AND LANGAN SUBCONTRACTORS, DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION BY A TRAINED HEALTH AND SAFETY SPECIALIST.

APPROVALS

By signature, the personnel identified below hereby acknowledge that they have reviewed this Health and Safely Plan (HASP) and agree to comply with the requirements contained therein as well as the applicable provisions of 29 CFR Parts 1910 and 1926. The undersigned also acknowledge and accept that this HASP is the project HASP for the site work described in the Site Management Plan (SMP). Furthermore, in reviewing and accepting this HASP, as currently written, the undersigned agree that to the best of their knowledge, this HASP adequately identifies the activities and hazards associated with work at this site and describes the appropriate and necessary precautions and protections for site workers required by the applicable OSHA statutes and regulations.

Amanda M. Forsburg	7/14/2023
LANGAN Project Manager - PM (Amanda Forsburg)	Date
LANGAN Health and Safety Manager (Tony Moffa, CHMM)	Date
LANGAN Health and Safety Officer – HSO	Date

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Attachment B Field Procedures Change Authorization Form
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Attachment I Langan Guidelines

1.0 INTRODUCTION

1.1 Purpose and Policy

This Health and Safety Plan (HASP) has been developed to comply with the regulations under Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120(b)(4), Hazardous Waste Operations and Emergency Response. It addresses foreseeable activities associated with the site work activities to be conducted at the 550 Tenth Avenue site in New York, New York (see Figure 1). This HASP establishes personnel protection standards and mandatory safety practices and procedures. Additionally, it assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at known or suspected hazardous waste sites.

Langan personnel involved with inspection of site work activities which involve the displacement of soil, groundwater, and/or material during the proposed development shall comply with the requirements of this HASP. All Langan personnel engaged in onsite activities will read this document carefully and complete the Safety Briefing Form (Attachment A), a copy of which will be provided to Langan's Project files. Contractors and subcontractors conducting construction-related activities which will disturb or displace soil in the identified AOC are required to develop and follow their own HASP which must be equal or more stringent than the Langan HASP. Contractors and subcontractors are responsible for their own workers Health and Safety and providing a safe working environment in accordance with all applicable federal, state and local requirements. Each Subcontractor will have a designated Site Health and Safety Manager who will be responsible for ensuring that the designated procedures are implemented in the field. Personnel who have any questions or concerns regarding implementation of this plan are encouraged to request clarification from the Langan Project Manager. Field personnel must follow the designated health and safety procedures, be alert to the hazards associated with working close to vehicles and equipment, and use common sense and exercise reasonable caution at all times.

This HASP covers construction related field activities which have the potential to disturb and/or displace historic fill material or groundwater impacted with VOCs, SVOCs, pesticides, metals, PFAS, and/or hazardous lead as identified in the 550 Tenth Avenue Remedial Investigation Report (RIR).

This HASP was prepared in accordance with the following documents and/or guidelines:

- Occupational Safety and Health Administration (OSHA) regulations for hazardous site workers (29 CFR 1910.120 and 29 CFR 1926); and,
- NIOSH/OSHA/USCG/USEPA *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.*

Langan's Health and Safety Program and Safe Operating Procedures support this site-specific HASP.

The level of protection and the procedures specified in this HASP represent the minimum health and safety requirements to be observed by site personnel engaged in the referenced inspection of construction related activities. Unknown conditions may exist, and known conditions may change. Should an employee find himself or herself in a potentially hazardous situation, the employee will immediately discontinue the hazardous procedures(s) and either personally effect appropriate preventative or corrective measures, or immediately notify the Health and Safety Officer or the Langan Project Manager of the nature of the hazard. In the event of an immediately dangerous or life threatening situation, the employee always has "stop work" authority. Any necessary revision to the Health and Safety procedures will be recorded in the Field Procedure Change Authorization Form (Attachment B), and will require authorization from the Langan Health and Safety Officer and Project Manager.

THE ULTIMATE RESPONSIBILITY FOR THE HEALTH AND SAFETY OF THE INDIVIDUAL EMPLOYEE RESTS WITH THE EMPLOYEE AND HIS OR HER COLLEAGUES. Each employee is responsible for exercising the utmost care and good judgment in protecting his or her own health and safety and that of fellow employees. Should any employee observe a potentially unsafe condition or situation, it is the responsibility of that employee to immediately bring the observed condition to the attention of the appropriate health and safety personnel as designated above and to follow-up the verbal notification by completing the

Unsafe Conditions and Practices Form provided in Attachment C, a copy of which will be provided to the Langan Health and Safety Officer.

"Extenuating" circumstances such as budget or time constraints, equipment breakdown, changing or unexpected conditions, never justify unsafe work practices or procedures. In fact, the opposite is true. Under stressful circumstances all project personnel must be mindful of the potential to consciously or unconsciously compromise health and safety standards, and be especially safety conscious. **ALL SITE PERSONNEL ARE EXPECTED TO CONSIDER "SAFETY FIRST" AT ALL TIMES.**

1.2 Site Descriptions

The Site is located in the Clinton neighborhood of Manhattan, New York and is identified as Lot 61. A Site Location Plan is provided as Figure 1. The Site is an approximately 16,000-square foot parcel and is bordered by 10th Avenue to the west, West 41st Street to the north, West 40th Street to the south, and the active redevelopment of former Covenant House New York Wings B and C to the east. New York City Transit (NYCT) tunnels are located to the north of the site, below West 41st Street. In addition, Lincoln Tunnel entrance roads and access ramps for the nearby Port Authority Bus Terminal are located to the south of the site, beyond West 40th Street. The Site consists of Wing A of the Covenant House New York shelter for homeless youth and a parking lot.

1.3 Scope of Work

The site work activities which will require the oversight by Langan personnel include the following tasks:

- Task 1 - Annual Site Inspection.

Details of the scopes of work to be completed in each of the work areas for this project are provided within the 550 Tenth Avenue Site Management Plan (SMP).

During construction, all soil/fill excavated or disturbed at the site will be either transported off site for disposal at an approved facility or reused on-site pending NYSDEC approval. Personnel conducting activities that will contact the impacted soil/fill or other impacted materials shall abide to the provisions of this HASP.

2.0 PROJECT TEAM ORGANIZATION AND RESPONSIBILITIES

This section specifies the Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) Project Organization.

2.1 Langan Project Manager

The Langan Project Manager (PM) is Amanda Forsburg. The PM responsibilities include:

Responsibilities:

- Prepares and organizes the background review of site conditions, the site HASP, and the field team.
- Obtains permission for site access and coordinates activities with appropriate officials.
- Briefs the field team on their specific assignments.
- Coordinates with the Health and Safety Officer (HSO) to ensure that health and safety requirements are met.
- Serves as the liaison with public officials.
- Ensuring that this HASP is developed and approved prior to on-site activities.
- Ensuring that all 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 Health and Safety Manager (HSM)

The Langan Corporate Health and Safety Manager (HSM) is Tony Moffa. His responsibilities include:

- Serving as a resource in the development and implementation of HASPs;
- Assist in reviewing results of Jobsite Safety Inspections;
- Assisting site Health and Safety Officer (HSO) with development of the HASP, updating HASP as dictated by changing conditions, jobsite inspection results, etc.;
- Maintaining all records on personnel (medical evaluation results, training and certifications, accident investigation results, etc.).

2.3 Health and Safety Officer (HSO)

The Langan Health and Safety Officer (HSO) will be identified prior to the start of field work. The HSO responsibilities include:

- Participating in the development and implementation of this HASP;
- Conducting Jobsite Safety Inspections (Attachment H) and correcting any shortcomings in a timely manner;
- Helping to select proper PPE (Personal Protective Equipment) and periodically inspecting it;
- Ensuring that PPE is properly stored and maintained;
- Controlling entry into and exit from the contaminated areas or zones of the site;
- Confirming each team member's suitability for work based on a current physician's recommendation;
- Monitoring the work parties 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;
- Resolves conflicting situations which may arise concerning safety requirements and working conditions.
- Conducting daily tailgate meetings to review applicable JSAs as well as check-in with site personnel.

3.0 HAZARDS ANALYSIS

This section presents all assessment of the general, chemical, physical and biological hazards that may be encountered during the tasks specified under this HASP (Section 1.3). A detail on types of potential contaminants of concerns Langan anticipates to encounter at different locations during the intrusive redevelopment and associated remediation is listed in Tables 1 and 2 of this HASP.

3.1 General Hazard Assessment

A general hazard assessment was conducted for the required field work described in Section 1.3 and the following potential hazards have been identified:

- Inhalation of volatile contaminants;
- Skin and eye contact with contaminants;
- Ingestion of contaminants;
- Inhalation of dusts impacted with VOCs, SVOCs, pesticides, PFAS, and/or metals;
- Physical hazards associated with the use of heavy equipment;
- Excavation hazards;
- Tripping hazards;
- Noise exposure;
- Heat stress (depending on weather conditions);
- Cold exposure (depending on weather conditions);
- Flammable hazards;
- Electrical hazards; and,
- Use of personal protective equipment.

These hazards are further described in the task-by-task hazard analysis in Table 3. Specific chemical, physical and biological hazards are discussed below.

Mitigation and controls will include as needed work procedures, work/rest regiment, dust control measures, personal protective equipment, and respiratory protection as appropriate.

3.2 Chemical Exposure Hazards

The following chemical hazard evaluation for the proposed site development activities is based on the previous environmental investigations at the site. The evaluation has been conducted to identify chemicals/materials that potentially may be present at the site, and to ensure that work activities, personnel protection, and emergency response are consistent with the specific contaminants that potentially could be encountered.

3.2.1 Specific Chemical Hazards Previously Detected at the Site

Contaminants identified during the investigations completed for the site that may be encountered while conducting site excavation and foundation construction activities include:

- VOCs, SVOCs, pesticides, PFAS, and metals (including hazardous lead) commonly associated with historic urban.
- VOCs, metals, and PFAS in groundwater at concentration above NYSDEC SGVs.
- Petroleum-related VOCs in soil vapor.

Table 1 lists Contaminants of Concern and potentially affected media. The potential contaminants that might be encountered during the field activities and the exposure limits are listed in Table 2.

3.2.2 Chemical Hazard Exposure Routes

Potential hazards and their exposure routes include:

- Inhalation of organic vapors due to the presence of volatile organic compounds from diesel-powered equipment.

- Inadvertent ingestion of potentially toxic substances via hand to mouth contact or deliberate ingestion of materials inadvertently contaminated with potentially toxic materials such as SVOCs, pesticides, and/or metals.

- Skin and eye contact with contaminants at the site and decontamination activities.

Exposure limits and health effects of selected chemicals are in Table 2. The probability of exposure for each task is outlined in Table 3.

3.2.3 Control of Exposure to Chemical Hazards

To protect potentially exposed personnel the following procedures and protocols will be adopted and used as needed: work procedures will be adhered to, work zones will be established, dust control will be utilized,

respirators (if required) and personal protective equipment will be worn, area air monitoring will be conducted during times of disturbance of the impacted fill material and strict personnel decontamination procedures will be followed.

3.3 Physical Hazards

3.3.1 Temperature Extremes

Hot Temperatures

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE, in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke. If onsite workers exhibit the signs of heat exhaustion or heat stroke, they should seek immediate medical attention.

Cold Temperatures

Workers may be exposed to the hazard of working in a cold environment. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia, as well as slippery surfaces, brittle equipment, poor judgment, and unauthorized procedural changes. In order to prevent frostbite, hypothermia, trench foot and immersion foot, the workers are responsible for dressing warmly in layers with thick socks, gloves, and appropriate head and face gear. Upon the onset of discomfort due to the cold, onsite workers should take regular five to ten minute breaks to warm up inside nearby buildings and to drink warm fluids. Please note that the NYCDEP statute prohibits idling an engine for more than three minutes (one-minute if adjacent to a school). This statue includes the use of a vehicle for the purpose of warming up employees. As such, all contractors and employees shall identify a place to warm up in advance. If discomfort continues and the onsite workers start to exhibit the signs of frostbite, hypothermia, trench foot or immersion foot, they should seek immediate medical attention.

3.3.2 Noise and Air Resources

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps and generators. Hearing protection is required and shall be used in designated areas of the site as indicated by the posted signs.

3.3.3 Hand and Power Tools

In order to complete the various tasks for the project, personnel will utilize 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. Hand and power tools will be inspected prior to use. Proper personal protective equipment shall be worn while utilizing hand and power tools. Ground Fault Circuit Interrupters (GFCIs) are required for all portable electric tools.

3.3.4 Slips, Trips, and Falls

Working in and around the site will pose slip, trip and fall hazards due to equipment, piping, slippery surfaces that may be oil covered, or from surfaces that are wet from rain or ice. Potential adverse health effects include falling to the ground and becoming injured or twisting an ankle. Good housekeeping at the site must be maintained at all times.

3.3.5 Fire and Explosion

Prior to starting all excavation work, a review of appropriate New York City maps will be conducted to identify potential hazards. The possibility of encountering fire and explosion hazards exists from under- ground utilities and gases. Therefore, all excavation equipment must be grounded.

3.3.6 Material Handling

Manual lifting of heavy objects may be required. Failure to follow proper lifting techniques can result in back injuries and strains. Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

Whenever possible, heavy objects must be lifted and moved by mechanical devices rather than by manual effort. The mechanical devices will be appropriate for the lifting or moving task and will be 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, such as a Master Rigger or equivalent. Lifting devices, including equipment, slings, ropes, chains, and straps, 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, and/or parked on an incline, will be chocked to prevent movement. If applicable, outriggers will be extended on a flat, firm surface during operation. The lift and swing path of a crane/equipment will be watched and maintained clear of obstructions. 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 will be made available in all mechanical lifting devices. All material must be stored in tiers, racked, blocked, or otherwise secure to prevent sliding, falling, or collapse. All loads/material will be verified to be secure before transportation.

3.3.7 Confined Space/Excavation Hazards

Personnel entry into trenches or unshored (*e.g.,* lagging) excavations within the designated areas of concern will not be permitted. No other confined spaces are known to exist on Site. If entry into trenches or excavations is required, all work will stop until the HASP has been revised to address the new hazards.

3.3.8 Working Near Equipment

Personnel working in the immediate vicinity of heavy equipment (*e.g.*, excavators, loaders, etc.) may encounter physical hazards resulting from contact with equipment. Field personnel should be aware of the presence of these hazards at all times and take appropriate action to avoid them. Due to the limited ability to communicate when wearing respiratory

protection, the risk is increased. Workers must be careful to communicate with heavy equipment operators regarding their location, and should maintain a safe distance from operating equipment at all times. Prior to working around equipment, the site personnel will review appropriate hand signals with the operator.

Equipment will be equipped with back up alarms.

3.3.9 Electrical Safety

Personnel may utilize 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. Ground Fault Circuit Interrupters (GFCIs) are required for all portable electric tools.

3.3.10 Utilities

Prior to the start of any intrusive work, the location of above-ground and underground utilities and other structures will be completed by the contractor/subcontractor responsible for completing construction activities.

3.3.11 Vehicular Traffic

Portions of site activities (load in and load out) will be conducted in the street so vehicular and pedestrian traffic will be present. Appropriate precautions to protect the on-site workers and civilians should be used including the use of cones and traffic vests as appropriate.

3.4 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals and insects. As the potential for exposure to blood borne pathogens during implementation of the SMP is anticipated to be low, a Blood Borne Pathogen Exposure Plan (BBPEP) is not required. A BBPEP will be prepared if site operation requires its implementation.

3.4.1 Animals

During site operations, animals such as dogs, cats, pigeons, mice, and rats may be encountered. Workers shall use discretion and avoid all contact with animals. Bites and scratches from dogs and cats can be painful and if the animal is rabid, the potential for contracting rabies exists. Contact with rat and mice droppings may lead to contracting hantavirus. Inhalation of dried pigeon droppings may lead to psittacosis. Cryptococcosis and histoplasmosis are also diseases associated with exposure to dried bird droppings but these are less likely to occur in this occupational setting.

3.4.2 Insects

Insects, including bees, wasps, hornets, mosquitoes, spiders, and ticks may be present at the site. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. In addition, mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis.

3.4.3 Wound Care

A source of occupational exposure may occur when an employee gives First Aid and or CPR to an individual who had infectious blood. The occupational exposure occurs when there is the possibility for an employee's eyes, mucous membranes, non-intact skin (i.e., cut and abraded skin) to come into contact with potentially infectious materials from another employee. If an accident were to occur where First Aid would need to be administered, the person administering the First Aid will presume that any wounds and materials used are contaminated with BBP and should wear the appropriate PPE to prevent contact with these materials. Additionally, should the use of First Aid materials and or clothing that was potentially contaminated with BBP be encountered these materials should be property containerized and transported to the nearest hospital for proper disposal.

3.5 Coronavirus

General Preventative Measures

Field personnel must follow general proper hygiene measures while in the field including:

- Avoid touching eyes, nose and mouth.
- Cover cough or sneeze with tissue, and throw in trash.
- Wash hands often with soap and water for 20 seconds after going to 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 6 feet from other people (social distancing).
- Wear face coverings when around other worker to minimize spread of COVID-19. (May be required in certain states or locations.)

Construction Trailers

Employees should avoid 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 personal, restrict use from any workers who are ill or showing symptoms of being ill, use if face coverings and ensure a safe distance of 6 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 and notify their project manager and site construction manager or safety officer. Work should resume when the safety and health of Langan and subcontractors is adequately addressed.

3.6 Task Hazard Analysis

The tasks to be completed during the proposed site work activities, as summarized in Section 1.3, are listed in Table 3 with a Hazard Analysis for each task.

4.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

4.1 Levels of Protection

PPE must protect workers from the specific hazards they are likely to encounter 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. 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 these levels of protection will be based on continuous air monitoring results as described in Section 5.0. The decision to modify standard PPE will be made by the HSO after conferring with the Langan Project Manager. The levels of protection are described below.

- **Level D Protection**

  a. Safety glasses with sideshields or chemical splash goggles
  b. Safety boots/shoes (toe-protected)
  c. Hard hat
  d. Long sleeve work shirt and work pants
  e. Nitrile gloves
  f. Hearing protection (as needed)
  g. Reflective traffic vest

- **Level D Protection (Modified)**

  a. Safety glasses with sideshields or chemical splash goggles
  b. Safety boots/shoes (toe-protected)
  c. Disposable chemical-resistant boot covers
  d. Coveralls (polycoated Tyvek or equivalent to be worn when contact with wet contaminated soil, groundwater, or non-aqueous phase liquids is anticipated)
  e. Hard hat
  f. Long sleeve work shirt and work pants
  g. Nitrile gloves
  h. Hearing protection (as needed)
  i. Reflective traffic vest

- **Level C Protection**

  a. Full face-piece, air-purifying, cartridge*-equipped, NIOSH-approved respirator [*combo cartridge P100/OV/CL/HC/SD/CD/HS (escape)]
  b. Inner (latex) and outer (nitrile) chemical-resistant glove
  c. Chemical-resistant safety boots/shoes (toe-protected)
  d. Disposable chemical-resistant boot covers
  e. Hard hat
  f. Long sleeve work shirt and work pants
  g. Coveralls (Tyvek or equivalent, poly-coated Tyvek will be worn when contact, or anticipated contact with wet contaminated soils, ground water, and/or non-aqueous phase liquids (NAPL) is anticipated)
  h. Hearing protection (as needed)
  i. Reflective traffic vest

The action levels used in determining the necessary levels of respiratory protection and upgrading to Level C are provided in Table 4. The written Respiratory Protection Program is maintained by Langan's H&S Department. The monitoring procedures and equipment are outlined in Section 5.0.

4.2 Respirator Fit-Test

All Langan employees and subcontractors performing site work who could be exposed to hazardous substances at the work site are in possession of a full face-piece, air-purifying respirator and have been successfully quantitative fit-tested

within the past year. Quantitative fit-test records are maintained by Langan's H&S Department.

4.3 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 in order to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is as follows:

- Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first.
- If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.

Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short the time period was the previous day they were used.

5.0 AIR QUALITY MONITORING AND ACTIONS LEVELS

5.1 Monitoring During Site Operations

Atmospheric air monitoring results are 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 which 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 soil/fill at the site, real time air monitoring will be conducted for dust and volatile organic compounds (VOCs). A photoionization detector (PID) and/or flame ionization detector (FID) will be used to monitor concentrations of VOCs at personnel breathing-zone height. Dust

monitoring will be accomplished with an aerosol monitor. Air monitoring will be the responsibility of the HSO or designee. Air monitoring will be conducted approximately every 30 minutes during ground intrusive activities on the project site. All manufacturers' instructions for instrumentation and calibration will be available onsite.

Subcontractors' air monitoring plans must be equal or more stringent as the Langan plan.

An air monitoring calibration log is provided in Attachment D of this HASP.

5.1.1 Volatile Organic Compounds

Monitoring with a PID, such as a MiniRAE 2000 (10.6v) or equivalent will occur during intrusive work. Colormetric Indicator Tubes for benzene may be used as backup for the PID, if measurements remain above background monitor every 2 hours. The HSO will monitor the employee 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 workzone every 30 minutes in addition to the employee breathing zone. Instrument action levels for monitored gases are provided in Table 4.

5.1.2 Dust

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 Thermo Personal DataRam (pDR) or a TSI DustTrak should be used to monitor for air particulates. The HSO will monitor the employee 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 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.

5.2 Monitoring Equipment Calibration and Maintenance

Instrument calibration shall be documented and included in a dedicated safety and health logbook or on separate calibration pages of the field book. All instruments shall 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 response.

All instruments shall be operated in accordance with the manufacturers' specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on site by the HSO for reference.

5.3 Determination of Background Levels

Background (BKD) levels for VOCs and dust 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.

6.0 COMMUNITY HEALTH AND SAFETY CONSIDERATIONS

Community air monitoring will be conducted in compliance with the NYSDOH Generic Community Air Monitoring Program (CAMP) outlined below.

The CAMP will include real-time monitoring for VOCs and particulates at the downwind perimeter of each designated work area when ground-intrusive work is in progress. Continuous monitoring will be required for all ground-intrusive work. Ground-intrusive work includes, but is not limited to, soil/fill excavation and handling and utility trenching. Periodic monitoring for VOCs may be required during non-intrusive work such as the collection of soil samples. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location and taking a reading prior to leaving a sample location.

CAMP monitoring of total VOC levels will be conducted using PIDs, and monitoring for particulates will be conducted using particulate sensors equipped with filters that can detect airborne particulates less than 10 microns in diameter (PM10). Monitoring for particulates and odors will be conducted during ground-intrusive work by a field engineer, scientist, or geologist under the supervision of the RE. The work zone is defined as the general area in which machinery is operating in support of remediation. A portable PID will be used to monitor the work zone and for periodic monitoring of total VOC levels during work such as soil sampling. The site perimeter will be visually monitored for fugitive dust emissions.

The following actions will be taken based on total VOC levels measured:

- If total VOC levels exceed 5 ppm above background for the 15-minute average at the perimeter, work will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work will resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the work zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work will resume provided that the total VOC level 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, work will be shut down.

The following actions will be taken based on dust levels measured or visual dust observations:

- If the downwind particulate level is 100 µg/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 PM10 levels do not exceed 150 µg/m^3 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/m^3 above the background level, work must be stopped

and a re-evaluation of activities initiated. 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.

Sustained concentrations of VOCs or PM10 will be reported to the NYSDEC and NYSDOH Project Managers and included in the daily report. In addition, a map showing the location of the CAMP station and work zone air monitoring station will be included in the daily report.

7.0 WORK ZONES AND DECONTAMINATION

7.1 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.

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 clearly 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 shall be determined by the HSO allowing adequate space for the activity to be completed, field members and emergency equipment.

7.2 Contamination Control

7.2.1 Personnel Decontamination Station

Personal hygiene, coupled with diligent decontamination, will significantly reduce the potential for exposure.

7.2.2 Minimization of Contact with Contaminants

During 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 other physical contact with contamination as PPE is intended to minimize accidental contact. This may ultimately minimize the degree of decontamination required and the generation of waste materials from site operations.

Field procedures will be developed to control over spray and runoff and to ensure that unprotected personnel working nearby are not affected.

7.2.3 Personnel Decontamination Sequence

Decontamination will be performed by removing all PPE used in EZ and placing it in drums/trash cans at the CRZ. Baby wipes shall 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, tools and Investigative Derived Waste (i.e., soil cutting) are provided below.

7.2.4 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 shall 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 exist, such as with open excavation, this area will be covered with polyethylene sheeting to eliminate any potential inhalation hazards. All emergency personnel are to be immediately informed of the injured person's condition, potential contaminants, and provided with all pertinent data.

7.2.5 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.

7.2.6 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.

7.3 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 shall be used by field teams, along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

Signal	Meaning
Hand gripping throat	Out of air, can't breathe
Grip on partner's wrist or placement of both hands around partner's waist	Leave area immediately, no debate
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand
Thumbs down	No, negative

8.0 MEDICAL SURVEILLANCE

All personnel who will be performing field work involving potential exposure to toxic and hazardous substances will be required to have passed an initial baseline medical examination, with annual 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. Results of medical evaluations are maintained by Langan's H&S Department.

9.0 EMERGENCY RESPONSE PLAN

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, 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 the Langan Incident/Injury Hotline (973-560-4699) should be called as soon as possible.

9.1 Responsibilities

9.1.1 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 are 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 frame.

9.1.2 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 are 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 shall locate emergency phone numbers and identify hospital routes prior *to beginning* work on the sites. The Emergency Coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator is responsible for implementing the Emergency Response Plan.

9.1.3 Site Personnel

Project site personnel are responsible for knowing the Emergency Response Plan and the procedures contained herein. 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.

9.2 Communications

Once an emergency situation has been stabilized or as soon as practically possible, the HSO will contact the Langan Incident/Injury Hotline (973-560-4699) and Project Manager of identify any emergency situation.

9.3 Local Emergency Support Units

In order to be able to deal with any emergency that might occur during investigative activities at the site, Attachment E will be available in the field vehicles and provided to all personnel conducting work within the EZ.

Figure 3 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. Due to traffic congestion that is prevalent in the New York metropolitan area, alternate hospital routes will need to be considered. The Emergency Coordinator will determine the appropriate route based on time of day and traffic patterns. Changes in the referenced primary facilities shall be documented with the HASP Field Change Authorization Request Form (Attachment B).

The Emergency Phone Numbers listed are preliminary. Upon mobilization, the HSO shall verify all numbers and document the changes in the Site Logbook. Any changes shall also be documented with the HASP Field Change Authorization Request Form.

Hospital route maps will be provided to all field personnel.

9.4 Pre-Emergency Planning

Langan will communicate directly with administrative personnel from the emergency room at the hospital in order 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 in each site vehicle.

9.5 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the HSO on site immediately. First-aid equipment will be available on site at the following locations:

First Aid Kit:	Vehicles
Emergency Eye Wash:	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. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from 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.

Personnel with current first aid and CPR certification will be identified.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance.

Nearest hospital:

Mount Sinai West: Emergency Room
1000 10th Avenue
New York, New York 10019
Telephone: 212-523-6800
(directions from site to hospital found on Figure 3)

9.6 Non-Emergency Medical Treatment

In case of injury to personnel, which is not a medical emergency the employee will contact WorkCare at (1-888-449-7787). WorkCare provides access 24 hours / 7 days a week to experienced occupational health nurses and physicians who confer with employees at the onset of a work-related injury or illness. WorkCare will provide over the phone injury treatment or direct employees to medical treatment by third party provider, if appropriate.

9.7 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 redevelopment and remediation 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.

9.8 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 redevelopment and remediation 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).

9.8.1 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.

9.9 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 shall evacuate.
- Upgrade to Level C Respiratory Protection.
- Downwind perimeter locations shall be monitored for volatile organics.

- If the release poses a potential threat to human health or the environment in the community, the Emergency Coordinator shall notify the Langan Project Manager.
- Local emergency response coordinators will be notified.

9.10 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Safety Data Sheet (SDS) 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 shall also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs. Affected items of clothing shall also be removed from contact with skin.

Providing wash water and soap will be the responsibility of each individual contractor or subcontractor on-site.

9.11 Decontamination During Medical Emergencies

If emergency life-saving 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 advise 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, the normal decontamination procedures will be followed.

9.12 Incident Reporting

Once first aid and/or emergency response needs have been met, the following parties are to be contacted:

- WorkCare (1-888-449-7787)
- Langan Incident/Injury Report Hotline (973-560-4699)
- Langan Project Manager, Amanda Forsburg (973-560-4574)
- Langan Health and Safety Manager, Tony Moffa (215-491-6500)
- The employer of any injured worker who is not a Langan employee

For emergencies involving personal injury and/or exposure including near-misses, the HSO or designee will complete and submit an Incident Report form (Attachment F) within 24 hours. If the employee involved is not a Langan employee, his employer shall receive a copy of the report.

9.13 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work will continue 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.

9.14 Spill Control and Response

All small spills/environmental releases shall 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. 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 shall have spill kits on them with enough material to contain and absorb the worst-case spill from that vehicle. All vehicles and equipment shall be inspected prior to be 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 shall 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 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 shall not make any notification of spills to outside agencies. The client will notify regulatory agencies as per their reporting procedures.

9.15 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on site:

- Industrial first aid kit.
- Fire extinguishers (one per site).

9.16 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.

10.0 TRAINING

10.1 General Health and Safety Training

Completion of an initial 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training program (or its equivalent) as detailed in OSHA's 29 CFR 1910.120(e) is required for all employees who will perform work in areas where the potential for a toxic exposure exists. Annual 8-hour refresher training is also required to maintain competencies to ensure a safe work environment.

10.2 Site-Specific Training

Prior to commencement of site activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include a documented verbal review of the entire HASP and all the provisions within the HASP document. Should any new employees arrive on-site, they will also be given a documented full HASP review – or one that address the appropriate tasks that remain at the time of the new employee's arrival.

10.3 Onsite Safety Briefings

Project personnel and visitors will participate in documented daily on-site health and safety briefings ("Tailgate Talks") led by the HSO to assist site personnel in safely conducting their work activities. The briefings will include information on operations to be conducted that shift, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity for the work crews to be updated on monitoring results. Prior to starting any new activity, a training session will be held for crew members involved in the activity. The Safety Briefing form (Attachment A) can be used to facilitate this effort.

10.4 Hazard Communication

All material brought on-site will be in the appropriate containers and will be properly labeled. The SDS for unleaded gasoline, diesel fuel, and hydraulic fluid are attached. Langan's written Hazard Communication program, in compliance with 29 CFR 1910.1200, is maintained by Langan's H&S Department.

11.0 RECORDKEEPING

The following is a summary of required health and safety logs, reports and recordkeeping.

11.1 Field Change Authorization Request

A field change authorization request is to be completed for requesting a change to this HASP (Attachment B). Any changes to the work to be performed that is 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.

11.2 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training, documentation of three-day 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 Langan's H&S Department.

11.3 Onsite Log

A log of personnel on site each day will be kept by the HSO or designee.

11.4 Daily Safety Meetings ("Tailgate Talks")

Completed Safety Briefing forms will be maintained by the HSO.

11.5 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.

11.6 Hazard Communication Program/SDS

Safety Data Sheets (SDS) have been obtained for applicable substances and are included in this HASP (Attachment G). Langan's written Hazard Communication program, in compliance with 29 CFR 1910.1200, is maintained by Langan's H&S Department.

11.7 Documentation

Employees are required to contact WorkCare at (1-888-449-7787) to document incidents/injuries which are not medical emergencies. 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 client representative to report the incident or near miss. A written report must be completed and submitted to the client representative within 24 hours of the incident. For emergencies involving personnel injury and/or exposure, 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.

12.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have been verbally given a full HASP review by Langan personnel, and understand the provisions of this EHS Plan. It is maintained on site by the HSO as a project record.

Each field team member shall sign this section after Site-specific training is completed and before being permitted to work onsite.

Name (Print and Sign)	*Company*	*Date*

TABLES

TABLE 1
SUSPECTED CONTAMINANTS OF CONCERN
550 TENTH AVENUE
NEW YORK, NEW YORK

Contaminant Of Concern	Affected Media
VOLATILES	
1,2,3-Trichloropropane	Groundwater
1,2-Dibromo-3-Chloroproane	Groundwater
1,2-Dichloroethane	Groundwater
Acetone	Groundwater
SEMI-VOLATILES	
Benzo(a)anthracene	Soil / Groundwater
Benzo(b)flouranthene	Soil / Groundwater
Benzo(k)flouranthene	Soil / Groundwater
Benzo(a)pyrene	Soil / Groundwater
Chrysene	Soil / Groundwater
Dibenzo(a,h)anthracene	Soil
Indeno (1,2,3-cd) pyrene	Soil / Groundwater
PESTICIDES	
4,4'-DDT	Soil
METALS	
Barium	Soil / Groundwater
Beryllium	Groundwater
Cadmium	Soil
Chromium, Trivalent	Soil
Copper	Soil
Iron	Groundwater
Lead	Soil / Groundwater
Magnesium	Groundwater
Manganese	Soil / Groundwater
Mercury	Soil / Groundwater
Nickel	Soil
Selenium	Soil / Groundwater
Sodium	Groundwater
Zinc	Soil
Per- and Polyfluoroalkyl Substances (PFAS)	
Perfluorooctanesulfonic Acid (PFOS)	Soil / Groundwater
Perfluorooctanoic Acid (PFOA)	Groundwater

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
550 TENTH AVENUE
NEW YORK, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
1,2,3-Trichloropropane	10 ppm	100 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritate eyes, nose, throat; central nervous system depression; in animals: liver, kidney damage; [potential occupational carcinogen]
1,2-Dibromo-3-chloropropane	---	---	Inhalation, Skin Absorption, Ingestion, Skin and/or Eye Contact	Irritate eyes, skin, nose, throat; drowsiness; nausea, vomiting; pulmonary edema; liver, kidney injury; sterility; [potential occupational carcinogen]
Acetone	1000 ppm	2500 ppm	inhalation, ingestion, skin and/or eye contact	irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis
Benzo(a)anthracene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Benzo(b)fluoranthene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Benzo(k)fluoranthene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Benzo(a)pyrene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Chrysene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Dibenzo(a,h)anthracene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Indeno (1,2,3-cd) pyrene	0.2 mg/mg^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Barium	0.5 mg/m^3	50 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritate eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
550 TENTH AVENUE
NEW YORK, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Copper	1 mg/m^3	100 mg/m^3	Inhalation, Ingestion, skin and/or eye contact	Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing; [potential occupational carcinogen]
Cadmium	0.005 mg/m^3	9 mg/m^3	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]
Chromium metal	0.5 mg/m^3	250 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritate eyes, skin; lung fibrosis (histologic)
Ethylene dichloride	1 ppm	50 ppm	Inhalation, ingestion, skin absorption, skin and/or eye contact	Irritate eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]
Iron	10 mg/m^3	2,500 mg/m^3	Inhalation	Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis)
Lead	0.05 mg/m^3	100 mg/m^3	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 eyes; hypertension

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
550 TENTH AVENUE
NEW YORK, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Magnesium	15 mg/m^3	750 mg/m^3	Inhalation, skin and/or eye contact	Irritate eyes, nose; metal fume fever: cough, chest pain, flu-like fever
Manganese	5 mg/m^3	500 mg/m^3	Inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage
Mercury	0.1 mg/m^3	10 $mg/^3$	Inhalation, Ingestion, Skin Absorption, Skin and/or Eye Contact	Irritate eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria
Nickel	1 mg/m^3	10 mg/m^3	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritate eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
550 TENTH AVENUE
NEW YORK, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Selenium	0.2 mg/m^3	1 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritate 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
Sodium	2 mg/m^3	10 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritate eyes, skin, mucous membrane; pneumonitis; eye, skin burns; temporary loss of hair
Zinc	5 mg/m^3	500 mg/m^3	Inhalation	Metal fume fever: 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

--- No exposure limits listed in the NIOSH Pocket Guide to Chemical Hazards dated November 2010.

TABLE 3
HAZARD ANALYSIS
550 TENTH AVENUE
NEW YORK, NEW YORK

Task	Potential Risk	Description	Control Measure
1	Lifting equipment	Improper lifting/carrying of equipment and materials	Follow safe lifting and general material handling
1	Noise	Loud sounds caused by the machines during drilling, or excavation	Wear proper PPE (hearing protection)
1	Working near heavy machinery	Close proximity to drill rig and/or construction equipment	Be aware of surroundings, wear safety vest and hard hat
1	Slips, trips, and falls	Any number of injuries from slips, trips, and falls in carrying out these tasks	Good housekeeping at site, constant awareness and focus on the task
1	Inhalation of Dust	Breathing in visible dust from earthwork using drills or excavators	Wear proper PPE, monitor air for dust concentrations, use dust suppression techniques
1	Inhalation of Volatiles	Breathing in volatiles from earthwork using drills or excavators causing dust	Wear proper PPE, monitor air for volatile concentrations, use dust suppression techniques
1	Utilities	Hitting utility lines during drilling and or excavating	Use proper mark out of underground utilities before beginning earthwork
1	Skin contact with contaminated material	Material falls on skin; gets in eye	Wear proper PPE; follow safe work practices
1	Ingestion of contaminated material	Material falls on skin; gets into mouth	Wear proper PPE; follow safe work practices
1	Skin and eye contact with contaminated material	Material falls on skin; gets in eye	Wear proper PPE; follow safe work practices
1	Heat Stress	Stress or exhaustion related to high temperatures	Hydrate and rest as needed
1	Cold Stress	Stress or exhaustion related to low temperatures; hypothermia	Wear proper PPE; follow safe work practices
1	Bites and stings	Bee stings, ticks, snake bites	Wear proper PPE, be watchful, follow safe work practices
1	Lacerations and abrasions	Many opportunities working with hand tools	Inspect equipment being used for sharp edges, wear proper PPE; follow safe work practices

TABLE 4
INSTRUMENTATION ACTION LEVELS
550 TENTH AVENUE
NEW YORK, NEW YORK

Instrument	Action Level	Level of Protection / Action Required
PID	Background to 5 ppm	Level D/No respirator; no further action required
	> 5 ppm for > 5 minutes	1. Temporarily discontinue all activities and evaluate potential causes of the excessive readings. If these levels persist and cannot be mitigated (i.e., by slowing drilling or excavation activities), contact HSO to review conditions and determine source and appropriate response action. 2. If PID readings remain above 5 ppm, temporarily discontinue work and upgrade to Level C protection. 3. If sustained PID readings fall below 1 ppm, downgrading to Level D protection may be permitted
	> 5 ppm but < 150 ppm for > 5 minutes	Level C/ 1. Discontinue all work; all workers shall move to an area upwind of the jobsite. 2. Evaluate potential causes of the excessive readings and allow work area to vent until VOC concentrations fall below 5 ppm. 3. Level C protection will continue to be used until PID readings fall below 1 ppm.
	> 30 ppm (steady state condition) within AOC zone	Stop Work / Suppress Emissions / Evacuate and re-evaluate.
	> 150 ppm	Evacuate the work area
Total Dust Aerosol Monitor	> 0.100 mg/m3 above BKD (steady state condition) at perimeter of AOC zone for 15-minutes or visible dust.	Stop Work / Implement dust control / Continue dust monitoring if dust levels are less than 150 mg/m3
	< 0.150 mg/m3 above BKD (following dust suppression measures)	Stop Work / implement dust control, continue work once levels are <150 mg/m3
	>5 mg/m3	Level C

Notes:

1. 1 ppm level based on OSHA Permissible Exposure Limit (PEL) for benzene.
2. 5 ppm level based on OSHA Short Term Exposure Limit (STEL) maximum exposure for vinyl chloride for any 15 minute period.
3. 150 ppm level based on NIOSH Immediately Dangerous to Life and Health (IDLH) for tetrachloroethylene

TABLE 5
PERSONAL PROTECTIVE EQUIPMENT
550 TENTH AVENUE
NEW YORK, NEW YORK

Respiratory Protection*:*

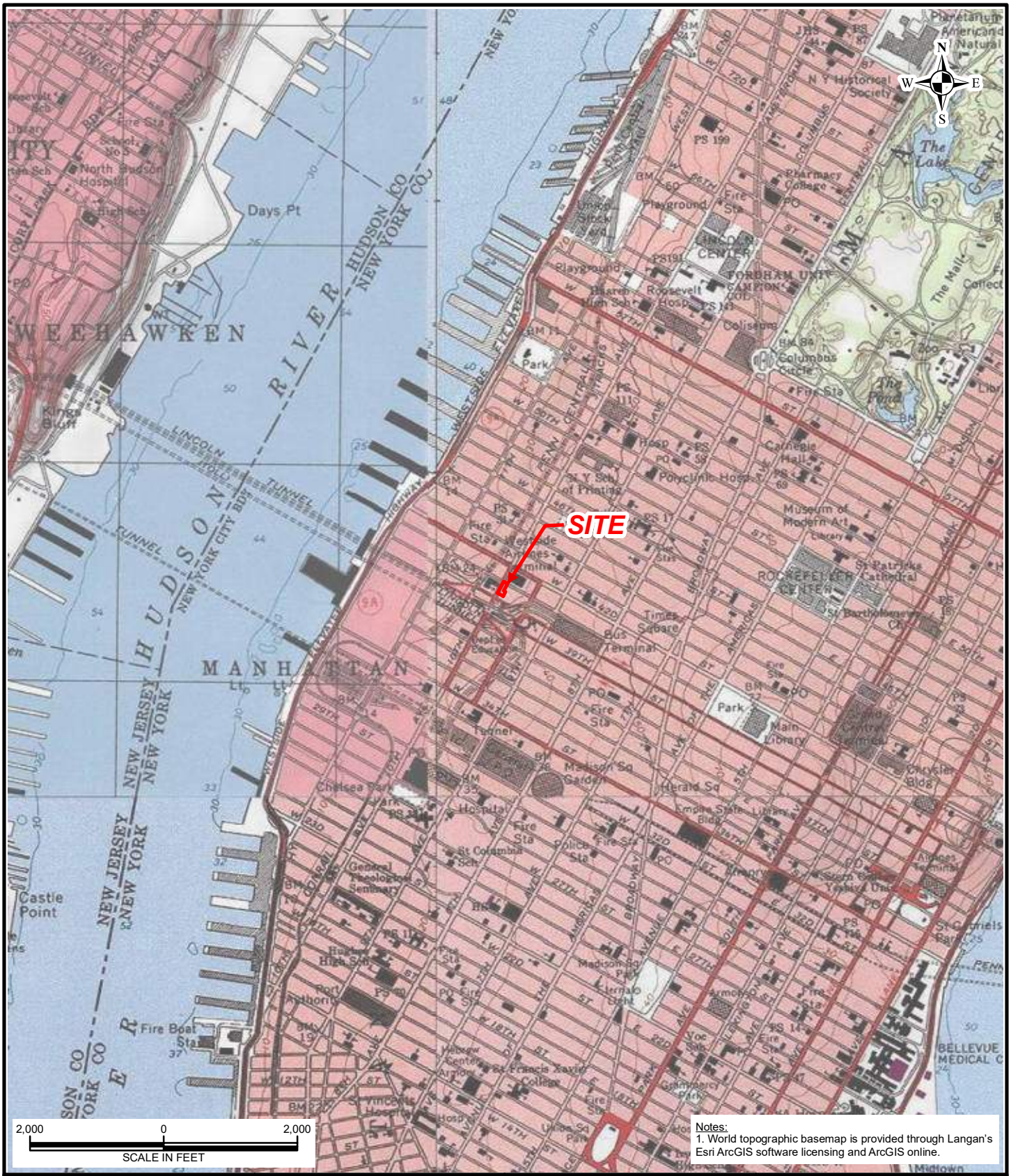
Level D:	No respirator required.
Level C:	Half-face, Air Purifying Respirator (APR) with combination HEPA (dusts, fumes, aerosols) and organic vapor cartridges. The respirator will be NIOSH-approved.
Level C - supplemental by task	Fullface, Air Purifying Respirator (APR) with combination HEPA (dusts, fumes, aerosols), acid gas, organic vapor cartridges. The respirator will be NIOSH-approved.

Personal Protective Clothing*:*

Level D:	Hard-hat, traffic vest (if working on or adjacent to the roadway), long sleeve work shirt & work pants of natural fibers, safety glasses or goggles, steel-toed boots, hearing protection (if needed), nitril inner gloves and leather outer gloves.
Level D - supplemental PPE by task	Tyvek disposal suit
Level C:	Chemically resistant outer boots and Chemical resistant Tyvek disposal suite.

\\LANGAN.COM\DATA\PAR\DATA4\100674401\PROJECT DATA_DISCIPLINE\ENVIRONMENTAL\REPORTS_PHASE 2 (100674402)\2023-07 - BCP SMP\APPENDIX E - HASP\TABLES\HASP TABLE 5 - PPE.DOC

FIGURES



Notes:
1. World topographic basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online.

LANGAN
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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
550 TENTH AVENUE
FILLING STATION SITE

BLOCK No. 1050
LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

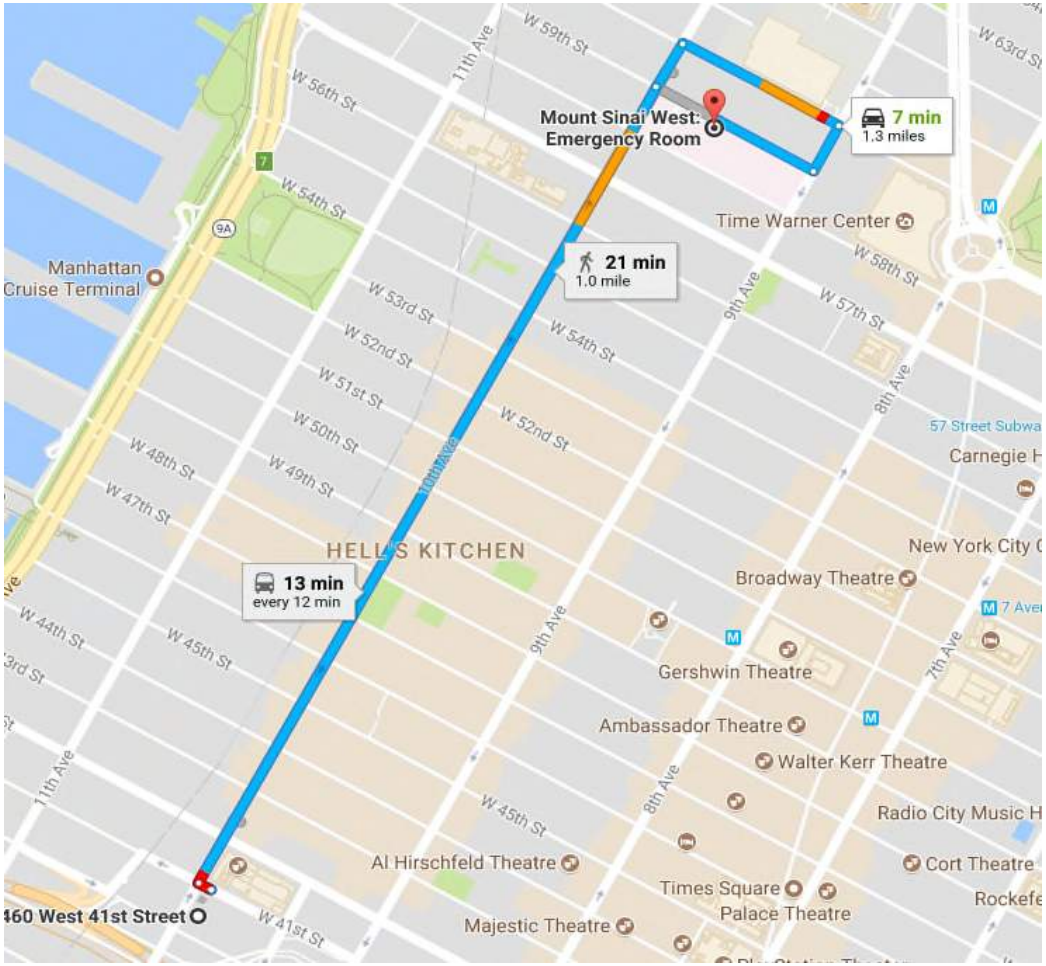
Drawing Title
SITE LOCATION MAP

Project No.	100674402
Date	11/11/2021
Scale	1"=2,000'
Drawn By	IHB
Submission Date	11/15/2021

Figure 1

© 2013 Langan

Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\MXD\Environmental_Figures\2021-11 RIR\Figure 1 - Site Location Map.mxd Date: 11/15/2021 User: ibaker Time: 11:51:42 AM



Emergency Route to Mount Sinai West (Phone # (212) 523-6800) :

1 Head northwest on West 41st St. towards 10th Ave.
2 Turn right at the 1st cross street onto 10th Ave.
3 Continue onto Amsterdam Ave.
4 Turn right onto West 60th St.
5 Turn right onto Columbus Ave.
6 Turn right onto West 59th St.
7 Emergency Room entrance will be on the left.

MAP REFERENCE: Google Maps

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Project

550 Tenth Avenue
EMERGENGY HOSPITAL ROUTE MAP

Manhattan **New York**

Project	DATE	SCALE	FIGURE NO.
100674402	**12/17/2021**	**NTS**	**2**

\\langan.com\data\PAR\data4\100674401\Project Data_Discipline\Environmental\Reports_Phase 2 (100674402)\2021-12 - BCP RAWP\Appendix D - CHASP\Figures\Figure 3 - Hospital Route

ATTACHMENT A

Health and Safety Briefing Statement

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ATTACHMENT A

HEALTH AND SAFETY BRIEFING STATEMENT

The following personnel were present at a pre-job safety briefing conducted at _____ (time) on _____ (date) at _____ (location), and have read this Health and Safety Plan for the above Site and are familiar with its provisions:

Name	Signature
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Fully charged ABC class fire extinguisher available on Site? _____
Fully stocked First Aid Kit available on Site? _____
All project personnel advised of location of nearest phone? _____
All project personnel advised of location of designated medical facility? _____

_____
Name of Field Team Leader or Site Safety Officer

_____
Signature Date

ATTACHMENT B

Field Procedures Change Authorization Form

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ATTACHMENT B

FIELD PROCEDURES CHANGE AUTHORIZATION FORM

Section to be changed: _____

Duration of Authorization Requested Date: _____

_____ Today only

_____ Duration of Task

_____ Other_____

_____

_____

Description of Procedures Modification:

_____

_____

_____

Justification:

_____ _____

Person Requesting Change Verbal Authorization Received From:

_____ _____

Name Name Time

_____ _____

Title Title

_____

Signature

Approvals:

_____

_____

_____

ATTACHMENT C

Unsafe Conditions and Practices Form

LANGAN

ATTACHMENT C

UNSAFE CONDITIONS AND PRACTICES FORM

DESCRIPTION OF CIRCUMSTANCES REGARDING UNSAFE CONDITION OR PRACTICE:

_____

_____

_____

_____

_____

_____

_____

IS THIS CONDITION EXISTING OR POTENTIAL? _____

REPORTED TO: _____

REPORTED BY:_____

DATE REPORTED: _____

COMMENTS: _____

_____

_____

ATTACHMENT D

Calibration Log

LANGAN

ATTACHMENT D

PROJECT: _____

DATE: _____

CALIBRATION LOG

Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calib Reading	Performed By:

ATTACHMENT E

Emergency Notification Numbers

ATTACHMENT E

EMERGENCY NOTIFICATION NUMBERS

The following list provides names and telephone numbers for emergency contact personnel.

ORGANIZATION	CONTACT		TELEPHONE
New York City Police			911
New York City Fire			911
Mt. Sinai West			212-523-6800
WorkCare (Non-Emergency Medical Treatment)			1-888-449-7787
Langan Incident / Injury Hotline			973-560-4699
Langan Project Manager	Amanda Forsburg		973-560-4574
National Response Center			800-424-8802
Center for Disease Control			404-488-4100
CHEMTREC			800-424-9300
TSCA HOTLINE			202-554-1404
RCRA HOTLINE			800-424-9346
CDC		(DAY) (NIGHT)	404-452-4100 404-329-2888
BUREAU OF ALCOHOL, TOBACCO & FIREARMS			800-424-9555 202-566-7777
NATIONAL RESPONSE CENTER			800-424-8802
PESTICIDE INFORMATION SERVICE			800-424-9346
BUREAU OF EXPLOSIVES, A.A. RAILWAYS			202-835-9500
FEDERAL EXPRESS - HAZARDOUS MATERIAL INFO			901-922-1666

ATTACHMENT F

Accident / Incident Report Form

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ATTACHMENT F

INCIDENT REPORT

LANGAN EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT
(Submit a Separate Report for Each Employee and/or Incident)

Date: _____

Employee's Name: _____ Employee No: _____

Sex: M _____ F _____ Age: _____

Region: _____ Location:_____

Project: _____ Project No: _____

Incident: _____

Type: Possible Exposure _____ Exposure _____ Physical Injury _____

Location: _____

Date of Incident: _____ Time of Incident: _____

Date of Report Incident: _____

Person(s) to Whom Incident was Reported: _____

Weather Conditions During Incident: Temperature _____ Humidity _____

Wind Speed and Direction: _____ Cloud Cover: _____

Clear: _____ Precipitation: _____

Materials Potentially Encountered: _____

Chemical (give name of description - liquid, solid, gas, vapor, fume, mist):

_____

_____

Radiological: _____

Other: _____

Nature of the Exposure/Injury: (State the nature of the exposure/injury in detail and list the parts of the body affected. Attach extra sheets if necessary).

_____

_____

_____

_____

_____

Did you receive medical care? Yes _____ No _____ If so, when _____

Where? On-Site _____ Off-Site _____

By Whom: Name of Paramedic: _____

Name of Physician: _____

Other: _____

If Off-Site, name facility (hospital, clinic, etc):_____

_____

Length of stay at the facility? _____

Was the Site Safety Officer contacted? Yes _____ No _____ When?_____

Was the Corporate Health and Safety Officer contacted? Yes _____ No _____

If so, who was the contact? _____

Did the exposure/injury result in permanent disability? Yes _____ No _____

If so, explain: _____

_____

_____

_____

Has the employee returned to work? Yes _____ No _____

List the names of other persons affected during this incident:

_____

_____

_____

_____

_____

_____

List the names of persons who witnessed the exposure/injury incident:

_____

_____

_____

_____

_____

_____

_____

Possible cause of the exposure/injury incident: _____

_____

_____

_____

_____

_____

What was the name and title of the field team leader or immediate supervisor at the site of the incident?

_____

Was the operation being conducted under an established Health and Safety Plan?

Yes _____ No _____ If yes, attach a copy. If no, explain

_____

_____

_____

_____

_____

_____

Describe protective equipment and clothing used by the employee:

_____

_____

_____

_____

_____

_____

Did any limitations in safety equipment or protective clothing contribute to or affect exposure? If so, explain:

_____

_____

_____

What was the employee doing when the exposure/injury occurred? (Describe briefly as Site Reconnaissance, Site Characterization, or Sampling, etc.):

_____

_____

_____

_____

Where exactly on site or off site did the exposure/injury occur?

_____

_____

_____

_____

_____

How did the exposure/injury occur? (Describe fully what factors led up to and/or contributed to the incident):

_____

_____

_____

_____

_____

Name of person(s) initiating report, job title, phone number:

_____

_____

_____

_____ _____

Employee Signature Date

_____ _____

Site Safety Officer Signature or Field Team Leader Signature Date

ATTACHMENT G

Safety Data Sheets
(SDS)

LANGAN

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

Matheson Tri-Gas, Inc. makes no express or implied warranties, guarantees or representations regarding the product or the information herein, including but not limited to any implied warranty or merchantability or fitness for use. Matheson Tri-Gas, Inc. shall not be liable for any personal injury, property or other damages of any nature, whether compensatory, consequential, exemplary, or otherwise, resulting from any publication, use or reliance upon the information herein.

End of Sheet MAT14370

Safety Data Sheet

1,1-Dichloro-2,2-bis(4-chlorophenyl-d_4)ethylene

Section 1. Chemical product and company identifications

Product code: D-3005
Chemical formula: $C_{14}D_8Cl_4$
CAS: 93952-19-3
CAS (unlabelled): 72-55-9
Synonyms: 4,4'-DDE, 2,2-Bis(4-chlorophenyl)-1,1-dichloroethylene

Supplier / Manufacturer:

C/D/N Isotopes Inc.
88 Leacock Street
Pointe-Claire (Québec) H9R 1H1
Phone: 514-697-6254
Toll-Free (Canada & USA): 1-800-565-4696
Fax: 514-697-6148
Website: www.cdnisotopes.com

In case of emergency:

TOXYSCAN HOTLINE: 1-855-780-0599

Section 2. Hazards identifications

Physical state: Solid
Warning: Harmful if swallowed. Suspected of causing cancer.
Routes of entry: Inhalation, skin and eyes

GHS (Globally Harmonized System of Classification and Labelling of Chemicals):

GHS Classification:
- Acute toxicity, Oral (Category 4)
- Carcinogenicity (Category 2)

GHS Label elements:
- Pictograms: 
- Signal word: Warning

Hazards statement:
- H302 Harmful if swallowed.
- H351 Suspected of causing cancer.

Precautionary statement: - P281 Use personal protective equipment as required.

Section 3. Composition and information on ingredients

Name	CAS	Concentration %
1,1-Dichloro-2,2-bis(4-chlorophenyl-d_4)ethylene	93952-19-3	> 98

Section 4. First aid measures

Eye contact: Flush eyes with water as a precaution.
Skin contact: Wash off with soap and plenty of water. Consult a physician.
Inhalation: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.
Ingestion: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
General advice: Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

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Section 5. Firefighting measures

Flammability of the product: Not flammable or combustible.
Lower explosion limit: No data available.
Upper explosion limit: No data available.
Auto-ignition temperature: No data available.
Flash point: No data available.
Products of combustion: Hazardous decomposition products formed under fire conditions: Carbon oxides, hydrogen chloride gas.
Firefighting media and instructions: 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.

Section 6. Accidental release measures

Personal precautions: Use personal protective equipment. 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. Discharge into the environment must be avoided.
Methods for cleaning up: Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

Section 7. Handling and storage

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.
Storage: Store at room temperature. Adequate ventilation. Protect from light.

Section 8. Exposure Controls, Personal Protections

Engineering controls: Use mechanical exhaust or laboratory fumehood to avoid exposure.
Eyes: Safety glasses with side-shields conforming to NIOSH (US).
Respiratory: 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).
Hands: Handle with gloves. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
Skin/body: Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Section 9. Physical and chemical properties (unlabelled)

Molecular weight: 318.03 g/mol
Physical status: Solid
Color: White-pale yellow
Odour: No data available
Density: No data available
Melting point: 88 - 90 °C (190 - 194 °F)
Boiling point: 336 °C (637 °F)
Vapour pressure: < 0.00001 hPa (< 0.00001 mmHg)
Vapour density: No data available
Partition coefficient (octanol/water): log Pow: 6.51
Water solubility: 0.04 mg/L

Section 10. Stability and reactivity

Stability and reactivity: Stable under recommended storage conditions.
Incompatibility: Strong oxidizing agents, strong bases.
Products of combustion: Hazardous decomposition products formed under fire conditions: Carbon oxides, hydrogen chloride gas.
Reactivity conditions: No data available.

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Section 11. Toxicological information (unlabelled)

Toxicological data: 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethylene

Information on ingredients:

Name	CAS	LD_{50}	LC_{50}
1,1-Dichloro-2,2-bis(4-chlorophenyl)ethylene	72-55-9	Oral - rat - 880 mg/kg	No data available

Potential acute effects

- **Eyes:** May cause eye irritation.
- **Skin:** Harmful if absorbed through skin. May cause skin irritation.
- **Inhalation:** May be harmful if inhaled. May cause respiratory tract irritation.
- **Ingestion:** Harmful if swallowed.

Potential chronic effects

- **Carcinogenic effects:** 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.
- **Mutagenic effects:** No data available.
- **Teratogenic effects:** No data available.
- **Medical conditions aggravated by overexposure:** No data available.

Section 12. Ecological information

Ecological data:

Name	Results	Species	Period
1,1-Dichloro-2,2-bis	0.2 - 0.3 mg/l LC50	Lepomis macrochirus	96 h
(4-chlorophenyl)ethylene	0.03 - 0.04 mg/l LC50	Oncorhynchus mykiss	96 h
	0.05 - 0.18 mg/l LC50	Salmo salar	96 h

Effects on environment: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Mobility: No data available.
Environmental precautions: No data available.
Persistence and degradability: No data available.
Bioaccumulative potential: Gambusia affinis (Mosquito fish) - 33 d. Bioconcentration factor (BCF): 12,037.

Section 13. Disposal considerations

Waste disposal: 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.

Section 14. Transportation information

Classification DOT/IMDG/IATA label:

Shipping name: Not dangerous goods
UN number: None
Class: None
Packaging group: None

Additional information: None

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Section 15. Regulatory information

UNITED STATES:
NFPA classification



Health: 1
Flammable: 0
Reactivity: 0
Specials conditions: None

Legend: 4: Severe, 3: High, 2: Moderate, 1: Slightly, 0: Not hazardous

U.S. Federal regulations:

TSCA 8(b) inventory: 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethylene
SARA 302/304/311/312 extremely hazardous substances: Not Listed
SARA 302/304 emergency planning and notification: Not Listed
SARA 302/304/311/312 hazardous chemicals: Not Listed
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard: Not Listed
CWA (Clean Water Act) 307: Not Listed
CWA (Clean Water Act) 311: Not Listed
CAA (Clean Air Act) 112 accidental release prevention: Not Listed
CAA (Clean Air Act) 112 regulated flammable substances: Not Listed
CAA (Clean Air Act) 112 regulated toxic substances: Not Listed

State regulations:

DEA List I Chemicals (Precursor Chemicals): Not Listed
DEA List II Chemicals (Essential Chemicals): Not Listed
Substances in Massachusetts: Not Listed
Dangerous substances in New Jersey: Not Listed
New York – Dangerous substances with acute effects: Not Listed
Dangerous substances in Pennsylvania – right to know: Not Listed

WHMIS (Canada):



Not WHMIS controlled.

Section 16. Additional information

References:

- ANSI Z400.1, MSDS Standard, 2001.
- Manufacturer's Material Safety Data Sheet.
- 29CFR Part1910.1200 OSHA MSDS Requirements.
- 49CFR Table List of Hazardous Materials, UN#, Proper Shipping Names, PG. -Canada
- Gazette Part II, Vol. 122, No. 2 Registration SOR/88-64 31 December, 1987 Hazardous Products Act "Ingredient Disclosure List".
- Federal act on the controlled products
- Canadian Transport of Dangerous Goods, Regulations and Schedules, Clear Language version 2002.
- Toxicological repertory, HSC.
- Material safety data sheet from the components.

Date of issue: **February 20th, 2017**
Version: 1
Elaborated by: **Toxyscan Inc., 1-866-780-0599**
Notice to reader: To the best of our knowledge, the information contained herein is accurate. However, C/D/N Isotopes Inc., Toxyscan Inc., or 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

Revision Date: 12/23/16
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**32203 / 4,4'-DDT 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:	www.restek.com
Revision Number:	8
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 - 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.
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 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.

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.
Call a POISON CENTER or doctor/physician if you feel unwell.
Specific treatment see section 4.
Rinse mouth.
Take off immediately all contaminated clothing and wash it 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 INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
methanol	67-56-1	200-659-6	99.900000
4,4'-DDT	50-29-3	200-024-3	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
4,4'-DDT	50-29-3	500 mg/m3 IDLH		1 mg/m3 TWA	1 mg/m3 TWA (listed under Dichlorodiphenyltrichloroethane)

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 Pressure:	No data available.
Vapor Density:	1.1 (air = 1)
Boiling Point:	No data available.
Melting Point:	-98 °C
Flash Point:	52
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	36
Lower Flammable/Explosive Limit, % in air:	6
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:	99.9
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	Inhalation LC50 Rat 22500 ppm 8 h
DDT	50-29-3	Dermal LD50 Rabbit 300 - 2820 mg/kg

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.	
DDT	50-29-3	Present

ACGIH:

Chemical Name	CAS No.	
DDT	50-29-3	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH:

Chemical Name	CAS No.	
DDT	50-29-3	potential occupational carcinogen

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
DDT	50-29-3	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

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
methanol	67-56-1	X	X	-	X
4,4'-DDT	50-29-3	X	-	-	X

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
DDT	50-29-3	Prop 65 Cancer
Methanol	67-56-1	Prop 65 Devolop Tox
p,p''-DDT	50-29-3	Prop 65 Devolop Tox
p,p''-DDT	50-29-3	Prop 65 Rep Female
p,p''-DDT	50-29-3	Prop 65 Rep Male

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
methanol	67-56-1	X	X	X	X
4,4'-DDT	50-29-3	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 09/30/14
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
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 4.7
Revision Date 05/23/2016
Print Date 06/23/2016

1. PRODUCT AND COMPANY IDENTIFICATION

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

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 toxicity, Inhalation (Category 3), H331
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)
H302 Harmful if swallowed.
H331 Toxic if inhaled.
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.
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.

P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
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	:	As
Molecular weight	:	74.92 g/mol
CAS-No.	:	7440-38-2
EC-No.	:	231-148-6
Index-No.	:	033-001-00-X

Hazardous components

Component	Classification	Concentration
Arsenic		
	Acute Tox. 4; Acute Tox. 3; Aquatic Acute 1; Aquatic Chronic 1; H302, H331, 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. 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
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	35µg As/l	In urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of the workweek (After four or five consecutive working days			

		with exposure)			
		inorganic arsenic plus methylated metabolites	35µg As/l	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
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: Pieces 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: 817 °C (1,503 °F) - lit.
f)	Initial boiling point and boiling range	613 °C (1,135 °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	5.727 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
Heat Exposure to air may affect product quality.

10.5 Incompatible materials
Oxidizing agents, Halogens, Palladium undergoes a violent reaction with arsenic, Zinc, Platinum oxide, Nitrogen trichloride, Bromine azide

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Arsenic 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 - 763 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

LD50 Oral - Mouse - 145 mg/kg
Remarks: Behavioral:Ataxia. Diarrhoea

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 is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

IARC:	1 - Group 1: Carcinogenic to humans (Arsenic)
NTP:	Known to be human carcinogen (Arsenic)
	Known to be human carcinogen (Arsenic)
OSHA:	OSHA specifically regulated carcinogen (Arsenic)

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: CG0525000

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.

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) - 9.9 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 3.8 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 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: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic
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

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
Arsenic	7440-38-2	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Arsenic	7440-38-2	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
Arsenic	7440-38-2	2008-10-10

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
H302	Harmful if swallowed.
H331	Toxic if inhaled.
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: 4.7 Revision Date: 05/23/2016 Print Date: 06/23/2016

SAFETY DATA SHEET

Version 5.6
Revision Date 06/02/2016
Print Date 07/20/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Benz[*a*]anthracene
Product Number	:	48563
Brand	:	Supelco
Index-No.	:	601-033-00-9
CAS-No.	:	56-55-3

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 #	:	+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)
Carcinogenicity (Category 1B), H350
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.
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

Synonyms	:	1,2-Benzanthracene Tetraphene
Formula	:	$C_{18}H_{12}$
Molecular weight	:	228.29 g/mol
CAS-No.	:	56-55-3
EC-No.	:	200-280-6
Index-No.	:	601-033-00-9

Hazardous components

Component	Classification	Concentration
Benz[a]anthracene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; 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
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

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 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
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: 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: 157 - 159 °C (315 - 318 °F)
f)	Initial boiling point and boiling range	437.6 °C (819.7 °F)
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
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 - > 200 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

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 (Benz[a]anthracene)
IARC:	2B - Group 2B: Possibly carcinogenic to humans (Benz[a]anthracene)
NTP:	Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)
NTP:	Reasonably anticipated to be a human carcinogen (Benz[a]anthracene)
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

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.
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)
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. (Benz[a]anthracene)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[a]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
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
Benz[a]anthracene	56-55-3	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	CAS-No. 56-55-3	Revision Date 2007-09-28
WARNING! This product contains a chemical known to the State of California to cause cancer. Benz[a]anthracene	CAS-No. 56-55-3	Revision Date 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.
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: 5.6 Revision Date: 06/02/2016 Print Date: 07/20/2017

SAFETY DATA SHEET

Revision Date 22-May-2017 **Revision Number** 2

1. Identification

Product Name **Benzo[a]pyrene, 98%**

Cat No. : **AC105600010; AC105601000**

Synonyms Benzo[def]chrysene.; 3,4-Benzopyrene; 3,4-Benzpyrene

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

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
Germ Cell Mutagenicity	Category 1A
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 1A

Label Elements

Signal Word
Danger

Hazard Statements
May cause an allergic skin reaction
May cause genetic defects
May cause cancer
May damage fertility or 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! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Benzo[a]pyrene	50-32-8	> 96

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 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
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	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 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	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.

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	
Melting Point/Range	175 179 °C
Boiling Point/Range	°C @ 760 mmHg

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	No information available
Vapor Density	No information available
Specific Gravity	No information available
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	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 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

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
Benzo[a]pyrene	50-32-8	Group 1	Reasonably Anticipated	A2	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 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

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

Do not empty into drains.

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

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 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

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Benzo[a]pyrene	X	X	-	200-028-5	-		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 %
Benzo[a]pyrene	50-32-8	> 96	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)

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
Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Benzo[a]pyrene	1 lb	-

California Proposition 65 This product does not contain any 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): 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

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Revision Date 22-May-2017
Print Date 22-May-2017
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

Revision Date 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **Barium**

Cat No. : **AC317860000; AC317860250; AC317861000; AC317865000**

Synonyms None Known.

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 solids	Category 2
Acute oral toxicity	Category 3
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
Danger

Hazard Statements
Flammable solid
Toxic 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
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
Call a POISON CENTER or doctor/physician 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
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: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
Fire
Explosion risk in case of fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store locked up
Store in a closed container
Store in a well-ventilated place. Keep cool
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition / information on ingredients

Component	CAS-No	Weight %
Barium	7440-39-3	99.9

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. Call a physician or Poison Control Center immediately.

Most important symptoms/effects No information available.
Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Dry chemical.

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
Contact with water liberates toxic gas. Water reactive. Combustible material. Produce flammable gases on contact with water.

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	3	0	W

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. Do not breathe dust. Do not breathe vapors or spray mist. Handle under inert gas, protect from moisture. Wear personal protective equipment.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Protect from moisture. Never allow product to get in contact with water during storage. Store under an inert atmosphere.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Barium	TWA: 0.5 mg/m^3	(Vacated) TWA: 0.5 mg/m^3	

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Barium			TWA: 0.5 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration

Engineering Measures 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.

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	Grey
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	725 °C / 1337 °F
Boiling Point/Range	1640 °C / 2984 °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	10 mmHg @ 1094 °C
Vapor Density	No information available
Relative Density	3.51 @ 20 °C
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	Ba
Molecular Weight	137.34

10. Stability and reactivity

Reactive Hazard Yes

Stability Moisture sensitive. Air sensitive.

Conditions to Avoid Exposure to air. Incompatible products. Exposure to moisture.

Incompatible Materials Acids, Water, Alcohols, Halogens

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
Oral LD50 Category 3. ATE = 50 - 300 mg/kg.
Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Barium	132 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, 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
Barium	7440-39-3	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. 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

UN-No	UN1400
Proper Shipping Name	BARIUM
Hazard Class	4.3
Packing Group	II

TDG

UN-No	UN1400
Proper Shipping Name	BARIUM
Hazard Class	4.3
Packing Group	II

IATA

UN-No	UN1400
Proper Shipping Name	Barium
Hazard Class	4.3
Packing Group	II

IMDG/IMO

UN-No	UN1400
Proper Shipping Name	Barium
Hazard Class	4.3
Packing Group	II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Barium	X	X	-	231-149-1	-		X	-	X	X	X

Legend:
X - Listed
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F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
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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 %
Barium	7440-39-3	99.9	1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

Clean Water Act Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Barium	1000 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
Barium	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
B4 Flammable solid
B6 Reactive flammable material
D2B Toxic materials
D1A Very 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)

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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: 12/08/16
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31272 / Benzo(b)fluoranthene 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:	www.restek.com
Revision Number:	9
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:





GHS Classification:	Flammable Liquid Category 2 Serious Eye Damage/Eye Irritation Category 2 Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Causes serious eye irritation. 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. Wash hands and skin thoroughly after handling. 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. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/physician if you feel unwell. If eye irritation persists: Get medical advice/attention. 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)	500 ppm STEL 750 ppm STEL; 1782 mg/m3 STEL	250 ppm TWA 500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (b) fluoranthene	205-99-2	ND		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 Pressure: No data available.
Vapor Density: 2.0 (air = 1)
Boiling Point: No data available.
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
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	Dermal LD50 Rabbit >15700 mg/kg; Oral LD50 Rat 5800 mg/kg; 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: 03/23/15
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
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.

1 Identification

Product identifier

Product name: Benzene

Stock number: L14012
CAS Number:
71-43-2
EC number:
200-753-7
Index number:
601-020-00-8
Relevant identified uses of the substance or mixture and uses advised against.
Identified use: SU24 Scientific research and development

Details of the supplier of the safety data sheet
Manufacturer/Supplier:
Alfa Aesar
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com
Information Department: Health, Safety and Environmental Department
Emergency telephone number:
During normal business hours (Monday-Friday, 8am-7pm EST), call (800) 343-0660. After normal business hours, call Carechem 24 at (866) 928-0789.

2 Hazard(s) identification

Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)



GHS02 Flame

Flam. Liq. 2 H225 Highly flammable liquid and vapor.



GHS08 Health hazard

Muta. 1B H340 May cause genetic defects.
Carc. 1A H350 May cause cancer.
STOT RE 1 H372 Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
Asp. Tox. 1 H304 May be fatal if swallowed and enters airways.



GHS07

Skin Irrit. 2 H315 Causes skin irritation.
Eye Irrit. 2 H319 Causes serious eye irritation.
Hazards not otherwise classified No information known.

Label elements
GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms



GHS02 GHS07 GHS08

Signal word Danger
Hazard statements
H225 Highly flammable liquid and vapor.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H340 May cause genetic defects.
H350 May cause cancer.
H372 Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
H304 May be fatal if swallowed and enters airways.
Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
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.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
WHMIS classification
B2 - Flammable liquid
D2A - Very toxic material causing other toxic effects



Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)



Health (acute effects) = 2
Flammability = 3
Physical Hazard = 1

(Contd. on page 2)

Product name: Benzene

(Contd. of page 1)

Other hazards
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

3 Composition/information on ingredients

Chemical characterization: Substances
CAS# Description:
71-43-2 Benzene
Identification number(s):
EC number: 200-753-7
Index number: 601-020-00-8

4 First-aid measures

Description of first aid measures
After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact Rinse opened eye for several minutes under running water. Then consult a doctor.
After swallowing Seek medical treatment.
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 Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
Special hazards arising from the substance or mixture
If this product is involved in a fire, the following can be released:
Carbon monoxide and carbon dioxide
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Keep away from ignition sources
Environmental precautions: Do not allow product to reach sewage system or any water course.
Methods and material for containment and cleaning up:
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose of contaminated material as waste according to section 13.
Ensure adequate ventilation.
Prevention of secondary hazards: Keep away from ignition sources.
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.

7 Handling and storage

Handling
Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Open and handle container with care.
Information about protection against explosions and fires:
Protect against electrostatic charges.
Fumes can combine with air to form an explosive mixture.
Keep ignition sources away.

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:
Do not store together with acids.
Store away from strong bases.
Store away from oxidizing agents.
Store away from halogens.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.
Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

(Contd. on page 3)

Product name: Benzene

(Contd. of page 2)

Control parameters

Components with limit values that require monitoring at the workplace:

71-43-2 Benzene (100.0%)

PEL (USA)	Short-term value: 15* mg/m³, 5* ppm Long-term value: 3* mg/m³, 1* ppm *table Z-2 for exclusions in 29CFR1910.1028(d)
REL (USA)	Short-term value: 1 ppm Long-term value: 0.1 ppm See Pocket Guide App. A
TLV (USA)	Short-term value: 8 mg/m³, 2.5 ppm Long-term value: 1.6 mg/m³, 0.5 ppm Skin; BEI
EL (Canada)	Short-term value: 2.5 ppm Long-term value: 0.5 ppm Skin; ACGIH A1; IARC 1
EV (Canada)	Short-term value: 2.5 ppm Long-term value: 0.5 ppm Skin

Ingredients with biological limit values:

71-43-2 Benzene (100.0%)

BEI (USA)	25 µg/g creatinine Medium: urine Time: end of shift Parameter Parameter: S-Phenylmercapturic acid (background 500 µg/g creatinine Medium: urine Time: end of shift Parameter: t,t-Muconic acid (background)

Additional information: No data

Exposure controls
Personal protective equipment
General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.
Maintain an ergonomically appropriate working environment.
Breathing equipment: Use suitable respirator when high concentrations are present.
Recommended filter device for short term use:
Use a respirator with organic vapor/acid gas cartridges as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards such as NIOSH (USA) or CEN (EU).
Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.
The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.
Material of gloves Fluorocarbon rubber (Viton)
Penetration time of glove material (in minutes) Not determined
Eye protection: Safety glasses
Body protection: Protective work clothing.

9 Physical and chemical properties

Information on basic physical and chemical properties
General Information
Appearance:

Form:	Liquid
Color:	Colorless
Odor:	Aromatic
Odor threshold:	Not determined.
pH-value:	Not determined.
Change in condition	
Melting point/Melting range:	5 °C (41 °F)
Boiling point/Boiling range:	80 °C (176 °F)
Sublimation temperature / start:	Not determined
Flash point:	-11 °C (12 °F)
Flammability (solid, gaseous)	Not determined.
Ignition temperature:	555 °C (1031 °F)
Decomposition temperature:	Not determined
Auto igniting:	Not determined.
Danger of explosion:	Product is not explosive. However, formation of explosive air/vapor mixtures is possible.
Explosion limits:	
Lower:	1.2 Vol %
Upper:	8 Vol %
Vapor pressure at 20 °C (68 °F):	101 hPa (76 mm Hg)
Density at 20 °C (68 °F):	0.874 g/cm³ (7.294 lbs/gal)
Relative density	Not determined.
Vapor density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with	
Water at 25 °C (77 °F):	1.8 g/l
Partition coefficient (n-octanol/water):	Not determined.
Viscosity:	
dynamic at 20 °C (68 °F):	0.66 mPas
kinematic:	Not determined.

(Contd. on page 4)

Product name: Benzene

(Contd. of page 3)

Other information No further relevant information available.

10 Stability and reactivity

Reactivity No information known.
Chemical stability Stable under recommended storage conditions.
Thermal decomposition / conditions to be avoided: Decomposition will not occur if used and stored according to specifications.
Possibility of hazardous reactions Reacts with strong oxidizing agents
Conditions to avoid No further relevant information available.
Incompatible materials:
Acids
Oxidizing agents
Bases
Halogens
Hazardous decomposition products: Carbon monoxide and carbon dioxide

11 Toxicological information

Information on toxicological effects
Acute toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for this substance.

LD/LC50 values that are relevant for classification:

Oral	LD50	930 mg/kg (rat)
Dermal	LD50	>9400 µL/kg (rabbit)
Inhalative	LC50/7H	10000 ppm/7H (rat)

Skin irritation or corrosion: Causes skin irritation.
Eye irritation or corrosion: Causes serious eye irritation.
Sensitization: No sensitizing effects known.
Germ cell mutagenicity:
May cause genetic defects.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains mutation data for this substance.
Carcinogenicity:
May cause cancer.
EPA-A: human carcinogen: sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer.
IARC-1: Carcinogenic to humans: sufficient evidence of carcinogenicity.
ACGIH A1: Confirmed human carcinogen: Agent is carcinogenic to humans based on epidemiologic studies of, or convincing clinical evidence in, exposed humans.
EPA-K: Known human carcinogens.
Carcinogen as defined by OSHA.
NTP-K: Known to be carcinogenic: sufficient evidence from human studies.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for this substance.
Reproductive toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains reproductive data for this substance.
Specific target organ system toxicity - repeated exposure:
Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
Specific target organ system toxicity - single exposure: No effects known.
Aspiration hazard: May be fatal if swallowed and enters airways.
Subacute to chronic toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for this substance.
Additional toxicological information: To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

12 Ecological information

Toxicity
Aquatic toxicity: No further relevant information available.
Persistence and degradability No further relevant information available.
Bioaccumulative potential No further relevant information available.
Mobility in soil No further relevant information available.
Additional ecological information:
General notes:
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.
Avoid transfer into the environment.
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 Consult state, local or national regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.

14 Transport information

UN-Number	
DOT, IMDG, IATA	UN1114
UN proper shipping name	
DOT	RQ Benzene
IMDG, IATA	BENZENE
Transport hazard class(es)	
DOT	
Class	3 Flammable liquids.
Label	3
Class	3 (F1) Flammable liquids

(Contd. on page 5)

Product name: Benzene

(Contd. of page 4)

Label **IMDG, IATA**	3
	
Class **Label**	3 Flammable liquids. 3
Packing group **DOT, IMDG, IATA**	II
Environmental hazards:	Not applicable.
Special precautions for user **EMS Number:**	Warning: Flammable liquids F-E,S-D
Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.
Transport/Additional information:	
DOT **Hazardous substance:** **Marine Pollutant (DOT):**	 10 lbs, 4.54 kg No
UN "Model Regulation":	UN1114, Benzene, 3, II

15 Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture
GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms



GHS02 GHS07 GHS08

Signal word Danger
Hazard statements
H225 Highly flammable liquid and vapor.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H340 May cause genetic defects.
H350 May cause cancer.
H372 Causes damage to the lung, the kidneys, the liver, the spleen, the blood, the brain and the endocrine system through prolonged or repeated exposure. Route of exposure: Oral, Inhalative, Dermal.
H304 May be fatal if swallowed and enters airways.
Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
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.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.
National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
All components of this product are listed on the Canadian Domestic Substances List (DSL).

SARA Section 313 (specific toxic chemical listings)
71-43-2 | Benzene

California Proposition 65

Prop 65 - Chemicals known to cause cancer
71-43-2 | Benzene

Prop 65 - Developmental toxicity
71-43-2 | Benzene

Prop 65 - Developmental toxicity, female Substance is not listed.

Prop 65 - Developmental toxicity, male
71-43-2 | Benzene

Information about limitation of use:
Workers are not allowed to be exposed to this hazardous material. Exceptions can be made by the authorities in certain cases.
For use only by technically qualified individuals.
Other regulations, limitations and prohibitive regulations
Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006. Substance is not listed.
The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
Substance is not listed.
Annex XIV of the REACH Regulations (requiring Authorisation for use) Substance is not listed.
Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing SDS: Global Marketing Department
Date of preparation / last revision 11/23/2015 / -
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
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
vPvB: very Persistent and very Bioaccumulative

(Contd. on page 6)

Product name: Benzene

(Contd. of page 5)

ACGIH: American Conference of Governmental Industrial Hygienists (USA)
OSHA: Occupational Safety and Health Administration (USA)
NTP: National Toxicology Program (USA)
IARC: International Agency for Research on Cancer
EPA: Environmental Protection Agency (USA)

Safety Data Sheet

Revision Date: 12/30/16
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31274 / Benzo(k)fluoranthene 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:	www.restek.com
Revision Number:	10
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:





GHS Classification:	Flammable Liquid Category 2 Serious Eye Damage/Eye Irritation Category 2 Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Causes serious eye irritation. 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. Wash hands and skin thoroughly after handling. 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. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/physician if you feel unwell. If eye irritation persists: Get medical advice/attention. 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 (k) fluoranthene	207-08-9	205-916-6	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)	500 ppm STEL 750 ppm STEL; 1782 mg/m3 STEL	250 ppm TWA 500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (k) fluoranthene	207-08-9	ND		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 Pressure: No data available.
Vapor Density: 2.0 (air = 1)
Boiling Point: No data available.
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
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	Dermal LD50 Rabbit >15700 mg/kg; Oral LD50 Rat 5800 mg/kg; Inhalation LC50 Rat 50100 mg/m3 8 h

Component Carcinogenic Data:
OSHA:

Chemical Name	**CAS No.**	
Benzo(k)fluoranthene	207-08-9	Present

ACGIH:

Chemical Name	**CAS No.**	
Acetone	67-64-1	A4 - Not Classifiable as a 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(k)fluoranthene	207-08-9	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 (k) fluoranthene	207-08-9	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[k]fluoranthene	207-08-9	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 (k) fluoranthene	207-08-9	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 05/15/15
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
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SAFETY DATA SHEET

Version 5.3
Revision Date 03/04/2015
Print Date 05/13/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Chrysene

Product Number : 35754
Brand : Sigma-Aldrich
Index-No. : 601-048-00-0

CAS-No. : 218-01-9

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)
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
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)
H341 Suspected of causing genetic defects.
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.
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	:	$C_{18}H_{12}$
Molecular weight	:	228.29 g/mol
CAS-No.	:	218-01-9
EC-No.	:	205-923-4
Index-No.	:	601-048-00-0

Hazardous components

Component	Classification	Concentration
Chrysene		
	Muta. 2; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H341, 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
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. 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
	Remarks	Cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section), see BEI® for Polycyclic Aromatic Hydrocarbons (PAHs) Exposure by all routes should be carefully controlled to levels as low as possible. Confirmed animal carcinogen with unknown relevance to humans		
Chrysene	218-01-9	TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		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
Chrysene	218-01-9	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: 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: 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: 252 - 254 °C (486 - 489 °F) - lit.
f)	Initial boiling point and boiling range	448 °C (838 °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	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 5.73
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 - Mouse - > 320 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
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:	2B - Group 2B: Possibly carcinogenic to humans (Chrysene)
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 (Chrysene)

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: GC0700000

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 daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1.90 mg/l - 2 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.

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: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Chrysene)
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. (Chrysene)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Chrysene)

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
Chrysene	218-01-9	1994-04-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date

Chrysene	218-01-9	1994-04-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Chrysene	218-01-9	1994-04-01

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No.	Revision Date
Chrysene	218-01-9	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
H341	Suspected of causing genetic defects.
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:	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: 03/04/2015 Print Date: 05/13/2016

SAFETY DATA SHEET

Creation Date 22-Sep-2009 **Revision Date** 10-Feb-2015 **Revision Number** 1

1. Identification

Product Name **cis-1,2-Dichloroethylene**

Cat No. : **AC113380000; AC113380025; AC113380100; AC113380500**

Synonyms cis-Acetylene dichloride.

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
Acute oral toxicity	Category 4
Acute Inhalation Toxicity - Vapors	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
Danger

Hazard Statements
Highly flammable liquid and vapor
Harmful if swallowed
Harmful if inhaled
Causes serious eye irritation
Causes skin irritation
May cause respiratory irritation



Precautionary Statements
Prevention
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Avoid breathing 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
Take precautionary measures against static discharge
Do not eat, drink or smoke when using this product
Response
Call a POISON CENTER or doctor/physician 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: 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
Ingestion
Rinse mouth
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Fire
Explosion risk in case of fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store in a well-ventilated place. Keep cool
Store in a closed container
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition / information on ingredients

Component	CAS-No	Weight %
cis-1,2-Dichloroethylene	156-59-2	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 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 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 Water spray. Carbon dioxide (CO_2). Dry chemical. Use water spray to cool unopened containers. chemical foam.

Unsuitable Extinguishing Media No information available

Flash Point 6 °C / 42.8 °F
Method - No information available

Autoignition Temperature 440 °C / 824 °F

Explosion Limits
Upper 12.80%
Lower 9.70%
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Flammable. Vapors may travel to source of ignition and flash back.

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	3	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin, eyes and clothing.

Environmental Precautions See Section 12 for additional ecological information.

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.

7. Handling and storage

Handling Ensure adequate ventilation. Wear personal protective equipment. Use explosion-proof equipment. Use only non-sparking tools. Avoid contact with skin, eyes and clothing. Avoid breathing dust/fume/gas/mist/vapours/spray. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
cis-1,2-Dichloroethylene	TWA: 200 ppm		

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
cis-1,2-Dichloroethylene			TWA: 200 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

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	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-80 °C / -112 °F
Boiling Point/Range	60 °C / 140 °F @ 760 mmHg
Flash Point	6 °C / 42.8 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	12.80%
Lower	9.70%
Vapor Pressure	201 mmHg @ 25 °C
Vapor Density	3.34 (Air = 1.0)
Relative Density	1.280
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	440 °C / 824 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C2 H2 Cl2
Molecular Weight	96.94

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Exposure to air. Exposure to light. Incompatible products. Exposure to moist air or water.

Incompatible Materials Bases

Hazardous Decomposition Products Hydrogen chloride gas, 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 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
cis-1,2-Dichloroethylene	156-59-2	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 Respiratory system

STOT - repeated exposure None known

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

Do not empty into drains. Do not flush into surface water or sanitary sewer system.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
cis-1,2-Dichloroethylene	Not listed	Not listed	EC50 = 721 mg/L 5 min EC50 = 905 mg/L 30 min	Not listed

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	UN1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

TDG

UN-No	UN1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

IATA

UN-No	1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

IMDG/IMO

UN-No	1150
Proper Shipping Name	1,2-DICHLOROETHYLENE
Hazard Class	3
Packing Group	II

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
cis-1,2-Dichloroethylene	X	-	X	205-859-7	-		-	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	Yes

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

Component	Hazardous Substances RQs	CERCLA EHS RQs
cis-1,2-Dichloroethylene	1000 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
cis-1,2-Dichloroethylene	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 B2 Flammable liquid
D1B Toxic materials
D2B Toxic materials



16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 22-Sep-2009
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

Section 1 - PRODUCT AND COMPANY IDENTIFICATION

Material Name
CRUDE COKE OVEN TAR, CRUDE COAL TAR

Synonyms
CENTRIFUGE TAR

Product Use
process chemical.

Restrictions on Use
None known.

Details of the supplier of the safety data sheet

KOPPERS INC.
436 Seventh Avenue
Pittsburgh, PA 15219-1800
Mfg Contact: 412-227-2001 (SDS Requests: 866-852-5239)

CHEMTREC: 800-424-9300 (Outside USA: +1 703-527-3887)
Emergencies: (Medical in USA): 877-737-9047
Emergencies: (Medical Outside of USA): 651-632-9269
E-mail: naorgmsds@koppers.com

Section 2 - HAZARDS IDENTIFICATION

Classification in accordance with paragraph (d) of 29 CFR 1910.1200.
Acute Toxicity - Dermal - Category 4
Acute Toxicity - Inhalation - Dust/Mist - Category 3
Skin Corrosion/Irritation - Category 2
Serious Eye Damage/Eye Irritation - Category 2A
Skin Sensitization - Category 1
Germ Cell Mutagenicity - Category 1B
Carcinogenicity - Category 1A
Reproductive Toxicity - Category 1B
Specific target organ toxicity - Single exposure - Category 1 (blood , respiratory system , kidneys , nervous system , heart)
Specific target organ toxicity - Single exposure - Category 2 (eyes)
Specific Target Organ Toxicity - Repeated Exposure - Category 1 (blood , eyes , respiratory system , central nervous system)
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)

Toxic if inhaled.
Harmful in contact with skin.
Causes skin irritation.
Causes serious eye irritation.
May cause an allergic skin reaction.
May cause genetic defects.
May cause cancer.
May damage fertility or the unborn child.
Causes damage to organs. (blood , respiratory system , kidneys , nervous system , heart)
May cause damage to organs. (eyes)
Causes damage to organs through prolonged or repeated exposure. (blood , eyes , respiratory system , central nervous system)
Toxic to aquatic life with long lasting effects.

Precautionary Statement(s)

Prevention

Do not breathe vapor or mist.
Wash thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Do not eat, drink or smoke when using this product.
Contaminated work clothing should not be allowed out of the workplace.
Wear protective gloves/protective clothing/eye protection/face protection.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid release to the environment.

Response

IF exposed or concerned: Get medical advice/attention.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Call a POISON CENTER or doctor/physician.
IF ON SKIN: Wash with plenty of soap and water.
Call a POISON CENTER or doctor/physician if you feel unwell.
If skin irritation or rash 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 contents/container in accordance with local/regional/national/international regulations.

Statement(s) of Unknown Acute Toxicity

Dermal	72% of the mixture consists of ingredient(s) of unknown acute toxicity.
Inhalation	97% of the mixture consists of ingredient(s) of unknown acute toxicity.

Other Hazards

Heated material may cause thermal burns.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

CAS	Component Name	Percent
65996-89-6	Tar, coal, high-temperature	100
-	The above listed complex substance contains the following constituents	-
Not Available	POLYCYCLIC AROMATIC HYDROCARBONS	7.0-31.0
91-20-3	Naphthalene	3.0-12.0
85-01-8	Phenanthrene	2.5-7.5
206-44-0	Fluoranthene	1.5-5.0
120-12-7	Anthracene	0.7-4.0
83-32-9	Acenaphthene	0.10-3.0
205-99-2	Benzo(b)fluoranthene	0.4-2.5
132-64-9	Dibenzofuran	1.0-2.5
50-32-8	Benzo[a]pyrene	0.1-2.0
56-55-3	Benz[a]anthracene	0.5-1.6
207-08-9	Benzo(k)fluoranthene	0.1-1.5
218-01-9	Chrysene	0.1-1.5
193-39-5	Indeno(1,2,3-cd)pyrene	0.1-1.0
108-88-3	TOLUENE	0.1-1.0
71-43-2	Benzene	0.1-1.0
108-95-2	Phenol	0.1-1.0

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Aromatic hydrocarbons, polycyclic (130489-29-2).

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

Take off immediately all contaminated clothing. Wash all affected skin areas with warm soapy water. Skin contact causes photosensitization which can last for 36-72 hours after exposure. Keep out of direct sunlight for the next two

to three days to avoid sunburn to the photosensitized skin areas. Use a broad spectrum blockout cream to protect against UV alpha ray exposure. Get medical attention, if needed.

Eyes
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Then get immediate medical attention.

Ingestion
Not a likely route of exposure. Rinse mouth. Do NOT induce vomiting. If a large amount is swallowed, get medical attention. Do not give anything by mouth to unconscious or convulsive person. If vomiting occurs, keep head lower than hips to help prevent aspiration.

Most Important Symptoms/Effects
Acute
Harmful in contact with skin, toxic if inhaled, skin irritation, eye irritation, thermal burns from heated material, allergic reactions, blood damage, respiratory system damage, kidney damage, nervous system damage, heart damage, eye damage

Delayed
allergic reactions, mutagenic effects, Reproductive Effects, blood damage, eye damage, respiratory system damage, central nervous system damage, lung cancer, bladder cancer, skin cancer, scrotal cancer

Indication of any immediate medical attention and special treatment needed
Treat symptomatically and supportively.

Section 5 - FIRE FIGHTING MEASURES

Extinguishing Media
Suitable Extinguishing Media
regular dry chemical, carbon dioxide, regular foam, water spray, fog or mist

Unsuitable Extinguishing Media
Do not use high-pressure water streams.

Hazardous Combustion Products
oxides of carbon

Advice for firefighters
Contact with heat may generate toxic and/or flammable gases. Containers may rupture or explode if exposed to heat.

Fire Fighting Measures
Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Use extinguishing agents appropriate for surrounding fire. Flood with fine water spray. Directly spraying water or foam onto hot burning product may cause frothing. 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. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire.

Special Protective Equipment and Precautions for Firefighters
Wear full protective firefighting 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

Stop leak if possible without personal risk. To prevent liquid from flowing into drains, completely contain spilled material with dikes, sandbags, etc. Collect spilled material in appropriate container for disposal. In Canada, report releases to provincial authorities, municipal authorities, or both, as required. Due to the concentration of Benzo(b)fluoranthene and the CERCLA (40 CFR 302.4) reportable quantity of 1 pound, the release of 40 pounds (4 gallons) of this product requires National Response Center notification. See Section 13 for waste disposal information.

Section 7 - HANDLING AND STORAGE

Precautions for Safe Handling

Do not breathe vapor or mist. Avoid breathing vapors of heated materials. Avoid contact with eyes, skin and clothing. Use only outdoors or in a well-ventilated area. When using, do not eat, drink or smoke. Wear protective gloves/clothing and eye/face protection. Wash exposed areas thoroughly with soap and water, or a waterless hand cleaner, after skin contact and before eating, drinking, using tobacco products, or restrooms. Use protective skin cream on exposed skin before and during work shift. To reduce sun sensitivity a sun-blocking lotion can also be applied prior to application of a protective cream. Contaminated clothing should be removed and laundered before reuse. Contaminated work clothing should not be allowed out of the workplace unless laundered or decontaminated. After working with the product use warm soapy water and a wash cloth to thoroughly wash all areas of skin that have been contacted with product. After washing, apply a broad spectrum UV blockout cream on exposed skin areas before going into sunlight. Keep out of strong sunlight for two to three days after being affected by the product. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

Conditions for Safe Storage, Including any Incompatibilities

Store in a well-ventilated place.
Keep container tightly closed.
Store locked up.
Store and handle in accordance with all current regulations and standards. Label all containers. Keep in a closed, properly labeled container in a cool (shaded), dry, well-ventilated area. Protect from physical damage. 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 Part B).

Incompatible Materials

oxidizing materials

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

Tar, coal, high-temperature	**65996-89-6**
ACGIH:	0.2 mg/m3 TWA as benzene-soluble aerosol (related to Pitch, coal tar, high-temperature)
OSHA (US):	0.2 mg/m3 TWA (benzene soluble fraction) (related to Pitch, coal tar, high-temperature)
Naphthalene	**91-20-3**
ACGIH:	10 ppm TWA
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA (US):	10 ppm TWA ; 50 mg/m3 TWA

Benzene	**71-43-2**
ACGIH:	0.5 ppm TWA
	2.5 ppm STEL
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA (US):	10 ppm TWA applies to industry segments exempt from the benzene standard at 29 CFR 1910.1028 ; 1 ppm TWA
	5 ppm STEL (See 29 CFR 1910.1028) 15 min ; 0.5 ppm Action Level ; 1 ppm TWA
	5 ppm STEL (see 29 CFR 1910.1028)
	25 ppm Ceiling
Phenol	**108-95-2**
ACGIH:	5 ppm TWA
	Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA (US):	5 ppm TWA ; 19 mg/m3 TWA
	prevent or reduce skin absorption

ACGIH - Threshold Limit Values - Biological Exposure Indices (BEI)

Tar, coal, high-temperature (65996-89-6)
Medium: urine Time: end of shift at end of workweek Parameter: 1-Hydroxypyrene with hydrolysis (nonquantitative) (related to Pitch, coal tar, high-temperature)
Naphthalene (91-20-3)
Time: end of shift Parameter: 1-Naphthol with hydrolysis plus 2-Naphthol with hydrolysis (nonquantitative, nonspecific)
Benzene (71-43-2)
25 µg/g creatinine Medium: urine Time: end of shift Parameter: S-Phenylmercapturic acid (background); 500 µg/g creatinine Medium: urine Time: end of shift Parameter: t,t-Muconic acid (background)
Phenol (108-95-2)
250 mg/g creatinine Medium: urine Time: end of shift Parameter: Phenol with hydrolysis (background, nonspecific)

Engineering Controls

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

ANSI Z87.1-1989 approved safety glasses with side shields. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. At elevated temperatures: A face shield is recommended.

Skin Protection

Wear protective clothing to prevent contact. Wear long sleeved shirt or overalls fastened at wrists and neck, with long legged trousers with trouser legs worn outside over boot tops, boots, socks, and safety hat plus gloves. Use protective skin cream on exposed skin before and during work shift. Protective clothing must be changed when it shows signs of contamination. Remove and launder contaminated clothing separately from other laundry before reuse. When material is at an elevated temperature, wear appropriate heat resistant clothing.

Respiratory Protection
If the applicable TLVs and/or PELs are exceeded, use NIOSH-approved multipurpose air-purifying cartridge respirators, for organic vapors and P-100 particulate.

Glove Recommendations
Wear appropriate chemical resistant gloves. When material is at an elevated temperature, wear appropriate heat resistant gloves.

Protective Materials
protective skin cream, chemical resistant material, heat resistant material

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance	black viscous Liquid	**Physical State**	liquid
Odor	aromatic odor	**Color**	black
Odor Threshold	Not available	**pH**	Not applicable
Melting Point	16.6 °F	**Boiling Point**	410 °F
Boiling Point Range	Not available	**Freezing point**	Not available
Evaporation Rate	Not available	**Flammability (solid, gas)**	Not applicable
Autoignition Temperature	Not available	**Flash Point**	>205 °F
Lower Explosive Limit	Not available	**Decomposition temperature**	Not available
Upper Explosive Limit	Not available	**Vapor Pressure**	0.2 - 1 mmHg @ 68 °C
Vapor Density (air=1)	Not available	**Specific Gravity (water=1)**	1.16
Water Solubility	Not available	**Partition coefficient: n-octanol/water**	Not available
Viscosity	>20.5 mm2/s	**Kinematic viscosity**	Not available
Solubility (Other)	Not available	**Density**	Not available
Physical Form	viscous liquid	**Texture**	viscous
Molecular Weight	Not available	**OSHA Flammability Category**	4

Other Information
None known

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. Avoid contact with incompatible materials. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

Incompatible Materials
oxidizing materials

Hazardous decomposition products
oxides of carbon

Section 11 - TOXICOLOGICAL INFORMATION

Information on Likely Routes of Exposure

Inhalation
respiratory system damage, central nervous system damage, eye damage, blood damage, kidney damage, lung cancer, bladder cancer

Skin Contact
irritation, sensitivity to sunlight, allergic reactions, thermal burns from heated material, eye damage, Reproductive Effects, central nervous system damage, blood damage, kidney damage, nervous system damage, skin cancer, scrotal cancer

Eye Contact
irritation, sensitivity to sunlight, thermal burns from heated material, eye damage

Ingestion
thermal burns from heated material, eye damage, central nervous system damage, blood damage, nervous system damage, kidney damage

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:

Tar, coal, high-temperature (65996-89-6)
Oral LD50 Rat 3300 mg/kg (related to Pitch, coal tar, high-temperature)
Dermal LD50 Rat >5000 mg/kg (no deaths occurred) (related to Pitch, coal tar, high-temperature)

Naphthalene (91-20-3)
Oral LD50 Rat 1110 mg/kg
Dermal LD50 Rabbit 1120 mg/kg
Inhalation LC50 Rat >340 mg/m3 1 h

Phenol (108-95-2)
Oral LD50 Rat 340 mg/kg
Dermal LD50 Rabbit 630 mg/kg

Product Toxicity Data

Acute Toxicity Estimate

Dermal	1174.01 mg/kg
Inhalation - Dust and Mist	2.72 mg/L
Oral	>2000 mg/kg

Immediate Effects

Harmful in contact with skin, toxic if inhaled, skin irritation, eye irritation, thermal burns from heated material, allergic reactions, blood damage, respiratory system damage, kidney damage, nervous system damage, heart damage, eye damage.

Delayed Effects
allergic reactions, mutagenic effects, Reproductive Effects, blood damage, eye damage, respiratory system damage, central nervous system damage, lung cancer, bladder cancer, skin cancer, scrotal cancer

Irritation/Corrosivity Data
Erythema/eschar score: very slight

Respiratory Sensitization
No evidence that the material can lead to respiratory hypersensitivity.

Dermal Sensitization
Component data indicate the substance is sensitizing.

Component Carcinogenicity

Tar, coal, high-temperature	**65996-89-6**
ACGIH:	A1 - Confirmed Human Carcinogen (related to Pitch, coal tar, high-temperature)
IARC:	Supplement 7 [1987] (Group 1 (carcinogenic to humans))
NTP:	Known Human Carcinogen (related to Pitch, coal tar, high-temperature)
NIOSH:	potential occupational carcinogen (related to Pitch, coal tar, high-temperature)

May cause cancer. NOAEL: 36 mg/kg bw/day - oral.

Germ Cell Mutagenicity
Bacterial Reverse Mutation Test – positive. May cause genetic defects.

Tumorigenic Data
No data available

Reproductive Toxicity
Available data characterizes this substance as a reproductive hazard. May damage fertility or the unborn child.

Specific Target Organ Toxicity - Single Exposure
blood, respiratory system, kidneys, nervous system, heart, eyes

Specific Target Organ Toxicity - Repeated Exposure
blood, eyes, respiratory system, central nervous system

Aspiration hazard
Not expected to be an aspiration hazard.

Medical Conditions Aggravated by Exposure
respiratory disorders, skin disorders and allergies, eye disorders, central nervous system disorders (i.e. headache, drowsiness, dizziness, loss of coordination) blood system disorders, metabolic disorders, immune system disorders or allergies

Additional Data
Coal tars are listed in the IARC monographs as carcinogenic to humans (Group 1). IARC's evaluation is based on evidence from the first half of the 20th century that occupational exposures to coal-tar derived products are associated with skin cancer in humans. There are also case reports and a few other studies on occupational exposures to coal-tars that are consistent with this evaluation. Epidemiological studies provide evidence that certain exposures

in the coke production industry are carcinogenic to humans, giving rise to lung cancer possibly from coal-tar fume. Also, there is evidence for the carcinogenicity in experimental animals of coal-tars. Today, with the use of engineering controls and personal protective equipment, occupational exposure to coal tar derived components is expected to be below permissible limits (measured as CTPVs). In addition to containing information about the product as a whole, this data sheet also contains information about individual components of the product. Information of this nature may not have been derived from studies or data relating to this product and/or may have been derived from studies or data that did not involve human exposure and involved animal exposure only. Some polycyclic aromatic hydrocarbons (PAHs), found in coal tar complex substances, have been reported to cause lung and skin cancer in humans under conditions of poor personal hygiene, prolonged/repeated contact, and exposure to sunlight. The National Toxicology Program (NTP) and IARC have independently classified various PAH compounds present in coal tar substances as reasonably anticipated to be human carcinogens (NTP), probably carcinogenic to humans (IARC Group 2A), possibly carcinogenic to humans (IARC Group 2B), and not classifiable as to carcinogenicity to humans (IARC Group 3). The cancers reported in the studies upon which IARC based its conclusions involved lung, skin, liver, stomach, kidney and blood cancers in animals. Based on the results of animal experiments PAHs may cause injury to the liver, kidneys, lungs, blood and lymph systems. Some PAH's have also been associated with impaired fertility, heritable genetic damage and birth defects in mice.

Section 12 - ECOLOGICAL INFORMATION

Ecotoxicity
Toxic to aquatic life with long lasting effects.

Component Analysis - Aquatic Toxicity

Tar, coal, high-temperature	**65996-89-6**
Fish:	LC50 96 h Oryzias latipes 7.33 - 235 mg/L [semi-static]
Algae:	EC50 72 h Pseudokirchneriella subcapitata 0.015 mg/L IUCLID
Invertebrate:	LC50 48 h Daphnia magna 4.44 - 11.2 mg/L IUCLID

Fish Toxicity
>250 mg/l 96 hour(s) LL50 Brachydanio rerio (Zebra fish)

Invertebrate Toxicity
2.8 mg/l 48 hour(s) EL50 Daphnia magna.

Algal Toxicity
29 mg/l 72 hour(s) EL50 Desmodesmus subspicatus. 5 mg/l 72 hour(s) NOELR.

Persistence and Degradability
Highly insoluble in water.

Bioaccumulative Potential
This material is believed not to bioaccumulate due to low water solubility. Highly insoluble in water.

Mobility
Highly insoluble in water.

Other Toxicity
No data available.

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Methods

Dispose in accordance with all applicable regulations. Based on the results of the Toxicity Characteristic Leaching Procedure (TCLP): Benzene - D018 (toxicity >/= 0.5 ppm).

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: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. , (Contains: BENZO(A)PYRENE , BENZO(B)FLUORANTHENE , NAPHTHALENE) RQ
Hazard Class: 9
UN/NA #: UN3082
Packing Group: III
Required Label(s): 9
Marine pollutant
Further information: For International Shipments: RQ Environmentally hazardous substances, liquid, n.o.s. ID Number UN3082 This material contains reportable quantity (RQ) Hazardous Substances.

IATA Information:
Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. , (Contains: BENZO(A)PYRENE , BENZO(B)FLUORANTHENE , NAPHTHALENE) RQ
Hazard Class: 9
UN#: UN3082
Packing Group: III
Required Label(s): 9
Marine pollutant
Further information: Passenger & Cargo Aircraft - Ltd. Qty. - (Packing Instruction / Max. Net Qty. per Pkg.): Y964 / 30 kg GPassenger & Cargo Aircraft (Packing Instruction / Max. Net Qty. per Pkg.): 964 / 450 L ERG Code: 9L

TDG Information:
Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. , (Contains: BENZO(A)PYRENE , BENZO(B)FLUORANTHENE , NAPHTHALENE) RQ
Hazard Class: 9
UN#: UN3082
Packing Group: III
Required Label(s): 9
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.

Tar, coal, high-temperature	**65996-89-6**
IBC Code:	Category X (molten) (related to Pitch, coal tar, high-temperature)

Further information

STCC Code: 2814137; HAZ STCC Code: 4966312, ERG: 171 US DOT Reportable Quantites BENZO(B)FLUORANTHENE (205-99-2) 1 lbs RQ; 0.454 kg RQ

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.

Tar, coal, high-temperature	**65996-89-6**
TSCA 12b:	Section 4 , 1 % de minimus concentration
Naphthalene	**91-20-3**
SARA 313:	0.1 % de minimis concentration
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
Phenanthrene	**85-01-8**
SARA 313:	1 % de minimis concentration
CERCLA:	5000 lb final RQ ; 2270 kg final RQ
Fluoranthene	**206-44-0**
SARA 313:	1 % Supplier notification limit
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
Anthracene	**120-12-7**
SARA 313:	1 % de minimis concentration
CERCLA:	5000 lb final RQ ; 2270 kg final RQ
Acenaphthene	**83-32-9**
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
Benzo(b)fluoranthene	**205-99-2**
SARA 313:	0.1 % Supplier notification limit
CERCLA:	1 lb final RQ ; 0.454 kg final RQ
Dibenzofuran	**132-64-9**
SARA 313:	1 % de minimis concentration
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
Benzo[a]pyrene	**50-32-8**
SARA 313:	0.1 % Supplier notification limit
CERCLA:	1 lb final RQ ; 0.454 kg final RQ

Benz[a]anthracene	**56-55-3**
SARA 313:	0.1 % Supplier notification limit
CERCLA:	10 lb final RQ ; 4.54 kg final RQ
Benzo(k)fluoranthene	**207-08-9**
SARA 313:	0.1 % Supplier notification limit
CERCLA:	5000 lb final RQ ; 2270 kg final RQ
Chrysene	**218-01-9**
SARA 313:	1 % Supplier notification limit
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
Indeno(1,2,3-cd)pyrene	**193-39-5**
SARA 313:	0.1 % Supplier notification limit
CERCLA:	100 lb final RQ ; 45.4 kg final RQ
TOLUENE	**108-88-3**
SARA 313:	1 % de minimis concentration
CERCLA:	1000 lb final RQ ; 454 kg final RQ
Benzene	**71-43-2**
SARA 313:	0.1 % de minimis concentration
CERCLA:	10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule); 4.54 kg final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity in an August 14, 1989 final rule)
Phenol	**108-95-2**
SARA 302:	500 lb lower TPQ ; 10000 lb upper TPQ
SARA 313:	1 % de minimis concentration
CERCLA:	1000 lb final RQ ; 454 kg final RQ
SARA 304:	1000 lb EPCRA RQ

SARA Section 311/312 (40 CFR 370 Subparts B and C) reporting categories

Carcinogenicity; Acute toxicity; Reproductive Toxicity; Skin Corrosion/Irritation; Respiratory/Skin Sensitization; Serious Eye Damage/Eye Irritation; Specific Target Organ Toxicity; Germ Cell Mutagenicity

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
Tar, coal, high-temperature	**65996-89-6**	Yes	Yes	Yes	Yes	Yes

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)



WARNING

This product can expose you to chemicals including Benzene , which is 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.

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

Tar, coal, high-temperature	**65996-89-6**
	0.1 % (related to Pitch, coal tar, high-temperature)
Naphthalene	**91-20-3**
	1 %
Phenanthrene	**85-01-8**
	1 %
Fluoranthene	**206-44-0**
	1 %
Anthracene	**120-12-7**
	1 %
Acenaphthene	**83-32-9**
	1 %
Benzo(b)fluoranthene	**205-99-2**
	0.1 %
Benzo[a]pyrene	**50-32-8**
	0.1 %

Benz[a]anthracene	**56-55-3**
	0.1 %
Chrysene	**218-01-9**
	0.1 %
Indeno(1,2,3-cd)pyrene	**193-39-5**
	0.1 %
TOLUENE	**108-88-3**
	1 %
Benzene	**71-43-2**
	0.1 %

WHMIS Classification
D2A , D2B

Component Analysis - Inventory
Tar, coal, high-temperature (65996-89-6)

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 (Draft)
Yes	DSL	EIN	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes	No	No	Yes

The above listed complex substance contains the following constituents (-)

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 (Draft)
No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

POLYCYCLIC AROMATIC HYDROCARBONS (Not Available)

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 (Draft)
No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Naphthalene (91-20-3)

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 (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes

Phenanthrene (85-01-8)

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 (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes

Fluoranthene (206-44-0)

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 (Draft)
Yes	NSL	EIN	Yes	No	Yes	Yes	No	No	No	Yes	Yes	No	Yes	Yes

Anthracene (120-12-7)

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 (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes

Acenaphthene (83-32-9)

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 (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes

Benzo(b)fluoranthene (205-99-2)

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 (Draft)
No	No	EIN	No	No	No	No	No	No	No	No	Yes	No	Yes	Yes

Dibenzofuran (132-64-9)

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 (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes

Benzo[a]pyrene (50-32-8)

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 (Draft)
Yes	DSL	EIN	No	Yes	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes

Benz[a]anthracene (56-55-3)

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 (Draft)
Yes	NSL	EIN	No	No	No	No	No	No	No	Yes	Yes	No	Yes	Yes

Benzo(k)fluoranthene (207-08-9)

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 (Draft)
No	No	EIN	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes

Chrysene (218-01-9)

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 (Draft)
Yes	DSL	EIN	Yes	No	No	No	Yes	No	No	No	Yes	No	Yes	Yes

Indeno(1,2,3-cd)pyrene (193-39-5)

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 (Draft)
Yes	NSL	EIN	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes

TOLUENE (108-88-3)

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 (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

Benzene (71-43-2)

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 (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

Phenol (108-95-2)

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 (Draft)
Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

U.S. Inventory (TSCA)
Listed on inventory.

Section 16 - OTHER INFORMATION

NFPA Ratings
Health: 2 Fire: 1 Reactivity: 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Summary of Changes
Updated: 7/20/2018; SDS SUMMARY OF CHANGES: SECTION 15 - CA Proposition 65

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; F - Background (for Venezuela Biological Exposure Indices); 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; Ne- Non-specific; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; Nq - Non-quantitative; NSL – Non-Domestic Substance List (Canada); 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; Sc - Semi-quantitative; 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 (Draft) - Vietnam (Draft); WHMIS - Workplace Hazardous Materials Information System (Canada).

Other Information

Disclaimer:
The information set forth in this Safety Data Sheet does not purport to be all-inclusive and should be used only as a guide. While the information and recommendations set forth herein are believed to be accurate, the company makes no warranty regarding such information and recommendations and disclaims all liability from reliance thereon.

SAFETY DATA SHEET

COPPER

Section 1. Identification

GHS product identifier	:	COPPER
Chemical name	:	Mixture
CAS number	:	Mixture
Other means of identification	:	CC01053472
Product type	:	liquid

Relevant identified uses of the substance or mixture and uses advised against

Product use	:	Industrial applications. Plastics.

Supplier's details	:	**POLYONE CORPORATION** ColorMatrix Group Inc. 680 North Rocky River Drive, Berea, Ohio, 44017-1628, USA +1 216 622 0100
Emergency telephone number (with hours of operation)	:	**CHEMTREC 1-800-424-9300 (24hrs for spill, leak, fire, exposure or accident).**

Section 2. Hazards identification

This mixture has not been evaluated as a whole for health effects. Information provided on health effects of this product is based on the individual components. However, some vapors or contaminants may be released upon heating and the end-user (fabricator) must take the necessary precautions (mechanical ventilation, respiratory protection, etc.) to protect employees from exposure. See sections 8 and 11 for special precautions. After handling, always wash hands thoroughly with soap and water.

OSHA/HCS status	:	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	:	SKIN CORROSION/IRRITATION - Category 2

GHS label elements

Hazard pictograms :



Signal word : Warning
Hazard statements : Causes skin irritation.

Precautionary statements

General : Not applicable.
Prevention : Wear protective gloves. Wash hands thoroughly after handling.
Response : IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical attention.
Storage : Not applicable.
Disposal : Not applicable.
Supplemental label elements : None known.
Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture
Chemical name : Mixture
Other means of identification : CC01053472

CAS number/other identifiers

Ingredient name	%	CAS number
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	Not available.
Titanium dioxide	5 - 10	13463-67-7

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.
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. 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 adverse health effects persist or are severe. 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.
Ingestion	:	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. 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 : In case of fire, use water spray (fog), foam, dry chemical or CO_2.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
metal oxide/oxides

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.

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. 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. 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. 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.

Section 7. Handling and storage

Precautions for safe handling

Protective measures	:	Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. 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 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 unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Titanium dioxide	**OSHA PEL 1989 (1989-03-01)** PEL: Permissible Exposure Level 10 mg/m3 Form: Total dust **OSHA PEL (1993-06-30)** PEL: Permissible Exposure Level 15 mg/m3 Form: Total dust **ACGIH TLV (1996-05-18)** TLV-TWA: Threshold Limit Value - Time weighted average PEL: Permissible Exposure Level 10 mg/m3

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: 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.

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 [liquid]
Color	:	BROWN
Odor	:	Faint odor.
Odor threshold	:	Not available.
pH	:	Not available.
Melting point	:	Not available.
Boiling point	:	Not available.
Flash point	:	Not available.
Burning time	:	Not available.

Burning rate	:	Not available.
Evaporation rate	:	Not available.
Flammability (solid, gas)	:	Not available.
Lower and upper explosive (flammable) limits	:	**Lower:** Not available. **Upper:** Not available.
Vapor pressure	:	Not available.
Vapor density	:	Not available.
Relative density	:	Not available.
Solubility	:	Not available.
Solubility in water	:	insoluble in water.
Partition coefficient: n-octanol/water	:	Not available.
Auto-ignition temperature	:	Not available.
Decomposition temperature	:	Not available.
SADT	:	Not available.
Viscosity	:	**Dynamic:** Not available. **Kinematic:** Not available.

Section 10. Stability and reactivity

Reactivity	:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	:	Stable under recommended storage and handling conditions (see Section 7).
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Keep away from extreme heat and oxidizing agents.
Incompatible materials	:	Keep away from strong acids. Oxidizer.
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

This mixture has not been evaluated as a whole for health effects. Exposure effects listed are based on existing health data for the individual components which comprise the mixture.

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Titanium dioxide				

	LC50 Inhalation	Rat - Male	6.82 Mg/l	4 h
	LD50 Dermal	Rabbit	> 5,000 mg/kg	-

Conclusion/Summary : Mixture.Not fully tested.

Irritation/Corrosion

Conclusion/Summary
Skin : Mixture.Not fully tested.
Eyes : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Sensitization

Conclusion/Summary
Skin : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Mutagenicity

Conclusion/Summary : Mixture.Not fully tested.

Carcinogenicity

Conclusion/Summary : Mixture.Not fully tested.

Classification

Product/ingredient name	OSHA	IARC	NTP
Titanium dioxide		2B	

Reproductive toxicity

Conclusion/Summary : Mixture.Not fully tested.

Teratogenicity

Conclusion/Summary : Mixture.Not fully tested.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Product/ingredient name	Result

Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	ASPIRATION HAZARD - Category 1

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.
Skin contact : Causes skin irritation.
Ingestion : 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

Conclusion/Summary : Mixture.Not fully tested.

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

Route	ATE value
Inhalation (dusts and mists)	7.81 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Titanium dioxide			
	Acute LC50 > 1,000,000 µg/l Marine water	Fish - Mummichog	96 h
	Acute LC50 > 1,000 mg/l Fresh water	Fish - Fathead minnow	96 h
	Acute LC50 13 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute LC50 6.5 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 19.3 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 27.8 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 35.306 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h

Conclusion/Summary : Not available.

Persistence and degradability

Conclusion/Summary : Not available.

Bioaccumulative potential

Product/ingredient name	LogPow	BCF	Potential
Titanium dioxide		352.00	low

Mobility in soil

Soil/water partition coefficient (KOC)	:	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. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Acute hazardous waste "P" List: Not listed

United States - RCRA Toxic hazardous waste "U" List: Not listed

Section 14. Transport information

U.S. DOT Classification	:	Not regulated for transportation.
ICAO/IATA	:	Not classified as dangerous good under transport regulations.
IMO/IMDG (maritime)	:	Not classified as dangerous good under transport regulations.

Section 15. Regulatory information

U.S. Federal regulations : **United States - TSCA 12(b) - Chemical export notification:** None of the components are listed.
United States - TSCA 4(a) - Final Test Rules: Not listed
United States - TSCA 4(a) - ITC Priority list: Not listed
United States - TSCA 4(a) - Proposed test rules: Not listed

United States - TSCA 4(f) - Priority risk review: Not listed
United States - TSCA 5(a)2 - Final significant new use rules: Not listed
United States - TSCA 5(a)2 - Proposed significant new use rules: Not listed
United States - TSCA 5(e) - Substances consent order: Not listed
United States - TSCA 6 - Final risk management: Not listed
United States - TSCA 6 - Proposed risk management: Not listed
United States - TSCA 8(a) - Chemical risk rules: Not listed
United States - TSCA 8(a) - Dioxin/Furane precusor: Not listed
United States - TSCA 8(a) - Chemical Data Reporting (CDR): Not determined
United States - TSCA 8(a) - Preliminary assessment report (PAIR): Not listed
United States - TSCA 8(c) - Significant adverse reaction (SAR): Not listed
United States - TSCA 8(d) - Health and safety studies: Not listed
United States - EPA Clean water act (CWA) section 307 - Priority pollutants: Not listed
United States - EPA Clean water act (CWA) section 311 - Hazardous substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Flammable substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Toxic substances: Not listed
United States - Department of commerce - Precursor chemical: Not listed

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

US. EPA CERCLA Hazardous Substances (40 CFR 302)

not applicable

SARA 311/312

Classification	:	Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Classification
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	AH
Titanium dioxide	5 - 10	CH

SARA 313
Not applicable.

State regulations

Massachusetts : The following components are listed:
Mica
Iron oxide
Titanium dioxide

New York : None of the components are listed.

New Jersey : The following components are listed:
Mica
Iron oxide
Titanium dioxide

Pennsylvania : The following components are listed:
Iron oxide
Titanium dioxide

California Prop. 65
WARNING: This product contains a chemical known to the State of California to cause cancer.

United States inventory (TSCA 8b) : All components are listed or exempted.

Canada inventory : All components are listed or exempted.

International regulations

International lists : **Australia inventory (AICS):** All components are listed or exempted.
Taiwan inventory (CSNN): Not determined.
Malaysia Inventory (EHS Register): Not determined.
EINECS: All components are listed or exempted.
Japan inventory: Not determined.
China inventory (IECSC): All components are listed or exempted.
Korea inventory: All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): Not determined.

Philippines inventory (PICCS): All components are listed or exempted.

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

Section 16. Other information

History

Date of printing	:	05/21/2015
Date of issue/Date of revision	:	05/18/2015
Date of previous issue	:	10/30/2014
Version	:	1.1
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 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. Particularly this information may not be valid for such material used in conjunction with any other materials or in any process, unless specified in the text.

Safety Data Sheet

Revision Date: 01/06/17
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31276 / Dibenzo(a,h)anthracene 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:	www.restek.com
Revision Number:	7
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:	Carcinogenicity Category 2
GHS Signal Word:	Warning
GHS Hazard:	Suspected of causing cancer.
GHS Precautions:	
Safety Precautions:	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.
First Aid Measures:	IF exposed or concerned: Get medical advice/attention.
Storage:	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
Dichloromethane	75-09-2	200-838-9	99.900000
dibenz (a,h) anthracene	53-70-3	200-181-8	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:	Immediately 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 and monitor the eye daily as advised by your physician. Serious harm (damage) may result if treatment is delayed. Continue to flush eyes while awaiting medical attention
Skin Contact:	Wash with soap and water. Remove contaminated clothing, launder immediately, and discard contaminated leather goods. Get medical attention immediately.
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. Never give anything by mouth to an unconscious person

5. FIRE- FIGHTING MEASURES

Extinguishing Media:	Use alcohol resistant foam, carbon dioxide, or dry chemical when fighting fires. Water or foam may cause frothing if liquid is burning but it still may be a useful extinguishing agent if carefully applied to the surface of the fire. Do Not direct a stream of water into the hot burning liquid. Use methods suitable to fight surrounding fire.
Fire and/or Explosion Hazards:	No data.
Fire Fighting Methods and Protection:	Use methods for the surrounding fire.
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.
Storage Technical Measures and Conditions:	Store in a cool dry place. Isolate from incompatible materials.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Dichloromethane	75-09-2	2300 ppm IDLH	No data available.	50 ppm TWA	25 ppm TWA; 125 ppm STEL (15 min. TWA)
dibenz (a,h) anthracene	53-70-3	No data available.	No data available.	No data available.	No data available.

Personal Protection:

Engineering Measures:	Local exhaust ventilation or other engineering controls are normally required when handling or using this product to avoid overexposure.
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.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Wear additional eye protection such as chemical splash goggles and/or face shield when the possibility exists for eye contact with splashing or spraying

	liquid, or airborne material. Do not wear contact lenses. Have an eye wash station available.
Skin Protection:	Avoid skin contact by wearing chemically resistant gloves, an apron and other protective equipment depending upon conditions of use. 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:	Eye disease Skin disease including eczema and sensitization Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	Colorless
Odor:	Strong
Physical State:	No data available.
pH:	No data available.
Vapor Pressure:	No data available.
Vapor Density:	2.93 (air = 1)
Boiling Point:	No data available.
Melting Point:	-96.7 °C
Flash Point:	No data available.
Upper Flammable/Explosive Limit, % in air:	No data available.
Lower Flammable/Explosive Limit, % in air:	No data available.
Autoignition Temperature:	556 deg C
Decomposition Temperature:	No data available.
Specific Gravity:	1.3254 - 1.3258 g/cm3 at 20 °C
Evaporation Rate:	No data available.
Odor Threshold:	ND
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available.
VOC % by weight:	0
Molecular Weight:	No data available.

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	No data available.Contamination High temperatures
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents Caustics (bases)
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation Absorption Ingestion Skin contact Eye contact
Target Organs Potentially Affected By Exposure:	Skin, Cardiovascular System, Eyes, Liver
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)Inhalation may cause severe central nervous system depression (including unconsciousness).
Skin Contact:	Contact causes severe skin irritation and possible burns.
Skin Absorption:	Harmful if absorbed through the skin. May cause severe irritation and systemic damage.
Eye Contact:	Contact with the eyes may cause moderate to severe eye injury. Eye contact may result in tearing and reddening, but not likely to permanently injure eye tissue. Temporary vision impairment (cloudy or blurred vision) is possible.
Ingestion Irritation:	Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.
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 moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic

damage upon prolonged and/or repeated exposure (see "Target Organs)

Skin Absorption: Upon prolonged or repeated exposure, harmful if absorbed through the skin. May cause severe irritation and systemic damage

Component Toxicological Data:
NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methane, dichloro-	75-09-2	Inhalation LC50 Rat 53 mg/L 6 h

Component Carcinogenic Data:
OSHA:

Chemical Name	CAS No.	
Methylene chloride	75-09-2	25 ppm TWA (8 hr.); 125 ppm STEL (15 min.); 12.5 ppm Action Level (see 29 CFR 1910.1051); effective date for respiratory protection for certain employers to acheive the 8-hour TWA PEL is August 31, 1998; the start up date to install engineering controls is December 10, 1998.; {OSHA - 29 CFR 1910 Specifically Regulate
Dibenz[a,h]anthracene	53-70-3	Present

ACGIH:

Chemical Name	CAS No.	
Dichloromethane	75-09-2	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH:

Chemical Name	CAS No.	
Methylene chloride	75-09-2	potential occupational carcinogen

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
Dichloromethane	75-09-2	Group 2A
Dibenz[a,h]anthracene	53-70-3	Group 2A
No data.		Group 2B

12. ECOLOGICAL INFORMATION

Overview: Moderate ecological hazard. This product may be dangerous to plants and/or wildlife. Keep out of waterways.
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: Incinerate spent or discarded material a permitted hazardous waste facility.
Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Dichloromethane
UN Number: UN1593
Hazard Class: 6.1
Packing Group: III

International:

IATA Proper Shipping Name:	Dichloromethane
UN Number:	UN1593
Hazard Class:	6.1
Packing Group:	III

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
Dichloromethane	75-09-2	X	X	-	X
dibenz (a,h) anthracene	53-70-3	X	X	-	X

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Dichloromethane Dichloromethane (Methylene chloride)	75-09-2	Prop 65 Cancer
Dibenz[a,h]anthracene	53-70-3	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Dichloromethane	75-09-2	X	X	X	X
dibenz (a,h) anthracene	53-70-3	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 05/15/14

Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

References: No data available.

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 5.7
Revision Date 06/03/2016
Print Date 07/04/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Diesel Fuel No. 2

Product Number : UST147
Brand : Sigma-Aldrich

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
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Respiratory system, Central nervous system, H335, H336
Specific target organ toxicity - repeated exposure, Oral (Category 2), Liver, Blood, H373
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, H373

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.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H373	May cause damage to organs (Liver, Blood) through prolonged or repeated exposure if swallowed.
H373	May cause damage to organs (Central nervous system) through prolonged or repeated exposure if inhaled.

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.
P271	Use only outdoors or in a well-ventilated area.
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.
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

3.2 Mixtures

Hazardous components

Component		Classification	Concentration
Methylene chloride			
CAS-No. EC-No. Index-No.	75-09-2 200-838-9 602-004-00-3	Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; STOT SE 3; STOT RE 2; H315, H319, H335, H336, H351, H373, H373	>= 90 - <= 100 %
Fuels, diesel, no. 2			
CAS-No. EC-No. Index-No.	68476-34-6 270-676-1 649-227-00-2	Flam. Liq. 4; Carc. 2; STOT SE 3; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 2; H227, H304, H336, H351, H411	>= 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
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
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 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.

Store at Room Temperature.

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		
Methylene chloride	75-09-2	TWA	50.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Carboxyhemoglobinemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section)		

		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Carboxyhemoglobinemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans		
		Substance listed; for more information see OSHA document 1910.1052		
		Substance listed; for more information see OSHA document 1910.1052		
		See Table Z-2		
		PEL	25.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1052 This section applies to all occupational exposures to methylene chloride (MC), Chemical Abstracts Service Registry Number 75-09-2, in general industry, construction and shipyard employment. Methylene chloride (MC) means an organic compound with chemical formula, CH2Cl2. Its Chemical Abstracts Service Registry Number is 75-09-2. Its molecular weight is 84.9 g/mole OSHA specifically regulated carcinogen		
		STEL	125.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens
		1910.1052 This section applies to all occupational exposures to methylene chloride (MC), Chemical Abstracts Service Registry Number 75-09-2, in general industry, construction and shipyard employment. Methylene chloride (MC) means an organic compound with chemical formula, CH2Cl2. Its Chemical Abstracts Service Registry Number is 75-09-2. Its molecular weight is 84.9 g/mole OSHA specifically regulated carcinogen		
		PEL	25 ppm 87 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		see section 5202		
		STEL	125 ppm 435 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		see section 5202		
Fuels, diesel, no. 2	68476-34-6	TWA	100.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption varies		
		TWA	100.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption varies		
		TWA	100 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption varies		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Methylene chloride	75-09-2	Dichloromethane	0.3000 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
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.

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
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas
Hazardous decomposition products formed under fire conditions. - 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

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: OSHA specifically regulated carcinogen (Methylene chloride)

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.

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
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: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane, solution
Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1593 Class: 6.1 Packing group: III EMS-No: F-A, S-A

Proper shipping name: DICHLOROMETHANE, SOLUTION

IATA
UN number: 1593 Class: 6.1 Packing group: III
Proper shipping name: Dichloromethane, solution

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
Methylene chloride	75-09-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Methylene chloride	75-09-2	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
Methylene chloride	75-09-2	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
Asp. Tox.	Aspiration hazard
Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H227	Combustible liquid.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H373	May cause damage to organs (/$/*_2ORG_REP_ORA/$/) through prolonged or repeated exposure if swallowed.
H411	Toxic to aquatic life with long lasting effects.
Skin Irrit.	Skin irritation
STOT RE	Specific target organ toxicity - repeated exposure
STOT SE	Specific target organ toxicity - single exposure

HMIS Rating
Health hazard: 2
Chronic Health Hazard: *

Flammability:	0
Physical Hazard	1

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: 06/03/2016 Print Date: 07/04/2016

SAFETY DATA SHEET

Creation Date 06-Aug-2010 **Revision Date** 30-Oct-2014 **Revision Number** 2

1. Identification

Product Name **Ethylbenzene**

Cat No. : **AC433800000; AC433800010; AC433801000**

Synonyms Ethylbenzol; Phenylethane

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
Acute Inhalation Toxicity - Vapors	Category 4
Carcinogenicity	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 2
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Highly flammable liquid and vapor
May be fatal if swallowed and enters airways
Harmful if inhaled
May cause respiratory irritation
May cause drowsiness or dizziness
Suspected of causing 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
Use only outdoors or in a well-ventilated area
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
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
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)
Harmful to aquatic life with long lasting effects

3. Composition / information on ingredients

Component	CAS-No	Weight %
Ethylbenzene	100-41-4	>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 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. Aspiration into lungs can produce severe lung damage.

Ingestion Clean mouth with water and drink afterwards plenty of water. Do not induce vomiting. Call a physician or Poison Control Center immediately. If vomiting occurs naturally, have victim lean forward.

Most important symptoms/effects Breathing difficulties. . Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: May cause central nervous system depression

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 Do not use a solid water stream as it may scatter and spread fire

Flash Point 15 °C / 59 °F
Method - No information available

Autoignition Temperature 432 °C / 810 °F
Explosion Limits
Upper 6.8%
Lower 1.2%
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge Yes

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.

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	3	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Should not be released into the environment. 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. 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. Avoid ingestion and inhalation. Ensure adequate ventilation. 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. Flammables area.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Ethylbenzene	TWA: 20 ppm	(Vacated) TWA: 100 ppm (Vacated) TWA: 435 mg/m³ (Vacated) STEL: 125 ppm (Vacated) STEL: 545 mg/m³ TWA: 100 ppm TWA: 435 mg/m³	IDLH: 800 ppm TWA: 100 ppm TWA: 435 mg/m³ STEL: 125 ppm STEL: 545 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Ethylbenzene	TWA: 100 ppm TWA: 434 mg/m³ STEL: 125 ppm STEL: 543 mg/m³	TWA: 100 ppm TWA: 435 mg/m³ STEL: 125 ppm STEL: 545 mg/m³	TWA: 20 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. Use explosion-proof electrical/ventilating/lighting/equipment. 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	Liquid
Appearance	Colorless
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-95 °C / -139 °F
Boiling Point/Range	136 °C / 276.8 °F
Flash Point	15 °C / 59 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	6.8%
Lower	1.2%
Vapor Pressure	No information available
Vapor Density	No information available
Relative Density	0.860
Solubility	Slightly soluble in water
Partition coefficient; n-octanol/water	No data available

Autoignition Temperature	432 °C / 810 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C8 H10
Molecular Weight	106.17

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

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
Ethylbenzene	3500 mg/kg (Rat)	15400 mg/kg (Rabbit)	17.2 mg/L (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 May cause eye, skin, and respiratory tract irritation

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
Ethylbenzene	100-41-4	Group 2B	Not listed	A3	X	Not listed

IARC: (International Agency for Research on Cancer)
Group 2B - Possibly Carcinogenic to Humans
IARC: (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans

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 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 None known

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: May cause central nervous system depression

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. 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
Ethylbenzene	2.6 - 11.3 mg/L EC50 72 h 438 mg/L EC50 > 96 h 4.6 mg/L EC50 = 72 h 1.7 - 7.6 mg/L EC50 96 h	9.6 mg/L LC50 96 h 9.1 - 15.6 mg/L LC50 96 h 32 mg/L LC50 96 h 7.55 - 11 mg/L LC50 96 h 4.2 mg/L LC50 96 h 11.0 - 18.0 mg/L LC50 96 h	EC50 = 9.68 mg/L 30 min EC50 = 96 mg/L 24 h	1.8 - 2.4 mg/L EC50 48 h

Persistence and Degradability Insoluble 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 volatility.

Component	log Pow
Ethylbenzene	3.118

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 UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

TDG

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

IATA

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

IMDG/IMO

UN-No UN1175
Proper Shipping Name ETHYLBENZENE
Hazard Class 3
Packing Group II

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed The product is classified and labeled

according to EC directives or corresponding national laws The product is classified and labeled in accordance with Directive 1999/45/EC

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Ethylbenzene	X	X	-	202-849-4	-		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 %
Ethylbenzene	100-41-4	>95	0.1

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

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Ethylbenzene	X	1000 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Ethylbenzene	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
Ethylbenzene	1000 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals:

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Ethylbenzene	100-41-4	Carcinogen	54 µg/day 41 µg/day	Carcinogen

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Ethylbenzene	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 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 06-Aug-2010
Revision Date 30-Oct-2014
Print Date 30-Oct-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

1. IDENTIFICATION

Product Identifier: No. 2 Fuel Oil

Synonyms: No. 2 Heating Oil, #2 Fuel Oil, Heating Oil Plus™, Low Sulfur Heating Oil (LSHO), Ultra Low Sulfur Heating Oil (ULSHO)

Intended use of the product: Fuel

Contact:
Global Companies LLC
Water Mill Center
800 South St.
Waltham, MA 02454-9161
www.globalp.com

Contact Information: EMERGENCY TELEPHONE NUMBER (24 hrs.): CHEMTREC (800) 424-9300
COMPANY CONTACT (business hours): 800-542-0778

2. HAZARD IDENTIFICATION

According to OSHA 29 CFR 1910.1200 HCS

Classification of the Substance or Mixture

Classification (GHS-US):

Flam. Liquid	Category 3	H226
Skin Corrosion/Irritation	Category 2	H315
Aspiration Hazard	Category 1	H304
Acute toxicity – Inhalation	Category 4	H332
STOT SE	Category 3	H336
Carcinogenicity	Category 2	H350
Aquatic Chronic	Category 2	H411
Eye damage/Irritation	Category 2	H319

Labeling Elements



Signal Word (GHS-US): **Danger**

Hazard Statements (GHS-US):
H226 – Flammable liquid and vapor.
H315 – Causes Skin irritation.
H304 – May be fatal if swallowed and enters airways.
H332—Harmful if inhaled.
H336 – May cause drowsiness or dizziness.
H350 – May cause cancer.
H411 – Toxic to aquatic life with long lasting effects.
H319 – May cause eye damage/irritation.

Precautionary Statements (GHS-US):
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 pursuant to applicable electrical code.
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.
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+361+353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse with water/shower.
P308+311 - If exposed or concerned: Get medical advice/attention.
P301+310 - If swallowed: Immediately call a poison center/doctor/…
P331 - Do NOT induce vomiting.
P370+P378 – In case of fire use firefighting foam or other appropriate media for Class B fires to extinguish.
P403+235 - Store in a well-ventilated place. Keep cool.
P405 - Store locked up.
P501 – Dispose of contents/container in accordance with local/regional/national/international regulation.

Other information:

NFPA 704
Health: 1
Fire: 2
Reactivity: 0



3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Composition Information
Mixture

Name	Product Identifier (CAS#)	% (w/w)	Classification
No. 2 Fuel Oil	68476-30-2	95-100	Flam Liq. 3, H226; Skin Irrit. 2, H315; Aspiration 1, H304; STOT SE 3, H336; Carc.2. H350; Aquatic chronic 2, H411
Methyl Esters	N/A	0-5	N/A
Naphthalene	91-20-3	0.1	Carc. 2, H351; Acute Tox. 4, H302; Aquatic Acute 1, H400; Aquatic Chronic 1, H411

Additional Formulation Information:
No. 2 Fuel Oil consists of C9+ hydrocarbons resulting from distillation of crude oil.

Low Sulfur Heating Oil typically contains less than 500 ppm of sulfur

Ultra Low Sulfur Heating Oil typically contains less than 15 ppm of sulfur

4. FIRST AID MEASURES

Route	Measures
Inhalation	Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.
Ingestion	Aspiration Hazard: 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. 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 failure, and death.
Eye Contact	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. In case of contact lenses, remove immediately.
Skin Contact	Remove contaminated clothing and shoes. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops. Thermal burns require immediate medical attention depending on the severity and of the area of the body burned.

Most Important Symptoms
Contact with eyes and face may cause irritation. Long-term exposure may cause dermatitis (itching, irritation, pain and swelling).

Inhalation may cause irritation and significant or long term exposure could cause respiratory insufficiency and pulmonary edema.

Ingestion may cause aspiration, gastrointestinal disturbance, and CNS effects.

Immediate Medical Attention and Special Treatment
For contact with skin or eyes, immediately wash or flush contaminated eyes with gently flowing water. If possible, irrigate each eye continuously with 0.9% saline (NS). If ingested, rinse mouth. Do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

If inhaled, administer oxygen or establish a patent airway if breathing is labored. Suction if necessary. Monitor closely, anticipate seizures. Consider orotracheal or nostracheal intubation of airway control if patient is unconscious or is in severe respiratory distress.

Discard any clothing or shoes contaminated as they may be flammable.

5. FIRE-FIGHTING MEASURES

Extinguishing Media
Foam, carbon dioxide, dry chemical are most suitable

SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, C02, water spray, firefighting foam, or Halon. Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment.

LARGE FIRES: Foam, carbon dioxide, dry chemical. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Specific Hazards / Products of Combustion
Moderate fire hazard when exposed to heat or flame with a very low flash point. Product is flammable and easily ignited when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. 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.

Combustion may produce smoke, carbon monoxide and other products of incomplete combustion.

Special Precautions and Protective Equipment for Firefighters
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 firefighting foam.

Fighting Equipment/Instructions
Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH- approved pressure-demand self-contained breathing apparatus with full face piece and protective clothing.

Refer to Section 9 for fire properties of this chemical including flash point, auto ignition temperature, and explosive limits.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY SPCC, SPILL CONTINGENCY or EMERGENCY PLAN.

Personal Precautions
Due to high vapor density, flammable / toxic vapors may be present in low lying areas, dikes, pits, drains, or trenches. Vapors may accumulate in low lying areas and reach ignitable concentrations. Ventilate the area. Use of non-sparking tools and intrinsically safe equipment is recommended. Potential for flammable atmosphere should be monitored using a combustible gas indicator positioned downwind of the spill area. Refer to Sections 2 and 7 for further hazard warnings and handling instructions.

Use appropriate personal protective equipment to prevent eye/skin contact and absorption. Use NIOSH approved respiratory protection, if warranted, to prevent exposures above permissible limits. Refer to Section 8. Contaminated clothing should not be near sources of ignition.

Emergency Measures
As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Consider wind direction. Secure all ignition sources (flame, spark, hot work, hot metal, etc.) from area. Evaluate the direction of product travel, diking sewers, etc. to confirm spill areas. Do not touch or walk-through spilled material. For large spills, isolate initial action distance downwind 1,000 ft. (300 m).

Environmental Precautions
Stop the spill to prevent environmental release if it can be done safely. Product is toxic to aquatic life. Take action to isolate environmental receptors including drains, storm sewers and natural water bodies. Keep on impervious surface if at all possible. Use water sparingly to prevent product from spreading. Foam and absorbents may be used to reduce / prevent airborne release.

Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Follow federal, state or local requirements for reporting environmental release where necessary. Refer to Section 15 for further information.

Containment and Clean-Up Methods
Carefully contain and stop the source of the spill, if safe to do so. 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 firefighting 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.

Take up with dry earth, sand or other non-combustible, inert oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container with clean, non-sparking tools for reclamation or disposal. Response and cleanup crews must be properly trained and must utilize proper protective equipment. Refer to Section 8 for appropriate protective equipment.

7. HANDLING AND STORAGE

USE ONLY AS A FUEL.
DO NOT SIPHON BY MOUTH.

Handling Precautions
Handle as a flammable liquid. Keep away from heat, sparks, and open flame. No smoking. Electrical equipment should be approved for classified area. Bond and ground containers during product transfer pursuant to NFPA 70 and API RP 2003 to

reduce the possibility of static-initiated fire or explosion. Follow precautions to prevent static initiated fire.

Use good personal hygiene practices. Use only with protective equipment specified in Section 8. Avoid repeated and/or prolonged skin exposure. Use only outdoors or in well ventilated areas. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves. Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API RP 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents."

Storage
Large quantities of fuel oil are stored in tanks or portable containers at an ambient storage temperature. Separate from incompatible chemicals (Refer to Section 10) by distance or secondary containment. Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers that are clearly labeled. Label all secondary containers that this material is transferred into with the chemical name and associated hazard(s). Empty product containers or vessels may contain flammable vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Storage tanks should have a venting system. If stored in small containers, the area should be well ventilated, away from ignition sources and protected from potential damage or vehicular traffic. Post “No Smoking” signs in product storage areas. This storage area should comply with NFPA 30 “Flammable and Combustible Liquid Code” or applicable building code. 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 “Safe Entry and Cleaning of Petroleum Storage Tanks”.

Incompatibles
Keep away from strong oxidizers, ignition sources and heat.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits

Component	CAS #	List	Value
No. 2 Fuel Oil	68476-30-2	ACGIH TLV-TWA	100 mg/m3*
Naphthalene	91-20-3	ACGIH TLV-TWA OSHA PEL ACGIH STEL	10 ppm 10 ppm 15 ppm

*Critical effects; Skin; A3; CNS impairment.

Engineering Controls
Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Intrinsically safe equipment and non-sparking tools shall be used in circumstances where concentrations may exceed lower flammable limits. Grounding and bonding shall be used to prevent accumulation and discharge of static electricity. Emergency shower and eyewash should be provided in proximity to handling areas in the event of exposure to decontaminate.

Personal Protective Equipment

Exposure	Equipment
Eye / Face	Wear appropriate chemical protective glasses or goggles or face shields to prevent skin and eye contact especially caused from splashing.
Skin	Wear appropriate personal protective clothing to prevent skin contact. Gloves constructed of nitrile, neoprene or PVC are recommended when handling this material. 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.

Exposure	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. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations. 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.
Thermal	Product is stored at ambient temperature. No thermal protection is required except for emergency operations involving actual or potential for fire. Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

9. PHYSICAL AND CHEMICAL PROPERTIES

Property	Value	
Appearance	Clear or straw-colored liquid dyed red for distribution	
Odor	Mild petroleum distillate odor.	
Odor Threshold	<1 ppm	
pH	Not available	
Melting Point	-15 ˚F (-26 ˚C)	
Boiling Point Range	320 to 690 ˚F (160 to 366 ˚C)	
Flash Point	>125.6 ˚F (52 ˚C) PMCC	
Evaporation Rate	Slow, varies with conditions	
Flammability	Flammable liquid	
Flammable Limits	0.6 % - 7.5%	
Vapor Pressure	0.009 psia @ 70 ˚F	
Vapor Density	>1	(air=1)
Specific Gravity	0.81-0.88 @ 60 ˚F (16 ˚C)	(water=1)
Solubility	Insoluble in water; miscible with other petroleum solvents.	
Partition Coefficient (N-octanol/water)	Log Kow range of 3.3 to >.6.0	
Autoignition Temperature	494 ˚F (257 ˚C)	
Decomposition Temperature	When heated it emits acrid smoke and irritating vapors.	
Viscosity	>3 cSt	
Percent Volatiles	95-100	

10. STABILITY AND REACTIVITY

Stability
This is a stable material that is flammable liquid (OSHA/GHS hazard category 3). Stable during transport.

Reactivity
Material is not self-reacting. Flammable concentrations may be present in air. Compound can react with oxidizing materials.

Possibility of Hazardous Reactions
Hazardous polymerization will not occur.

Incompatibility
Keep away from strong oxidizers such as nitric and sulfuric acids.

Conditions to Avoid
Avoid high temperatures, open flames, sparks, static electricity, welding, smoking and other ignition sources.

Hazardous Decomposition Products
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL INFORMATION

Acute Toxicity:
Acute Toxicity (Inhalation LC50)

No. 2 Fuel Oil (68476-30-2)
LC50 Inhalation Rat >4.6 mg/l/4h

Acute Toxicity (Dermal LD50)

No. 2 Fuel Oil (68476-30-2)
LD50 Dermal Rabbit >2000 mg/kg

Acute Toxicity (Oral LD50)

No. 2 Fuel Oil (68476-30-2)
LD50 Oral Rat >12000 mg/kg

Acute Toxicity (Oral LD50)

Methyl Esters
LD50 Oral Rat >14400 mg/kg

Skin Corrosion/Irritation: Prolonged and repeated contact may cause skin irritation leading to dermatitis. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

Serious Eye Damage/Irritation: Causes serious eye irritation.

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not available

Carcinogenicity: OSHA: NO, IARC: Group 3, NTP: NO, ACGIH: NOIC:A3, NIOSH: NO

IARC: Group 3 – Not classifiable as to their carcinogenicity to humans ACGIH: A3 – Confirmed animal carcinogen with unknown relevance to humans

Petroleum middle distillates have been shown to produce skin tumors in laboratory animals following repeated and prolonged exposures. 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 (byproduct of combustion of this material) carcinogenic to humans (Group 1) and NIOSH regards diesel fuel exhaust particulate as a potential occupational carcinogen.

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Specific Target Organ Toxicity (Single Exposure): Inhalation exposure may cause drowsiness or dizziness by inhalation exposure.

Aspiration 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.

Potential Health Effects: Vapor irritating to skin, eyes, nose, and throat. 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.

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.

12. ECOLOGICAL INFORMATION

Toxicity
This material is expected to be toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

Data for Component: No. 2 Fuel Oil (68476-30-2)

Material is toxic to aquatic organisms based on an acute basis (LC50/EC50 >1 but ≤ 10 mg/L in the most sensitive species tested).

Material is a long-term aquatic hazard based on a chronic basis (LC50/EC50 >1 but ≤ 10 mg/L in the most sensitive species tested).

Persistence and Degradation: This material is not expected to be readily biodegradable.

Bioaccumulative Potential: Not available

Mobility in Soil: Not available

Other Adverse Effects: None known

Other Information: Avoid release to the environment.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options. May be considered a hazardous waste if disposed. Direct solid waste (landfill) or incineration at a solid waste facility is not permissible. Do not discharge to sanitary or storm sewer. Personnel handling waste containers should follow precautions provided in this document.

Shipping containers must be DOT authorized packages. Follow licensure and regulations for transport of hazardous material and hazardous waste as applicable.

14. TRANSPORT INFORMATION

US DOT

UN Identification Number	NA 1993
Proper Shipping Name	Fuel oil (No. 2)
Hazard Class and Packing Group	3, PGIII
Shipping Label	Combustible liquid
Placard / Bulk Package	Combustible liquid, 1993
Emergency Response Guidebook Guide Number	128

IATA Information

UN Identification Number	UN 1993
Proper Shipping Name	Fuel oil (No. 2)
Hazard Class and Packing Group	3, PGIII
ICAO Label	3
Packing Instructions Cargo	355
Max Quantity Per Package Cargo	220L
Packing Instructions Passenger	344Y
Max Quantity per Package	60L

ICAO

UN Identification Number	UN 1993
Shipping Name / Description	Fuel oil (No. 2)
Hazard Class and Packing Group	3, PG III
IMDG Label	3

IMDG

UN Identification Number	UN 1993
Shipping Name / Description	Heating Oil, Light
Hazard Class and Packing Group	3, PGIII
IMDG Label	3
EmS Number	N/A
Marine Pollutant	Yes

15. REGULATORY INFORMATION

U.S. Federal, State, and Local Regulatory Information
Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

OSHA Hazard Communication Standard
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning And Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	Yes
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Clean Water Act (Oil Spills)
Any spill or release of this product to “navigable waters” (Essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA Section 103 and SARA Section 304 (Release to the Environment)
The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts this material. This product does not contain any chemicals subject to the reporting requirements of CERCLA Section 103 or SARA 304.

SARA Section 313- Supplier Notification
This product does not contain any chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

EPA Notification (Oil Spills)
If the there is a discharge of more than 1,000-gallons of oil into or upon navigable waters of the United States, or if it is the second spill event of 42 gallons or more of oil into water within a twelve (12) month period, a written report must be submitted to the Regional Administrator of the EPA within sixty days of the event.

Pennsylvania Right to Know Hazardous Substance list:
The following product components are cited in the Pennsylvania Special Hazardous Substance List, and are present at levels which require reporting.

Component	CAS	Amount
No. 2 Fuel Oil	68476-30-2	100%

New Jersey Right to Know Hazardous Substance list:
The following product components are cited in the New Jersey Right to Know Hazardous Substance List, and are present at levels which require reporting.

Component	CAS	Amount
No. 2Fuel Oil	68476-30-2	100%

California Proposition 65 WARNING: This product contains chemicals known to the State of California to cause Cancer or Reproductive Toxicity.

Component	CAS	Amount
Naphthalene	91-20-3	<0.1%

U.S. Toxic Substances Control Act
All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30.

CEPA - Domestic Substances List (DSL)
All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

Canadian Regulatory Information (WHMIS)
Class B3 – Combustible Liquid
Class D2A – Materials causing other toxic effects. (Very Toxic)

16. OTHER INFORMATION

Version	4
Issue Date	May 20, 2016
Prior Issue Date	May 3, 2015

Description of Revisions
Revised to meet Globally Harmonized System for chemical hazard communication requirements pursuant to OSHA regulatory revisions 77 FR 17884, March 26, 2012.

Abbreviations

˚F	Degrees Fahrenheit (temperature)
<	Less than
=	Equal to
>	Greater than
AP	Approximately
C	Centigrade (temperature)
kg	Kilogram
L	Liter
mg	Milligrams
mL	Milliliter
mm^2	Square millimeters
mmHg	Millimeters of mercury (pressure)
N/A	Not applicable
N/D	Not determined
ppm	Parts per million
sec	Second
ug	Micrograms

Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AL	Action Level
ANSI	American National Standards Institute
API	American Petroleum Institute
CAS	Chemical Abstract Service
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation
EC50	Ecological concentration 50%
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guideline
GHS	Global Harmonized System

HMIS	Hazardous Materials Information System
IARC	International Agency for Research On Cancer
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
Koc	Soil Organic Carbon
LC50	Lethal concentration 50%
LD50	Lethal dose 50%
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act Reauthorization Act of 1986 Title III
REL	Recommended Exposure Limit (NIOSH)
RVP	Reid Vapor Pressure
SARA	Superfund Amendments and
SCBA	Self Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
UN	United Nations
UNECE	United Nations Economic Commission for Europe
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Canadian Workplace Hazardous Materials Information System

Disclaimer of Expressed and Implied Warranties

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 Safety Data Sheet **

SAFETY DATA SHEET

Version 5.5
Revision Date 05/27/2016
Print Date 07/13/2017

1. PRODUCT AND COMPANY IDENTIFICATION

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
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)
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 statement(s)
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.
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 : $C_{22}H_{12}$
Molecular weight : 276.33 g/mol
CAS-No. : 193-39-5
EC-No. : 205-893-2

Hazardous components

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.

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

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

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.

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.

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	163.6 °C (326.5 °F)
f)	Initial boiling point and boiling range	536.0 °C (996.8 °F)
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
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 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 (Indeno[1,2,3-cd]pyrene)
IARC:	2B - Group 2B: Possibly carcinogenic to humans (Indeno[1,2,3-cd]pyrene)
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 (Indeno[1,2,3-cd]pyrene)
NTP:	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 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

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
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-04-24

California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer. Indeno[1,2,3-cd]pyrene	CAS-No. 193-39-5	Revision Date 2007-09-28
WARNING! This product contains a chemical known to the State of California to cause cancer.	CAS-No. 193-39-5	Revision Date 2007-09-28

Indeno[1,2,3-cd]pyrene

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Carc.	Carcinogenicity
H351	Suspected of causing cancer.

HMIS Rating

Health hazard:	0
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: 05/27/2016 Print Date: 07/13/2017

Iron Filings, 40 mesh

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : **Iron Filings, 40 mesh**

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: **S25369**

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:

Not classified for physical or health hazards under GHS.

Signal word :Warning

Hazard statements:
Precautionary statements:
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Do not eat, drink or smoke when using this product

Combustible Dust Hazard: :
May form combustible dust concentrations in air (during processing).

Other Non-GHS Classification:

WHMIS
NFPA/HMIS



NFPA SCALE (0-4)



HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 7439-89-6	Iron	100 %
		Percentages are by weight

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Loosen clothing as necessary and position individual in a comfortable position.Move exposed to fresh air. Give artificial respiration if necessary. If breathing is difficult give oxygen.Get medical assistance if cough or other symptoms appear.

After skin contact: Rinse/flush exposed skin gently using soap and water for 15-20 minutes.Seek medical advice if discomfort or irritation persists.

After eye contact: Protect unexposed eye. Rinse/flush exposed eye(s) gently using water for 15-20 minutes. Remove contact lens(es) if able to do so during rinsing. Seek medical attention if irritation persists or if concerned.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists.Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed:

Irritation, Nausea,Headache, Shortness of breath.;

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician.Physician should treat symptomatically.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition. Use water, dry chemical, chemical foam, carbon dioxide, or alcohol-resistant foam.

For safety reasons unsuitable extinguishing agents:

Special hazards arising from the substance or mixture:

Combustion products may include carbon oxides or other toxic vapors.Thermal decomposition can lead to release of irritating gases and vapors.

Advice for firefighters:

Protective equipment: Use NIOSH-approved respiratory protection/breathing apparatus.

Additional information (precautions): Move product containers away from fire or keep cool with water spray as a protective measure, where feasible.Use spark-proof tools and explosion-proof equipment.Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.Avoid inhaling gases, fumes, dust, mist, vapor, and aerosols.Avoid contact with skin, eyes, and clothing.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Use spark-proof tools and explosion-proof equipment.Ensure that air-handling systems are operational.Ensure adequate ventilation.

Environmental precautions:

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13. Should not be released into environment.

Methods and material for containment and cleaning up:

Keep in suitable closed containers for disposal.Wear protective eyeware, gloves, and clothing. Refer to Section 8.Always obey local regulations.Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Collect solids in powder form using vacuum with (HEPA filter). Evacuate personnel to safe areas.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Minimize dust generation and accumulation. Follow good hygiene procedures when handling chemical materials. Refer to Section 8.Do not eat, drink, smoke, or use personal products when handling chemical substances. Avoid contact with eyes, skin, and clothing.

Conditions for safe storage, including any incompatibilities:

Store away from incompatible materials.Protect from freezing and physical damage.Keep away from food and beverages.Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Store in cool, dry conditions in well sealed containers. Store with like hazards

SECTION 8 : Exposure controls/personal protection





Control Parameters:	, , OSHA PEL TWA (Total Dust) 15 mg/m3 (50 mppcf*) , , ACGIH TLV TWA (inhalable particles) 10 mg/m3
Appropriate Engineering controls:	Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling.Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or dusts (total/respirable) below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen deficient environment.Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment).Use under a fume hood
Respiratory protection:	Not required under normal conditions of use. 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.When necessary use NIOSH approved breathing equipment.
Protection of skin:	Select glove material impermeable and resistant to the substance.Select glove material based on rates of diffusion and degradation.Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices.Use proper glove removal technique without touching outer surface. Avoid skin contact with used gloves.Wear protective clothing.

Eye protection: Wear equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).Safety glasses or goggles are appropriate eye protection.

General hygienic measures: Perform routine housekeeping.Wash hands before breaks and at the end of work.Avoid contact with skin, eyes, and clothing.Before wearing wash contaminated clothing.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Solid	**Explosion limit lower**: **Explosion limit upper**:	Not determined Not determined
Odor:	Not Determined	**Vapor pressure**:	Not determined
Odor threshold:	Not determined	**Vapor density**:	Not determined
pH-value:	Not Determined	**Relative density**:	Not determined
Melting/Freezing point:	Not determined	**Solubilities**:	
Boiling point/Boiling range:	Not determined	**Partition coefficient (n-octanol/water)**:	Not determined
Flash point (closed cup):	Not determined	**Auto/Self-ignition temperature**:	Not determined
Evaporation rate:	Not determined	**Decomposition temperature**:	Not determined
Flammability (solid,gaseous):	Not determined	**Viscosity**:	a. Kinematic:Not determined b. Dynamic: Not determined
Density: Not determined			

SECTION 10 : Stability and reactivity

Reactivity: Nonreactive under normal conditions.
Chemical stability: Stable under normal conditions.
Possible hazardous reactions: None under normal processing
Conditions to avoid: Incompatible Materials.
Incompatible materials: Strong acids.Strong bases.Oxidizing agents.
Hazardous decomposition products:

SECTION 11 : Toxicological information

Acute Toxicity: No additional information.	
Chronic Toxicity: No additional information.	
Corrosion Irritation: No additional information.	
Sensitization:	No additional information.
Single Target Organ (STOT):	No additional information.
Numerical Measures:	No additional information.

Carcinogenicity:	No additional information.
Mutagenicity:	No additional information.
Reproductive Toxicity:	No additional information.

SECTION 12 : Ecological information

Ecotoxicity Persistence and degradability:
Bioaccumulative potential:
Mobility in soil:
Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Contact a licensed professional waste disposal service to dispose of this material.Dispose of empty containers as unused product.Product or containers must not be disposed with household garbage.It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11).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. Ensure complete and accurate classification.

SECTION 14 : Transport information

UN-Number

Not Regulated.

UN proper shipping name

Not Regulated.

Transport hazard class(es)
Packing group:Not Regulated
Environmental hazard:
Transport in bulk:
Special precautions for user:

SECTION 15 : Regulatory information

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

None of the ingredients is listed

SARA Section 313 (Specific toxic chemical listings):

None of the ingredients is listed

RCRA (hazardous waste code):

None of the ingredients is listed

TSCA (Toxic Substances Control Act):

All ingredients are listed.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

None of the ingredients is listed

Proposition 65 (California):

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:

None of the ingredients is listed

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

None of the ingredients is listed

Canadian NPRI Ingredient Disclosure list (limit 1%):

None of the ingredients is listed

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment.The information contained herein is, to the best of our knowledge and belief, accurate.However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material.It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)
PNEC: Predicted No-Effect Concentration (REACH)
CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation

Effective date : 10.24.2014
Last updated : 03.23.2015

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)

Product use : Synthetic/Analytical chemistry.

Synonym : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

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 cause frostbite.
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 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.

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)

CAS number/other identifiers

CAS number : 115-11-7

Product code : 001031

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 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. 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 contact with eyes, skin and clothing. 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. 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. 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). 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
Isobutylene	**ACGIH TLV (United States, 3/2015).** 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 : 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 compressed gas.]

Color : Colorless.

Molecular weight : 56.12 g/mole

Molecular formula : C4-H8

Boiling/condensation point : -6.9°C (19.6°F)

Melting/freezing point : -140.7°C (-221.3°F)

Critical temperature : 144.75°C (292.6°F)

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: -76.1°C (-105°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 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 : 0.263 g/l

Partition coefficient: n-octanol/water : 2.34

Auto-ignition temperature : 465°C (869°F)

Decomposition temperature : Not available.

SADT : Not available.

Section 9. Physical and chemical properties

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.

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.

Section 11. Toxicological information

Information on the likely routes of exposure : Not available.

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.

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

Section 12. Ecological information

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	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	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: 150 kg **Special provisions** 19, T50	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	-	-	**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."

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 (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 : Fire hazard
Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Isobutylene	100	Yes.	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.

International regulations

International lists

National inventory

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 : This material is listed or exempted.

Malaysia : Not determined.

Section 15. Regulatory information

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Taiwan : This material is listed or exempted.

Canada

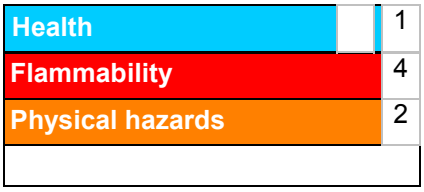
WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.

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.)



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
Flam. Gas 1, H220 Press. Gas Liq. Gas, H280	Expert judgment Expert judgment

History

Date of printing : 7/11/2016

Date of issue/Date of revision : 7/11/2016

Date of previous issue : No previous validation

Section 16. Other information

Version : 0.01

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 Nations

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.

Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 12-Sep-2014 **Revision Date** 12-Dec-2014 **Revision Number** 1

1. Identification

Product Name **Lead**

Cat No. : **L27-1RL**

Synonyms Lead metal.

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Emergency Telephone Number
Chemtrec US: (800) 424-9300
Chemtrec EU: 001 (202) 483-7616

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
Acute Inhalation Toxicity - Dusts and Mists	Category 4
Carcinogenicity	Category 1B
Reproductive Toxicity	Category 1A
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, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Harmful if swallowed
Harmful if inhaled
May cause drowsiness or dizziness
May cause cancer
May damage the unborn child. Suspected of damaging fertility
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
Do not breathe dust/fume/gas/mist/vapors/spray
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
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
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)
Very toxic to aquatic life with long lasting effects
Other hazards
WARNING! This product contains a chemical known in the State of California to cause cancer. WARNING! This product contains a chemical known in the State of California to cause birth defects or other reproductive harm.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Lead	7439-92-1	> 99

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 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
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	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 No information available.

7. Handling and storage

Handling Wear personal protective equipment. 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
Lead	TWA: 0.05 mg/m³	TWA: 50 µg/m³	IDLH: 100 mg/m³ TWA: 0.050 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Lead	TWA: 0.05 mg/m³	TWA: 0.15 mg/m³	TWA: 0.05 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 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	Light blue
Odor	Odorless
Odor Threshold	No information available
pH	Not applicable
Melting Point/Range	327.4 °C / 621.3 °F
Boiling Point/Range	1740 °C / 3164 °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	1.3 mmHg @ 970 °C
Vapor Density	No information available
Relative Density	11.3
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	Pb
Molecular Weight	207.19

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

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
Lead	7439-92-1	Group 2B	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

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

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

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 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 Kidney Blood

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

(Bad file name)

Ecotoxicity

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Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Lead	Not listed	1.32 mg/L LC50 96 h 1.17 mg/L LC50 96 h 0.44 mg/L LC50 96 h	Not listed	600 µg/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 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
Lead	X	X	-	231-100-4	-		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 %
Lead	7439-92-1	> 99	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
Lead	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Lead	X		-

OSHA Occupational Safety and Health Administration
Not applicable

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Lead	30 µg/m³ Action Level 50 µg/m³ 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
Lead	10 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals:

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Lead	7439-92-1	Carcinogen Developmental Female Reproductive Male Reproductive	15 µg/day	Developmental Carcinogen

State Right-to-Know

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Lead	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

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
D1B Toxic materials



16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 12-Sep-2014
Revision Date 12-Dec-2014
Print Date 12-Dec-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 17-Jan-2011 **Revision Date** 03-Aug-2015 **Revision Number** 3

1. Identification

Product Name **Magnesium**

Cat No. : **AC191080000; AC191080025; AC191080100; AC191085000**

Synonyms Magnesium metal (ribbons/turnings)

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 solids	Category 1
Self-heating substances and mixtures	Category 2
Substances/mixtures which, in contact with water, emit flammable gases	Category 2

Label Elements

Signal Word
Danger

Hazard Statements
Flammable solid
Self-heating in large quantities; may catch fire
In contact with water releases flammable gas



Precautionary Statements
Prevention
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Wear protective gloves/protective clothing/eye protection/face protection
Keep cool. Protect from sunlight
Keep away from any possible contact with water, because of violent reaction and possible flash fire
Handle under inert gas. Protect from moisture
Skin
Brush off loose particles from skin. Immerse in cool water/wrap with wet bandages
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Maintain air gap between stacks/pallets
Store away from other materials
Store in a dry place. Store in a closed container
Store bulk masses at temperatures not exceeding manufacturer recommendations
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 %
Magnesium	7439-95-4	>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 Remove from exposure, lie down. Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration.

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 Dry chemical. approved class D extinguishers. clay. sodium carbonate. Do not use a solid water stream as it may scatter and spread fire.

Unsuitable Extinguishing Media No information available

Flash Point 500 °C / 932 °F
Method - No information available

Autoignition Temperature 472.8 °C / 883 °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. Water reactive. Produce flammable gases on contact with water. Flammable.

Hazardous Combustion Products
Magnesium 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.

NFPA

Health	Flammability	Instability	Physical hazards
0	4	2	W

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Remove all sources of ignition.

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. Remove all sources of ignition. Ground and bond containers when transferring material. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Avoid contact with skin and eyes. Do not breathe dust. Use explosion-proof equipment. Use only non-sparking tools. Wash hands before breaks and immediately after handling the product. Ensure adequate ventilation. Wear personal protective equipment. Avoid dust formation.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat and sources of ignition. Never allow product to get in contact with water during storage. Store under an inert atmosphere.

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. 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	Solid
Appearance	Silver
Odor	Odorless
Odor Threshold	No information available
pH	7
Melting Point/Range	651 °C / 1203.8 °F
Boiling Point/Range	1107 °C / 2024.6 °F
Flash Point	500 °C / 932 °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	negligible
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	472.8 °C / 883 °F
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Mg
Molecular Weight	24.3

10. Stability and reactivity

Reactive Hazard Yes

Stability Stable under normal conditions. Air sensitive. Water reactive.

Conditions to Avoid Protect from water. Exposure to air. Incompatible products. Exposure to moist air or water.

Incompatible Materials Acids, Strong oxidizing agents, Halogens, Acid chlorides

Hazardous Decomposition Products Magnesium 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
Magnesium	230 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 May cause irritation

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
Magnesium	7439-95-4	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	See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Persistence and Degradability	Insoluble in water
Bioaccumulation/ Accumulation	No information available.
Mobility	Is not likely mobile in the environment due its low 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

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

TDG

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

IATA

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
Packing Group	III

IMDG/IMO

UN-No	UN1869
Proper Shipping Name	MAGNESIUM
Hazard Class	4.1
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
Magnesium	X	X	-	231-104-6	-		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	Yes

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
Magnesium	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

B6 Reactive flammable material
B4 Flammable solid
F Dangerously reactive material



16. Other information

Prepared By

Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 17-Jan-2011
Revision Date 03-Aug-2015
Print Date 03-Aug-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 10/09/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Manganese

Product Number : 266167
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, 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 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 none

Signal word none

Hazard statement(s)
H401 Toxic to aquatic life.

Precautionary statement(s)
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

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		
	Aquatic Acute 2; 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
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
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
Avoid dust formation. 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
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
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.

Moisture sensitive. Handle and store under inert gas.
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
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 2015 Adoption varies		

		TWA	0.020000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment 2015 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
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.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: chips Colour: grey, brown, silver
b)	Odour	odourless
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	0.0007 g/l at 20 °C (68 °F) - slightly soluble
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
Avoid moisture.

10.5 Incompatible materials
acids, Halogens, Bases, Phosphorus, Sulphur oxides, Hydrogen peroxide, Oxidizing agents, Nitric acid, Sodium Hydroxide, Carbon dioxide (CO_2), Nitryl Flouride, Steam

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 420)

LC50 Inhalation - Rat - male and female - 4 h - > 5.14 mg/l
(OECD Test Guideline 403)

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 - 72 h
(OECD Test Guideline 405)

Respiratory or skin sensitisation
- Mouse
Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

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

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: Not available

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., 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	semi-static test NOEC - Oncorhynchus mykiss (rainbow trout) - 3.6 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	Immobilization NOEC - Daphnia magna (Water flea) - 1.6 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	Growth inhibition EC50 - Desmodesmus subspicatus (Scenedesmus subspicatus) - 4.5 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	Respiration inhibition EC50 - Sludge Treatment - 1,000 mg/l - 3 h (OECD Test Guideline 209)

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
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
Manganese	7439-96-5	2007-07-01

SARA 311/312 Hazards
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
H401	Toxic to aquatic life.

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: 10/09/2015 Print Date: 05/01/2016

Safety Data Sheet
Mercury (Metallic)

SDS Revision Date: **05/01/2015**

1. Identification

1.1. Product identifier

Product Identity	Mercury (Metallic)
Alternate Names	Quicksilver; Hydrargyrum; Liquid Silver

1.2. Relevant identified uses of the substance or mixture and uses advised against

Intended use	See Technical Data Sheet.
Application Method	See Technical Data Sheet.

1.3. Details of the supplier of the safety data sheet

Company Name	WM Mercury Waste Inc. 21211 Durand Avenue Union Grove, WI 53182
Emergency	
CHEMTREC (USA)	(800) 424-9300
Customer Service: WM Mercury Waste Inc.	(800) 741-3343

2. Hazard(s) identification

2.1. Classification of the substance or mixture

Acute Tox. 2;H330	Fatal if inhaled.
Repr. 1B;H360D	May damage the unborn child.
STOT RE 1;H372	Causes damage to organs through prolonged or repeated exposure. Specific Target Organs: (Central Nervous System)
Aquatic Chronic 1;H410	Very toxic to aquatic life with long lasting effects.

2.2. Label elements

Using the Toxicity Data listed in section 11 and 12 the product is labeled as follows.



Danger

H330 Fatal if inhaled.

H360D May damage the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H410 Very toxic to aquatic life with long lasting effects.

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[Prevention]:

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P260 Do not breathe mist / vapors / spray.

P264 Wash 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.

P281 Use personal protective equipment as required.

P284 Wear respiratory protection.

[Response]:

P304+340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P308+313 IF exposed or concerned: Get medical advice / attention.

P310 Immediately call a POISON CENTER or doctor / physician.

P314 Get Medical advice / attention if you feel unwell.

P320 Specific treatment is urgent (see information on this label).

P391 Collect spillage.

[Storage]:

P403+233 Store in a well ventilated place. Keep container tightly closed.

P405 Store locked up.

[Disposal]:

P501 Dispose of contents / container in accordance with local / national regulations.

3. Composition/information on ingredients

This product contains the following substances that present a hazard within the meaning of the relevant State and Federal Hazardous Substances regulations.

Ingredient/Chemical Designations	Weight %	GHS Classification	Notes
Mercury **CAS Number: 0007439-97-6**	**100**	**Repr. 1B;H360D** **Acute tox. 2;H330** **STOT RE 1;H372** **Aquatic Acute 1;H400** **Aquatic Chronic 1;H410**	**[1][2]**

In accordance with paragraph (i) of §1910.1200, the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

[1] Substance classified with a health or environmental hazard.

[2] Substance with a workplace exposure limit.

[3] PBT-substance or vPvB-substance.

*The full texts of the phrases are shown in Section 16.

4. First aid measures

4.1. Description of first aid measures

General In all cases of doubt, or when symptoms persist, seek medical attention.
Never give anything by mouth to an unconscious person.

Inhalation Remove to fresh air, keep patient warm and at rest. If breathing is irregular or stopped, give artificial respiration. If unconscious place in the recovery position and obtain immediate medical attention. Give nothing by mouth.

Eyes Irrigate copiously with clean water for at least 15 minutes, holding the eyelids apart and seek medical attention.

Skin Remove contaminated clothing. Wash skin thoroughly with soap and water or use a recognized skin cleanser.

Ingestion If swallowed, wash out mouth with water, obtain immediate medical attention. Keep at rest. Do NOT induce vomiting.

4.2. Most important symptoms and effects, both acute and delayed

Overview **Eye:** Contact with eyes may cause severe irritation, and possible eye burns. Vapors may cause eye irritation.
Skin: May cause skin irritation. May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Chronic exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, and personality changes.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause effects similar to those for inhalation exposure.
Inhalation: Causes respiratory tract irritation. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. May cause severe respiratory tract irritation.
Chronic: Chronic exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, and personality changes.

Notes to Physician: Treat symptomatically and supportively.
Antidote: The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel. The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. See section 2 for further details.

Inhalation Fatal if inhaled.

5. Fire-fighting measures

5.1. Extinguishing media

Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition: Mercury/mercury oxides.

Do not breathe mist / vapors / spray.

5.3. Advice for fire-fighters

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Combustion generates toxic fumes.

ERG Guide No. 172

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Put on appropriate personal protective equipment (see section 8).

6.2. Environmental precautions

Do not allow spills to enter drains or waterways.

Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

6.3. Methods and material for containment and cleaning up

Vacuum or sweep up material and place into a suitable disposal container. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section).

7. Handling and storage

7.1. Precautions for safe handling

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid breathing dust, vapor, mist, or gas. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.

See section 2 for further details. - [Prevention]:

7.2. Conditions for safe storage, including any incompatibilities

Handle containers carefully to prevent damage and spillage.

Incompatible materials: Acetylene, ammonia, boron phosphodiiodide, chlorine, chlorine dioxide, methyl azide, sodium carbide, halogens, strong oxidizers.

Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Poison room locked.

See section 2 for further details. - [Storage]:

7.3. Specific end use(s)

No data available.

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8. Exposure controls and personal protection

8.1. Control parameters

Exposure

CAS No.	Ingredient	Source	Value
0007439-97-6	Mercury	OSHA	TWA 0.1 mg/m3
		ACGIH	Alkyl compounds TWA: 0.01 mg/m3 STEL 0.03 mg/m3 Skin Aryl compounds TWA: 0.05 mg/m3 C 0.1 mg/m3 Skin Elemental/Inorganic 0.025mg/m3 Skin
		NIOSH	No Established Limit
		Supplier	No Established Limit

Carcinogen Data

CAS No.	Ingredient	Source	Value
0007439-97-6	Mercury	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: Yes; Group 4: No;

8.2. Exposure controls

Respiratory Follow the OSHA respirator regulations found in 29CFR §1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Eyes Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin Wear appropriate protective clothing to prevent skin exposure. Wear appropriate gloves to prevent skin exposure.

Engineering Controls Provide adequate ventilation. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. If these are not sufficient to maintain concentrations of particulates and any vapor below occupational exposure limits suitable respiratory protection must be worn.

Other Work Practices Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

See section 2 for further details. - [Prevention]:

9. Physical and chemical properties

Appearance	Silver Liquid
Odor	Odorless
Odor threshold	Not Measured
pH	Not Applicable
Melting point / freezing point	-38.87 deg C

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Initial boiling point and boiling range	356.5 deg C @ 760.00mmHg
Flash Point	Not Measured
Evaporation rate (Ether = 1)	Not Available
Flammability (solid, gas)	Not Applicable
Upper/lower flammability or explosive limits	**Lower Explosive Limit:** Not Measured **Upper Explosive Limit:** Not Measured
Vapor pressure (Pa)	0.002 mmHg @ 25C
Vapor Density	7 (Air=1)
Specific Gravity	13.5400g/cm3 (Water=1)
Solubility in Water	Insoluble
Partition coefficient n-octanol/water (Log Kow)	Not Measured
Auto-ignition temperature	Not Measured
Decomposition temperature	Not Available
Viscosity (cSt)	1.554 cP 20.00
Molecular Formula	Hg
Molecular Weight	200.59

9.2. Other information

No other relevant information.

10. Stability and reactivity

10.1. Reactivity

Hazardous Polymerization will not occur.

10.2. Chemical stability

Stable under normal circumstances.

10.3. Possibility of hazardous reactions

No data available.

10.4. Conditions to avoid

High temperatures, incompatible materials, metals.

10.5. Incompatible materials

Acetylene, ammonia, boron phosphodiiodide, chlorine, chlorine dioxide, methyl azide, sodium carbide, halogens, strong oxidizers.

10.6. Hazardous decomposition products

Mercury/mercury oxides.

11. Toxicological information

Acute toxicity

Ingredient	Oral LD50, mg/kg	Skin LD50, mg/kg	Inhalation Vapor LC50, mg/L/4hr	Inhalation Dust/Mist LC50, mg/L/4hr	Inhalation Gas LC50, ppm

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Mercury - (7439-97-6)	37.00, Rat - Category: 2	No data available	No data available	No data available	No data available

Note: When no route specific LD50 data is available for an acute toxin, the converted acute toxicity point estimate was used in the calculation of the product's ATE (Acute Toxicity Estimate).

Classification	Category	Hazard Description
Acute toxicity (oral)	2	Fatal if swallowed.
Acute toxicity (dermal)	---	Not Applicable
Acute toxicity (inhalation)	2	Fatal if inhaled.
Skin corrosion/irritation	---	Not Applicable
Serious eye damage/irritation	---	Not Applicable
Respiratory sensitization	---	Not Applicable
Skin sensitization	---	Not Applicable
Germ cell mutagenicity	---	Not Applicable
Carcinogenicity	---	Not Applicable
Reproductive toxicity	1B	May damage the unborn child.
STOT-single exposure	---	Not Applicable
STOT-repeated exposure	1	Causes damage to organs through prolonged or repeated exposure.
Aspiration hazard	---	Not Applicable

12. Ecological information

12.1. Toxicity

Very toxic to aquatic life with long lasting effects.

No additional information provided for this product. See Section 3 for chemical specific data.

Aquatic Ecotoxicity

Ingredient	96 hr LC50 fish, mg/l	48 hr EC50 crustacea, mg/l	ErC50 algae, mg/l
Mercury - (7439-97-6)	Not Available	0.0052, Daphnia magna	Not Available

12.2. Persistence and degradability

There is no data available on the preparation itself.

12.3. Bioaccumulative potential

Not Measured

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

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This product contains no PBT/vPvB chemicals.

12.6. Other adverse effects

No data available.

13. Disposal considerations

13.1. Waste treatment methods

Observe all federal, state and local regulations when disposing of this substance.

14. Transport information

	DOT (Domestic Surface Transportation)	IMO / IMDG (Ocean Transportation)	ICAO/IATA
14.1. UN number	UN2809	UN2809	UN2809
14.2. UN proper shipping name	UN2809, Mercury, 8, III	Mercury	Mercury
14.3. Transport hazard class(es)	**DOT Hazard Class:** 8 (6.1)	**IMDG:** 8 **Sub Class:** 6.1	**Air Class:** 8
14.4. Packing group	III	III	III

14.5. Environmental hazards

IMDG Marine Pollutant: Yes (Mercury)

14.6. Special precautions for user

No further information

15. Regulatory information

Regulatory Overview The regulatory data in Section 15 is not intended to be all-inclusive, only selected regulations are represented.

Toxic Substance Control Act (TSCA) All components of this material are either listed or exempt from listing on the TSCA Inventory.

WHMIS Classification D1A

US EPA Tier II Hazards

Fire: No
Sudden Release of Pressure: No
Reactive: No
Immediate (Acute): Yes
Delayed (Chronic): Yes

EPCRA 311/312 Chemicals and RQs (lbs):

Mercury (1.00)

EPCRA 302 Extremely Hazardous:

To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

SDS Revision Date: **05/01/2015**

EPCRA 313 Toxic Chemicals:

Mercury

Proposition 65 - Carcinogens (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Developmental Toxins (>0.0%):
Mercury

Proposition 65 - Female Repro Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Male Repro Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

New Jersey RTK Substances (>1%):

Mercury

Pennsylvania RTK Substances (>1%):

Mercury

16. Other information

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to our products. Customers/users of this product must comply with all applicable health and safety laws, regulations, and orders.

The full text of the phrases appearing in section 3 is:

H330 Fatal if inhaled.

H360D May damage the unborn child.

H372 Causes damage to organs through prolonged or repeated exposure.

H400 Very toxic to aquatic life.

H410 Very toxic to aquatic life with long lasting effects.

This is the first version in the GHS SDS format. Listings of changes from previous versions in other formats are not applicable.

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall WM Mercury Waste Inc. be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages.

End of Document

Safety Data Sheet

Material Name: Hess 10W30 Motor Oil

SDS No. 8957
US GHS

Synonyms: Valvoline Product Code 52670413

* * * 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:

Skin Corrosion/Irritation – Category 2
Specific Target Organ Toxicity – Category 3 (narcosis)
Carcinogenicity - Category 1B

GHS LABEL ELEMENTS

Symbol(s)



Signal Word

WARNING

Hazard Statements

Causes skin irritation.
May cause cancer.
May cause drowsiness or dizziness.

Precautionary Statements

Prevention

Wash hands and forearms thoroughly after handling.
Wear protective gloves/protective clothing/eye protection.
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid breathing fume/mist/vapors/spray.
Use only outdoors or in a well-ventilated area.

Response

If on skin: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical advice/attention.
If exposed or concerned: Get medical advice/attention.
If inhaled: Remove person to fresh air and keep in a position comfortable for breathing. Call poison center or doctor if you feel unwell.

Storage

Store locked up.
Store in a well-ventilated place.
Keep container tightly closed.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
64742-65-0	Petroleum distillates, solvent dewaxed heavy paraffinic	83-93

Petroleum-based lubricating oil with detergent/dispersant engine oil package with zinc compounds.

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

If symptoms develop, move individual away from exposure and into fresh air. Flush eyes gently with water while holding eyelids apart. If symptoms persist or there is visual difficulty, seek medical attention.

First Aid: Skin

Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before reuse.

First Aid: Ingestion

Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.

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.

First Aid: Notes to Physician

Acute aspiration of large amounts of oil-laden material may produce a serious aspiration hazard. Patients who aspirate these oils should be followed for the development of long-term sequelae. Repeated aspiration of mineral oil can produce chronic inflammation of the lungs (i.e. lipoid pneumonia) that may progress to pulmonary fibrosis. Symptoms are often subtle and radiological changes appear worse than clinical abnormalities. Occasionally, persistent cough, irritation of the upper respiratory tract, shortness of breath with exertion, fever, and bloody sputum occur. Inhalation exposure to oil mists below current workplace exposure limits is unlikely to cause pulmonary abnormalities. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

See Section 9 for Flammability Properties.
Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively. No special fire hazards are known to be associated with this product. Dense smoke may be generated while burning.

Hazardous Combustion Products

May form: carbon dioxide and carbon monoxide, oxides of sulfur, nitrogen and phosphorous, various hydrocarbons.

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. Caution, flammable vapors may accumulate in closed containers.

SMALL SPILL: Absorb liquid on vermiculite, floor absorbent or other absorbent material. Persons not wearing proper personal protective equipment should be excluded from area of spill.

LARGE SPILL: Prevent run-off to sewers, streams, or other bodies of water. If run-off occurs, notify authorities as required, that a spill has occurred. Persons not wearing proper personal protective equipment should be excluded from area of spill until clean-up has been completed.

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, and open flame! Electrical equipment should be approved for classified area. 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 higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

Storage Procedures

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. 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

Avoid contact with: acids, halogens, strong oxidizing agents.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

ACGIH, OSHA, and NIOSH have not developed exposure limits for any of this product's components.

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

Not normally required. However, wear resistant gloves such as nitrile rubber to prevent irritation which may result from prolonged or repeated skin contact with product.

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

To prevent repeated or prolonged skin contact, wear impervious clothing and boots. Wear normal work clothing covering arms and legs.

Hygiene Measures

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Dry, clear and bright	**Odor:**	None
Physical State:	Liquid	**pH:**	ND
Vapor Pressure:	ND	**Vapor Density:**	ND
Boiling Point:	>425 °F (218.3°C) @ 760.00 mmHg	**Melting Point:**	ND
Solubility (H2O):	Negligible	**Specific Gravity:**	0.881 @ 60°F (16°C)
Evaporation Rate:	Slower than ethyl ether	**VOC:**	ND
Viscosity:	<= 3300.0 cps @ -20°C; 10.0 - 11.0 cst @ 100°C	**Octanol/H2O Coeff.:**	ND
Flash Point:	430 °F (221.1 °C)	**Flash Point Method:**	COC
Upper Flammability Limit (UFL):	ND	**Lower Flammability Limit (LFL):**	ND
Burning Rate:	ND	**Auto Ignition:**	ND

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Hazardous Reaction Potential

Will not occur.

Conditions to Avoid

None

Incompatible Products

Avoid contact with: acids, halogens, strong oxidizing agents.

Hazardous Decomposition Products

May form: aldehydes, carbon dioxide and carbon monoxide, hydrogen sulfide, oxides of sulfur, nitrogen and phosphorus, toxic fumes, various hydrocarbons.

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A: General Product Information

Harmful if large amounts are swallowed.

B: Component Analysis - LD50/LC50

Petroleum distillates, solvent dewaxed heavy paraffinic (64742-65-0)

Inhalation LC50 Rat >4.7 mg/L 4 h; Oral LD50 Rat >5000 mg/kg; Dermal LD50 Rabbit >5000 mg/kg

Potential Health Effects: Skin Corrosion Property/Stimulativeness

May cause mild skin irritation. Prolonged or repeated contact may dry the skin. Symptoms include redness, burning, drying and cracking of the skin, and skin burns. Additional symptoms of skin contact include: acne. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling and use.

Potential Health Effects: Eye Critical Damage/ Stimulativeness

May cause mild eye irritation. Symptoms include stinging, tearing, and redness.

Potential Health Effects: Ingestion

Swallowing small amounts of this material during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful.

Potential Health Effects: Inhalation

It is possible to breathe this material under certain conditions of handling and use (for example, during heating, spraying, or stirring). Breathing small amounts of this material during normal handling is not likely to cause harmful effects. Breathing large amounts may be harmful. Symptoms usually occur at air concentrations higher than the recommended exposure limits.

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.

Carcinogenicity

A: General Product Information

May cause cancer.

Used motor oil has been shown to cause skin cancer in laboratory animal continually exposed by repeated applications.

B: Component Carcinogenicity

None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

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

Acute aspiration of large amounts of oil-laden material may produce a serious aspiration hazard.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

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

Petroleum distillates, solvent dewaxed heavy paraffinic (64742-65-0)

Test & Species	Conditions
96 Hr LC50 Oncorhynchus mykiss	>5000 mg/L
48 Hr EC50 Daphnia magna	>1000 mg/L

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 * * *

DOT Information

Shipping Name: Not Regulated

* * * Section 15 - Regulatory Information * * *

Regulatory Information

Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

SARA Section 311/312 – Hazard Classes

Acute Health	Chronic Health	Fire	Sudden Release of Pressure	Reactive
X	X	--	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

ZINC C1-C14 ALKYLDITHIOPHOSPHATE (CAS No. 68649-42-3)

State Regulations

Component Analysis - State

None of this product's components are listed on the state lists from CA, MA, MN, NJ, PA, or RI.

Component Analysis - WHMIS IDL

No components are listed in the WHMIS IDL.

Additional Regulatory Information

Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Petroleum distillates, solvent dewaxed heavy paraffinic	64742-65-0	Yes	DSL	EINECS

* * * Section 16 - Other Information * * *

NFPA® Hazard Rating

Health	1
Fire	1
Reactivity	0



HMIS® Hazard Rating

Health	1*	Slight
Fire	1	Slight
Physical	0	Minimal
		*Chronic

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration., NJTSR = New Jersey Trade Secret Registry.

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

Fisher Scientific

Part of Thermo Fisher Scientific

SAFETY DATA SHEET

Creation Date 27-Sep-2010 **Revision Date** 12-Oct-2015 **Revision Number** 3

1. Identification

Product Name **Naphthalene**

Cat No. : **N7-500**

Synonyms Tar camphor; Naphthalin; Coal tar camphor

Recommended Use Laboratory chemicals.

Uses advised against No Information available

Details of the supplier of the safety data sheet

Emergency Telephone Number
Chemtrec US: (800) 424-9300
Chemtrec EU: 001 (202) 483-7616

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
Carcinogenicity	Category 1B
Target Organs - Liver, Kidney.	

Label Elements

Signal Word
Danger

Hazard Statements
Flammable solid
Harmful if swallowed
May cause 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
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
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

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)

Very toxic to aquatic life with long lasting effects
WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Naphthalene	91-20-3	>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 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 Clean mouth with water and drink afterwards plenty of water. Get medical attention if symptoms occur.

Most important symptoms/effects . Symptoms of overexposure may be 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. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media No information available

Flash Point 78 °C / 172.4 °F
Method - No information available

Autoignition Temperature	Not applicable 526 °C / 978.8 °F
Explosion Limits	
Upper	5.9 vol %
Lower	0.9 vol %
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Combustible material. Containers may explode when heated. 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	2	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid dust formation. Remove all sources of ignition. Take precautionary measures against static discharges.

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. Keep in suitable, closed containers for disposal. Remove all sources of ignition.

7. Handling and storage

Handling Wear personal protective equipment. Ensure adequate ventilation. Avoid ingestion and inhalation. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Keep away from open flames, hot surfaces and sources of ignition.

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
Naphthalene	TWA: 10 ppm Skin	(Vacated) TWA: 10 ppm (Vacated) TWA: 50 mg/m³ (Vacated) STEL: 15 ppm (Vacated) STEL: 75 mg/m³ TWA: 10 ppm TWA: 50 mg/m³	IDLH: 250 ppm TWA: 10 ppm TWA: 50 mg/m³ STEL: 15 ppm STEL: 75 mg/m³

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Naphthalene	TWA: 10 ppm TWA: 52 mg/m³ STEL: 15 ppm STEL: 79 mg/m³	TWA: 10 ppm TWA: 50 mg/m³ STEL: 15 ppm STEL: 75 mg/m³	TWA: 10 ppm STEL: 15 ppm Skin

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. Use explosion-proof electrical/ventilating/lighting/equipment. 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	White
Odor	Characteristic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	79 - 82 °C / 174.2 - 179.6 °F
Boiling Point/Range	218 °C / 424.4 °F
Flash Point	78 °C / 172.4 °F
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	5.9 vol %
Lower	0.9 vol %
Vapor Pressure	0.08 mbar @ 20 °C
Vapor Density	Not applicable
Specific Gravity	0.990
Solubility	slightly soluble
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable 526 °C / 978.8 °F
Decomposition Temperature	540 °C
Viscosity	Not applicable
Molecular Formula	C10H8
Molecular Weight	128.17

10. Stability and reactivity

Reactive Hazard Yes

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Avoid dust formation. Keep away from open flames, hot surfaces and sources of ignition.

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
Naphthalene	LD50 = 490 mg/kg (Rat) LD50 = 1110 mg/kg (Rat)	LD50 > 20 g/kg (Rabbit) LD50 = 1120 mg/kg (Rabbit)	LC50 > 340 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 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
Naphthalene	91-20-3	Group 2B	Reasonably Anticipated	A3	X	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)

Mutagenic Effects Not mutagenic in AMES Test

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 None known

STOT - repeated exposure Liver Kidney

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

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
Naphthalene	EC50: = 0.4 mg/L, 72h (Skeletonema costatum)	LC50 96 h 1-6.5 mg/L (Pimephales promelas)	EC50 = 0.93 mg/L 30 min EC50 > 20 mg/L 18 h	EC50: 1.09 - 3.4 mg/L, 48h Static (Daphnia magna) EC50: = 1.96 mg/L, 48h Flow through (Daphnia magna) LC50: = 2.16 mg/L, 48h (Daphnia magna)

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.

Component	log Pow
Naphthalene	3.3

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
Naphthalene - 91-20-3	U165	-

14. Transport information

DOT
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

TDG
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

IATA
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **Packing Group** III

IMDG/IMO
- **UN-No** UN1334
- **Proper Shipping Name** NAPHTHALENE, CRUDE
- **Hazard Class** 4.1
- **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
Naphthalene	X	X	-	202-049-5	-		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)

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Naphthalene	91-20-3	>95	0.1

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Naphthalene	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Naphthalene	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
Naphthalene	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
Naphthalene	91-20-3	Carcinogen	5.8 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Naphthalene	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 Moderate risk, Grade 2

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
B3 Combustible liquid
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-Sep-2010
Revision Date 12-Oct-2015
Print Date 12-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 4.7
Revision Date 12/28/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Nickel

Product Number : 268259
Brand : Aldrich
Index-No. : 028-002-00-7

CAS-No. : 7440-02-0

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)
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), H372
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)
H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer.
H372 Causes damage to organs 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.
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.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: 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

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Ni
Molecular weight	:	58.69 g/mol
CAS-No.	:	7440-02-0
EC-No.	:	231-111-4
Index-No.	:	028-002-00-7

Hazardous components

Component	Classification	Concentration
Nickel		
	Skin Sens. 1; Carc. 2; STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; 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
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
Nickel/nickel 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
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.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.
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
Nickel	7440-02-0	TWA	1.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Dermatitis Pneumoconiosis Not suspected as a human carcinogen		
		TWA	1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

		TWA	1.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		TWA	1.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Dermatitis Pneumoconiosis Not suspected as a human carcinogen		
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015 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.

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: Foil Colour: white, silver, metallic
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,453 °C (2,647 °F) - lit.
f)	Initial boiling point and boiling range	2,732 °C (4,950 °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	1 hPa (1 mmHg) at 1,810 °C (3,290 °F)
l)	Vapour density	No data available
m)	Relative density	8.9 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
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
acids, Oxidizing agents, Sulphur compounds, Hydrogen gas, Oxygen, Methanol, organic solvents, Aluminium, Fluorine, Ammonia

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
May cause sensitisation by skin contact.

Germ cell mutagenicity
No data available

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
	1 - Group 1: Carcinogenic to humans (Nickel)
	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
IARC:	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
	1 - Group 1: Carcinogenic to humans (Nickel)
	2B - Group 2B: Possibly carcinogenic to humans (Nickel)
NTP:	Reasonably anticipated to be a human carcinogen (Nickel)
	Reasonably anticipated to be a human carcinogen (Nickel)
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.

Aspiration hazard
No data available

Additional Information
RTECS: QR5950000

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 1.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1 mg/l - 48 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
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)
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
Nickel	7440-02-0	2007-07-01

SARA 311/312 Hazards
Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Nickel	7440-02-0	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
Nickel	7440-02-0	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
H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H402	Harmful to aquatic life.
H412	Harmful 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: 4.7 Revision Date: 12/28/2015 Print Date: 05/01/2016

SAFETY DATA SHEET

Section 1. Identification

CHS Inc.
P.O. Box 64089
Mail station 525
St. Paul, MN 55164-0089

Transportation Emergency (CHEMTREC) : **1-800-424-9300**
Technical Information : **1-651-355-8443**
SDS Information : **1-651-355-8445**

Product name	:	Regular, Midgrade & Premium Unleaded Gasoline	**SDS no.**	:	0147- M6A0
Common name	:	Unleaded Gasoline, Premium Unleaded Gasoline	**Revision date**	:	11/15/2013
Chemical name	:	Light Petroleum Distillate	**Chemical formula**	:	Mixture
Chemical family	:	Mixed Petroleum Hydrocarbon			

Relevant identified uses of the substance or mixture and uses advised against

Not available.

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 1
SKIN CORROSION/IRRITATION - Category 2
GERM CELL MUTAGENICITY - Category 1B
CARCINOGENICITY - Category 1A
TOXIC TO REPRODUCTION (Fertility) - Category 2
TOXIC TO REPRODUCTION (Unborn child) - Category 2
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1
ASPIRATION HAZARD - Category 1
AQUATIC HAZARD (ACUTE) - Category 3
AQUATIC HAZARD (LONG-TERM) - Category 3

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements :
Extremely flammable liquid and vapor.
Causes skin irritation.
May cause genetic defects.
May cause cancer.
Suspected of damaging fertility or the unborn child.
May be fatal if swallowed and enters airways.
May cause drowsiness and dizziness.
Causes damage to organs through prolonged or repeated exposure.
Harmful to aquatic life with long lasting effects.

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.

Hazardous Material Information System (U.S.A.)	**Health :**	2 *	**Flammability :**	4	**Physical hazards :**	0
National Fire Protection Association (U.S.A.)	**Health :**	2	**Flammability :**	4	**Instability :**	0

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Chemical name : Light Petroleum Distillate

Other means of identification : Unleaded Gasoline, Premium Unleaded Gasoline

Ingredient name	%	CAS number
Toluene	10 - 30	108-88-3
Xylene	10 - 30	1330-20-7
Tert-butyl methyl ether	10 - 30	1634-04-4
Benzene	1 - 5	71-43-2
1,2,4-Trimethylbenzene	1 - 5	95-63-6
Ethylbenzene	1 - 5	100-41-4
n-Hexane	1 - 5	110-54-3
Butyl ethyl ether	0.1 - 1	628-81-9
Naphthalene	0.1 - 1	91-20-3

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 : If material comes in contact with the eyes, immediately wash the eyes with large amounts of water for 15 minutes, occasionally lifting the lower and upper lids. Get medical attention.

Inhalation : If person breathes in large amounts of material, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the person warm and at rest. Get medical attention as soon as possible.

Skin contact : If the material comes in contact with the skin, wash the contaminated skin with soap and water promptly. If the material penetrates through clothing, remove the clothing and wash the skin with soap and water promptly. If irritation persists after washing, get medical attention immediately.

Ingestion : If material has been swallowed, do not induce vomiting. Get medical attention immediately.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.

Skin contact : Causes skin irritation.

Ingestion : Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways. Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following: pain or irritation, watering, redness.

Inhalation : Adverse symptoms may include the following: respiratory tract irritation, coughing.

Skin contact : Adverse symptoms may include the following: irritation, redness.

Ingestion : No known significant effects or critical hazards.

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)

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 or water-based fire extinguishers.

Specific hazards arising from the chemical : Highly volatile material. Flowing gasoline can be ignited by self-generated static electricity; containers should be bonded and grounded. Vapors may travel along the ground to a source of ignition (pilot light, heater, electric motor) some distance away. Containers, drums (even empty) can explode when heat (welding, cutting, etc.) is applied.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Water may be ineffective on flames, but should be used to keep fire-exposed containers cool. Large fires, such as tank fires, should be fought with caution. If possible, pump the contents from the tank and keep adjoining structures cool and protect personnel. Avoid spreading burning liquid with water used for cooling purposes. Do not flush down public sewers. The use of a self-contained breathing apparatus and protective clothing is recommended for fire fighters. Avoid inhalation of vapors.

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 : Keep unnecessary and unprotected personnel from entering. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

Methods and materials for containment and cleaning up

Spill : Contain with dikes or absorbent to prevent migration to sewers/streams. Take up small spill with dry chemical absorbent; large spills may require pump or vacuum prior to absorbent. May require excavation of severely contaminated soil.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). 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.

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.

Conditions for safe storage, including any incompatibilities : Do not store above the following temperature: 113°C (235.4°F). Odorous and toxic fumes may form from the decomposition of this product if stored at excessive temperatures for extended periods of time. Store in accordance with local regulations. Store in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Toluene	**NIOSH REL (United States, 6/2009).** STEL: 560 mg/m³ 15 minutes. STEL: 150 ppm 15 minutes. TWA: 375 mg/m³ 10 hours. TWA: 100 ppm 10 hours. **OSHA PEL Z2 (United States, 11/2006).** AMP: 500 ppm 10 minutes. CEIL: 300 ppm TWA: 200 ppm 8 hours. **ACGIH TLV (United States, 3/2012).** TWA: 20 ppm 8 hours.
Xylene	**ACGIH TLV (United States, 3/2012).** STEL: 651 mg/m³ 15 minutes. STEL: 150 ppm 15 minutes. TWA: 434 mg/m³ 8 hours. TWA: 100 ppm 8 hours. **OSHA PEL (United States, 6/2010).** TWA: 100 ppm 8 hours.

	TWA: 435 mg/m³ 8 hours.
Tert-butyl methyl ether	**ACGIH TLV (United States, 1/2005).** TWA: 50 ppm 8 hours. Form: All forms. **ACGIH TLV (United States, 2/2010).** TWA: 50 ppm 8 hours.
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, 6/2009).** 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 Z2 (United States, 11/2006).** AMP: 50 ppm 10 minutes. CEIL: 25 ppm TWA: 10 ppm 8 hours.
1,2,4-Trimethylbenzene	**ACGIH TLV (United States, 3/2012).** TWA: 123 mg/m³ 8 hours. TWA: 25 ppm 8 hours. **NIOSH REL (United States, 1/2013).** TWA: 125 mg/m³ 10 hours. TWA: 25 ppm 10 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 25 ppm 8 hours. TWA: 125 mg/m³ 8 hours.
Ethylbenzene	**ACGIH TLV (United States, 3/2012).** TWA: 20 ppm 8 hours. **NIOSH REL (United States, 6/2009).** STEL: 545 mg/m³ 15 minutes. STEL: 125 ppm 15 minutes. TWA: 435 mg/m³ 10 hours. TWA: 100 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 435 mg/m³ 8 hours. TWA: 100 ppm 8 hours.
n-Hexane	**ACGIH TLV (United States, 3/2012). Absorbed through skin.** TWA: 50 ppm 8 hours. **NIOSH REL (United States, 6/2009).** TWA: 180 mg/m³ 10 hours. TWA: 50 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 1800 mg/m³ 8 hours. TWA: 500 ppm 8 hours.
Naphthalene	**ACGIH TLV (United States, 3/2012). Absorbed through skin.** STEL: 79 mg/m³ 15 minutes. STEL: 15 ppm 15 minutes. TWA: 52 mg/m³ 8 hours. TWA: 10 ppm 8 hours. **NIOSH REL (United States, 1/2013).** STEL: 75 mg/m³ 15 minutes. STEL: 15 ppm 15 minutes. TWA: 50 mg/m³ 10 hours. TWA: 10 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 50 mg/m³ 8 hours. TWA: 10 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

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. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Recommended: Splash goggles and a face shield, where splash hazard exists.

Skin protection

Hand protection : 4 - 8 hours (breakthrough time): Nitrile gloves.

Body protection : Recommended: Long sleeved coveralls.

Other skin protection : Recommended: Impervious boots.

Respiratory protection : If ventilation is inadequate, use a NIOSH-certified respirator with an organic vapor cartridge and P95 particulate filter.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Reddish golden brown.

Odor : Gasoline

Odor threshold : 10 ppm

pH : Not available.

Melting point : Not available.

Boiling point : 26.66°C (80°F)

Flash point : Closed cup: -40°C (-40°F) [Pensky-Martens.]

Flammability : Not available.

Lower and upper explosive (flammable) limits : Lower: 1.4%
Upper: 7.6%

Relative density : 0.72

Evaporation rate : Slower.

Solubility : Insoluble in the following materials: cold water and hot water.

Solubility in water : Negligible.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : 257.22 to 454.44°C (495 to 850°F)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not available.

Vapor pressure : 53.3 kPa (400 mm Hg) (68°F)

Vapor density : 4 [Air = 1]

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.

Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis.

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

Product/ingredient name	Result	Species	Dose	Exposure
Toluene	LC50 Inhalation Vapor	Rat	49 g/m³	4 hours
	LD50 Oral	Rat	636 mg/kg	-
Xylene	LC50 Inhalation Gas.	Rat	5000 ppm	4 hours
	LD50 Oral	Rat	4300 mg/kg	-
Tert-butyl methyl ether	LC50 Inhalation Gas.	Rat	23576 ppm	4 hours
	LC50 Inhalation Vapor	Rat	41000 mg/m³	4 hours
	LD50 Oral	Rat	>4 g/kg	-
Benzene	LD50 Oral	Rat	930 mg/kg	-
1,2,4-Trimethylbenzene	LC50 Inhalation Vapor	Rat	18000 mg/m³	4 hours
	LD50 Oral	Rat	5 g/kg	-
Ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-
n-Hexane	LC50 Inhalation Gas.	Rat	48000 ppm	4 hours
	LD50 Oral	Rat	15840 mg/kg	-
Butyl ethyl ether	LD50 Oral	Rat	1870 mg/kg	-
Naphthalene	LD50 Dermal	Rabbit	>20 g/kg	-
	LD50 Oral	Rat	490 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Toluene	Eyes - Mild irritant	Rabbit	-	0.5 minutes 100 mg	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 mg	-
	Eyes - Mild irritant	Rabbit	-	870 µg	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 mg	-
	Skin - Mild irritant	Pig	-	24 hours 250 µL	-
	Skin - Mild irritant	Rabbit	-	435 mg	-
	Skin - Moderate irritant	Rabbit	-	500 mg	-
Xylene	Eyes - Mild irritant	Rabbit	-	87 mg	-
	Eyes - Severe irritant	Rabbit	-	24 hours 5 mg	-
	Skin - Mild irritant	Rat	-	8 hours 60 µL	-
	Skin - Moderate irritant	Rabbit	-	24 hours 500 mg	-
	Skin - Moderate irritant	Rabbit	-	100%	-
Benzene	Eyes - Moderate irritant	Rabbit	-	88 mg	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 mg	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 mg	-
	Skin - Mild irritant	Rat	-	8 hours 60 µL	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 mg	-
Ethylbenzene	Eyes - Severe irritant	Rabbit	-	500 mg	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 mg	-
n-Hexane	Eyes - Mild irritant	Rabbit	-	10 mg	-
Naphthalene	Skin - Mild irritant	Rabbit	-	495 mg	-
	Skin - Severe irritant	Rabbit	-	24 hours 0.05 mL	-

Sensitization

Skin : There is no data available.

Respiratory : There is no data available.

Mutagenicity

There is no data available.

Carcinogenicity

There is no data available.

Classification

Product/ingredient name	OSHA	IARC	NTP
Toluene	-	3	-
Xylene	-	3	-
Tert-butyl methyl ether	-	3	-
Benzene	+	1	Known to be a human carcinogen.
Ethylbenzene	-	2B	-
Naphthalene	-	2B	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

There is no data available.

Teratogenicity

There is no data available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Toluene	Category 3	Not applicable.	Narcotic effects
1,2,4-Trimethylbenzene	Category 3	Not applicable.	Respiratory tract irritation
n-Hexane	Category 3	Not applicable.	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Toluene	Category 2	Not determined	Not determined
Benzene	Category 1	Not determined	Not determined
n-Hexane	Category 2	Not determined	Not determined

Aspiration hazard

Name	Result
Toluene	ASPIRATION HAZARD - Category 1
Benzene	ASPIRATION HAZARD - Category 1
n-Hexane	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Dermal contact. Eye contact. Inhalation. Ingestion.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Toluene	Acute EC50 433 ppm Marine water	Algae - Skeletonema costatum	96 hours
	Acute EC50 12500 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 11600 µg/l Fresh water	Crustaceans - Gammarus pseudolimnaeus - Adult	48 hours
	Acute EC50 6000 µg/l Fresh water	Daphnia - Daphnia magna - Juvenile (Fledgling, Hatchling, Weanling)	48 hours
	Acute LC50 5500 µg/l Fresh water	Fish - Oncorhynchus kisutch - Fry	96 hours
	Chronic NOEC 500000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Daphnia - Daphnia magna	21 days
Xylene	Acute IC50 10 mg/L	Algae	72 hours
	Acute LC50 8500 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 13400 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Tert-butyl methyl ether	Acute LC50 672000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
Benzene	Acute EC50 29000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 1360000 µg/l Fresh water	Algae - Scenedesmus abundans	96 hours
	Acute EC50 9230 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 21000 µg/l Marine water	Crustaceans - Artemia salina - Nauplii	48 hours
	Acute LC50 5.28 ul/L Fresh water	Fish - Oncorhynchus gorbuscha - Fry	96 hours
	Chronic NOEC 1.5 to 5.4 ul/L Marine water	Fish - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling)	4 weeks
1,2,4-Trimethylbenzene	Acute LC50 4910 µg/l Marine water	Crustaceans - Elasmopus pectenicrus - Adult	48 hours
	Acute LC50 22.4 mg/L Fresh water	Fish - Tilapia zillii	96 hours
Ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 2970 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 5200 µg/l Marine water	Crustaceans - Americamysis bahia	48 hours
	Acute LC50 4200 µg/l Fresh water	Fish - Oncorhynchus mykiss	96 hours
	Chronic NOEC 1000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
n-Hexane	Acute LC50 113000 µg/l Fresh water	Fish - Oreochromis mossambicus	96 hours
Naphthalene	Acute EC50 1600 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 2350 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 213 µg/l Fresh water	Fish - Melanotaenia fluviatilis - Larvae	96 hours

Persistence and degradability

There is no data available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Toluene	2.73	90	low
Xylene	3.12	8.1 to 25.9	low
Tert-butyl methyl ether	1.04	1.5	low
Benzene	2.13	11	low
1,2,4-Trimethylbenzene	3.63	243	low
Ethylbenzene	3.6	-	low
n-Hexane	4	501.187	high
Butyl ethyl ether	2.03	-	low
Naphthalene	3.4	36.5 to 168	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : There is no data available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Section 14. Transport information

DOT IDENTIFICATION NUMBER UN1203 **DOT proper shipping name** GASOLINE (Toluene, Xylene) RQ (Benzene, Xylene)

DOT Hazard Class(es) 3 **PG** I **DOT EMER. RESPONSE GUIDE NO.** 128

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) PAIR**: Naphthalene
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): All components are listed or exempted.
Clean Water Act (CWA) 307: Toluene; Benzene; Ethylbenzene; Naphthalene
Clean Water Act (CWA) 311: Toluene; Xylene; Benzene; Ethylbenzene; Naphthalene

Clean Air Act Section 602 Class I Substances : Not listed
Clean Air Act Section 602 Class II Substances : Not listed
Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) : Listed

DEA List I Chemicals (Precursor Chemicals) : Not listed
DEA List II Chemicals (Essential Chemicals) : 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

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Toluene	10 - 30	Yes.	No.	No.	Yes.	Yes.
Xylene	10 - 30	Yes.	No.	No.	Yes.	No.
Tert-butyl methyl ether	10 - 30	Yes.	No.	No.	Yes.	No.
Benzene	1 - 5	Yes.	No.	No.	Yes.	Yes.
1,2,4-Trimethylbenzene	1 - 5	Yes.	No.	No.	Yes.	No.
Ethylbenzene	1 - 5	Yes.	No.	No.	Yes.	Yes.
n-Hexane	1 - 5	Yes.	No.	No.	Yes.	Yes.
Butyl ethyl ether	0.1 - 1	Yes.	No.	No.	Yes.	No.
Naphthalene	0.1 - 1	No.	No.	No.	Yes.	Yes.

SARA 313 : This product (does/not) contain toxic chemicals subject to the reporting requirements of SARA Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372.

Product name	CAS number	%
Toluene	108-88-3	Up to 18.1
Xylene	1330-20-7	Up to 15.3
Benzene	71-43-2	Up to 5.3
1,2,4-Trimethylbenzene	95-63-6	Up to 4.8
Ethylbenzene	100-41-4	Up to 2.6
n-Hexane	110-54-3	Up to 4
Naphthalene	91-20-3	Up to 1

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 : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; 1,2,4-Trimethylbenzene; Ethylbenzene; n-Hexane; Butyl ethyl ether

New York : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; Ethylbenzene; n-Hexane; Naphthalene

New Jersey : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; 1,2,4-Trimethylbenzene; Ethylbenzene; n-Hexane; Butyl ethyl ether; Naphthalene

Pennsylvania : The following components are listed: Toluene; Xylene; Tert-butyl methyl ether; Benzene; 1,2,4-Trimethylbenzene; Ethylbenzene; n-Hexane; Butyl ethyl ether; Naphthalene

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
Toluene	No.	Yes.	No.	7000 µg/day (ingestion) 13000 µg/day (inhalation)
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
Ethylbenzene	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.
Naphthalene	Yes.	No.	Yes.	No.

Section 16. Other information

Revision date : 11/15/2013 **Supersedes** : 01/23/2013

Revised Section(s) : 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16. **Prepared by** : KMK Regulatory Services Inc.

Notice to reader
THE INFORMATION CONTAINED IN THIS SDS RELATES ONLY TO THE SPECIFIC MATERIAL IDENTIFIED. IT DOES NOT COVER USE OF THAT MATERIAL IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY PARTICULAR PROCESS. IN COMPLIANCE WITH 29 C.F.R. 1910.1200(g), CHS HAS PREPARED THIS SDS IN SEGMENTS, WITH THE INTENT THAT THOSE SEGMENTS BE READ TOGETHER AS A WHOLE WITHOUT TEXTUAL OMISSIONS OR ALTERATIONS. CHS BELIEVES THE INFORMATION CONTAINED HEREIN TO BE ACCURATE, BUT MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY, EXPRESS OR IMPLIED, ABOUT THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THE INFORMATION OR ABOUT THE FITNESS OF CONTENTS HEREIN FOR EITHER GENERAL OR PARTICULAR PURPOSES. PERSONS REVIEWING THIS SDS SHOULD MAKE THEIR OWN DETERMINATION AS TO THE MATERIAL'S SUITABILITY AND COMPLETENESS FOR USE IN THEIR PARTICULAR APPLICATIONS.





SAFETY DATA SHEET

SILVER

Section 1. Identification

GHS product identifier	:	SILVER
Chemical name	:	Mixture
CAS number	:	Mixture
Other means of identification	:	CC01054908
Product type	:	liquid

Relevant identified uses of the substance or mixture and uses advised against

Product use	:	Industrial applications. Plastics.

Supplier's details	:	**POLYONE CORPORATION** ColorMatrix Group Inc. 680 North Rocky River Drive, Berea, Ohio, 44017-1628, USA +1 216 622 0100
Emergency telephone number (with hours of operation)	:	**CHEMTREC 1-800-424-9300 (24hrs for spill, leak, fire, exposure or accident).**

Section 2. Hazards identification

This mixture has not been evaluated as a whole for health effects. Information provided on health effects of this product is based on the individual components. However, some vapors or contaminants may be released upon heating and the end-user (fabricator) must take the necessary precautions (mechanical ventilation, respiratory protection, etc.) to protect employees from exposure. See sections 8 and 11 for special precautions. After handling, always wash hands thoroughly with soap and water.

OSHA/HCS status	:	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	:	SKIN CORROSION/IRRITATION - Category 2

GHS label elements

Hazard pictograms :



Signal word : Warning
Hazard statements : Causes skin irritation.

Precautionary statements

General : Not applicable.
Prevention : Wear protective gloves. Wash hands thoroughly after handling.
Response : IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical attention.
Storage : Not applicable.
Disposal : Not applicable.
Supplemental label elements : None known.
Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture
Chemical name : Mixture
Other means of identification : CC01054908

CAS number/other identifiers

Ingredient name	%	CAS number
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	Not available.
Titanium dioxide	10 - 30	13463-67-7

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.
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. 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 adverse health effects persist or are severe. 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.
Ingestion	:	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. 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	:	In case of fire, use water spray (fog), foam, dry chemical or CO_2.
Unsuitable extinguishing media	:	None known.
Specific hazards arising from the chemical	:	In a fire or if heated, a pressure increase will occur and the container may burst.
Hazardous thermal decomposition products	:	Decomposition products may include the following materials: carbon dioxide carbon monoxide metal oxide/oxides
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.
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. 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. 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. 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.

Section 7. Handling and storage

Precautions for safe handling

Protective measures	:	Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. 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 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 unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Titanium dioxide	**OSHA PEL 1989 (1989-03-01)** PEL: Permissible Exposure Level 10 mg/m3 Form: Total dust **OSHA PEL (1993-06-30)** PEL: Permissible Exposure Level 15 mg/m3 Form: Total dust **ACGIH TLV (1996-05-18)** TLV-TWA: Threshold Limit Value - Time weighted average PEL: Permissible Exposure Level 10 mg/m3

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: 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.

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 [liquid]
Color : SILVER
Odor : Faint odor.
Odor threshold : Not available.
pH : Not available.
Melting point : Not available.
Boiling point : Not available.
Flash point : Not available.
Burning time : Not available.

Burning rate	:	Not available.
Evaporation rate	:	Not available.
Flammability (solid, gas)	:	Not available.
Lower and upper explosive (flammable) limits	:	**Lower:** Not available. **Upper:** Not available.
Vapor pressure	:	Not available.
Vapor density	:	Not available.
Relative density	:	Not available.
Solubility	:	Not available.
Solubility in water	:	insoluble in water.
Partition coefficient: n-octanol/water	:	Not available.
Auto-ignition temperature	:	Not available.
Decomposition temperature	:	Not available.
SADT	:	Not available.
Viscosity	:	**Dynamic:** Not available. **Kinematic:** Not available.

Section 10. Stability and reactivity

Reactivity	:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	:	Stable under recommended storage and handling conditions (see Section 7).
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Keep away from extreme heat and oxidizing agents.
Incompatible materials	:	Keep away from strong acids. Oxidizer.
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

This mixture has not been evaluated as a whole for health effects. Exposure effects listed are based on existing health data for the individual components which comprise the mixture.

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Titanium dioxide				

	LC50 Inhalation	Rat - Male	6.82 Mg/l	4 h
	LD50 Dermal	Rabbit	> 5,000 mg/kg	-

Conclusion/Summary : Mixture.Not fully tested.

Irritation/Corrosion

Conclusion/Summary
Skin : Mixture.Not fully tested.
Eyes : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Sensitization

Conclusion/Summary
Skin : Mixture.Not fully tested.
Respiratory : Mixture.Not fully tested.

Mutagenicity

Conclusion/Summary : Mixture.Not fully tested.

Carcinogenicity

Conclusion/Summary : Mixture.Not fully tested.

Classification

Product/ingredient name	OSHA	IARC	NTP
Titanium dioxide		2B	

Reproductive toxicity

Conclusion/Summary : Mixture.Not fully tested.

Teratogenicity

Conclusion/Summary : Mixture.Not fully tested.

Specific target organ toxicity (single exposure)
Not available.

Specific target organ toxicity (repeated exposure)
Not available.

Aspiration hazard

Product/ingredient name	Result

Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	ASPIRATION HAZARD - Category 1

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.
Skin contact : Causes skin irritation.
Ingestion : 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

Conclusion/Summary : Mixture.Not fully tested.

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

Route	ATE value
Inhalation (dusts and mists)	8.073 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Titanium dioxide			
	Acute LC50 > 1,000,000 µg/l Marine water	Fish - Mummichog	96 h
	Acute LC50 > 1,000 mg/l Fresh water	Fish - Fathead minnow	96 h
	Acute LC50 13 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute LC50 6.5 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 19.3 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 27.8 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h
	Acute EC50 35.306 mg/l Fresh water	Aquatic invertebrates. Water flea	48 h

Conclusion/Summary : Not available.

Persistence and degradability

Conclusion/Summary : Not available.

Bioaccumulative potential

Product/ingredient name	LogPow	BCF	Potential
Titanium dioxide		352.00	low

Mobility in soil

Soil/water partition coefficient (KOC)	:	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. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Acute hazardous waste "P" List: Not listed

United States - RCRA Toxic hazardous waste "U" List: Not listed

Section 14. Transport information

U.S. DOT Classification	:	Not regulated for transportation.
ICAO/IATA	:	Not classified as dangerous good under transport regulations.
IMO/IMDG (maritime)	:	Not classified as dangerous good under transport regulations.

Section 15. Regulatory information

U.S. Federal regulations : **United States - TSCA 12(b) - Chemical export notification:** None of the components are listed.
United States - TSCA 4(a) - Final Test Rules: Not listed
United States - TSCA 4(a) - ITC Priority list: Not listed
United States - TSCA 4(a) - Proposed test rules: Not listed

United States - TSCA 4(f) - Priority risk review: Not listed
United States - TSCA 5(a)2 - Final significant new use rules: Not listed
United States - TSCA 5(a)2 - Proposed significant new use rules: Not listed
United States - TSCA 5(e) - Substances consent order: Not listed
United States - TSCA 6 - Final risk management: Not listed
United States - TSCA 6 - Proposed risk management: Not listed
United States - TSCA 8(a) - Chemical risk rules: Not listed
United States - TSCA 8(a) - Dioxin/Furane precusor: Not listed
United States - TSCA 8(a) - Chemical Data Reporting (CDR): Not determined
United States - TSCA 8(a) - Preliminary assessment report (PAIR): Not listed
United States - TSCA 8(c) - Significant adverse reaction (SAR): Not listed
United States - TSCA 8(d) - Health and safety studies: Not listed
United States - EPA Clean water act (CWA) section 307 - Priority pollutants: Listed **Chromium (III) oxide**

United States - EPA Clean water act (CWA) section 311 - Hazardous substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Flammable substances: Not listed
United States - EPA Clean air act (CAA) section 112 - Accidental release prevention - Toxic substances: Not listed
United States - Department of commerce - Precursor chemical: Not listed

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

US. EPA CERCLA Hazardous Substances (40 CFR 302)

not applicable

SARA 311/312

Classification : Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Classification
Miscellaneous Compounds Distillates, petroleum, hydrotreated middle	10 - 30	AH
Titanium dioxide	10 - 30	CH

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Aluminum	7429-90-5	1 - 5
Supplier notification	Aluminum	7429-90-5	1 - 5

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 : The following components are listed:
Mica
Titanium dioxide
Aluminum

New York : None of the components are listed.

New Jersey : The following components are listed:
Mica
Titanium dioxide
Aluminum

Pennsylvania : The following components are listed:
Titanium dioxide
Aluminum

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

United States inventory (TSCA 8b) : All components are listed or exempted.

Canada inventory : All components are listed or exempted.

International regulations

International lists	:	**Australia inventory (AICS):** Not determined. **Taiwan inventory (CSNN):** Not determined. **Malaysia Inventory (EHS Register):** Not determined. **EINECS:** All components are listed or exempted. **Japan inventory:** Not determined. **China inventory (IECSC):** All components are listed or exempted. **Korea inventory:** All components are listed or exempted. **New Zealand Inventory of Chemicals (NZIoC):** Not determined. **Philippines inventory (PICCS):** All components are listed or exempted.
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

Section 16. Other information

History

Date of printing	:	06/04/2015
Date of issue/Date of revision	:	06/03/2015
Date of previous issue	:	11/20/2014
Version	:	1.1
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 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. Particularly this information may not be valid for such material used in conjunction with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

1. Identification

Product identifier: Trichloroethylene

Other means of identification
Product No.: 9464, 8600, 9458, 9454

Recommended use and restriction on use

Recommended use: Not available.
Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor Information

Manufacturer

Company Name:	Avantor Performance Materials, Inc.
Address:	3477 Corporate Parkway, Suite 200 Center Valley, PA 18034
Telephone:	
	Customer Service: 855-282-6867
Fax:	
Contact Person:	Environmental Health & Safety
e-mail:	info@avantormaterials.com

Emergency telephone number:
24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard Classification

Health Hazards

Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2A
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1B
Specific Target Organ Toxicity - Single Exposure	Category 3

Environmental Hazards

Chronic hazards to the aquatic environment	Category 3

Label Elements

Hazard Symbol:



Signal Word: Danger

Hazard Statement: May cause cancer.
Suspected of causing genetic defects.
Causes serious eye irritation.
Causes skin irritation.
Harmful to aquatic life with long lasting effects.

Precautionary Statement

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. Wash hands thoroughly after handling. Avoid breathing dust/fume/gas/mist/vapors/spray. Avoid release to the environment.

Response: 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 ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash before reuse. Call a POISON CENTER or doctor/physician if you feel unwell. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Storage: Store locked up. Store in a well-ventilated place. Keep container tightly closed.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Substances

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
TRICHLOROETHYLENE		79-01-6	99 - 100%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Rinse mouth. Get medical attention if symptoms occur. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation: Move to fresh air. Get medical attention if symptoms persist. If breathing stops, provide artificial respiration.

Skin Contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if irritation persists after washing. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention if irritation persists after washing.

Most important symptoms/effects, acute and delayed

Symptoms: Irritating to eyes, respiratory system and skin.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General Fire Hazards: In case of fire and/or explosion do not breathe fumes.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media: Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical: Contact with metals may evolve flammable hydrogen gas. Fire may produce irritating, corrosive and/or toxic gases.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Keep unauthorized personnel away. Use personal protective equipment. See Section 8 of the MSDS for Personal Protective Equipment. Ventilate closed spaces before entering them. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Methods and material for containment and cleaning up: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.

Notification Procedures: Dike for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk. Inform authorities if large amounts are involved.

Environmental Precautions: Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling: Use personal protective equipment as required. Do not breathe mist or vapor. Do not taste or swallow. Do not eat, drink or smoke when using the product. Use only with adequate ventilation. Wash hands thoroughly after handling. See Section 8 of the MSDS for Personal Protective Equipment. Avoid contact with eyes. Avoid contact with skin. 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. Avoid breathing dust/fume/gas/mist/vapors/spray. Wash contaminated clothing before reuse.

Conditions for safe storage, including any incompatibilities: Store locked up. Keep in a cool, well-ventilated place. Store in a dry place.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

Chemical Identity	Type	Exposure Limit Values	Source
TRICHLOROETHYLENE	TWA	10 ppm	US. ACGIH Threshold Limit Values (2011)
	STEL	25 ppm	US. ACGIH Threshold Limit Values (2011)
	REL	25 ppm	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	TWA	50 ppm 270 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	STEL	200 ppm 1,080 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	TWA	100 ppm	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	Ceiling	200 ppm	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	MAX. CONC	300 ppm	US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	AN ESL	54 µg/m3	US. Texas. Effects Screening Levels (Texas Commission on Environmental Quality) (12 2010)

Biological Limit Values

Chemical Identity	Exposure Limit Values	Source
TRICHLOROETHYLENE (Trichloroacetic acid: Sampling time: End of shift at end of work week.)	15 mg/l (Urine)	ACGIH BEL (03 2013)
TRICHLOROETHYLENE (Trichloroethanol, without hydrolysis: Sampling time: End of shift at end of work week.)	0.5 mg/l (Blood)	ACGIH BEL (03 2013)

Appropriate Engineering Controls No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area.

Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin Protection

Hand Protection: Chemical resistant gloves

Other: Wear suitable protective clothing.

Respiratory Protection: In case of inadequate ventilation use suitable respirator.

Hygiene measures: Provide eyewash station and safety shower. Observe good industrial hygiene practices. Wash hands before breaks and immediately after handling the product. Do not eat, drink or smoke when using the product. Wash contaminated clothing before reuse.

9. Physical and chemical properties

Appearance

Physical state:	Liquid
Form:	Liquid
Color:	Colorless
Odor:	Ether-like odor
Odor threshold:	No data available.
pH:	No data available.
Melting point/freezing point:	-84.7 °C
Initial boiling point and boiling range:	87.2 °C
Flash Point:	Not applicable
Evaporation rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	10.5 %(V) 90 %(V)
Flammability limit - lower (%):	8 %(V) 12.5 %(V)
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	9.2 kPa (25 °C)
Vapor density:	4.53 AIR=1
Relative density:	1.47 (20 °C)
Solubility(ies)	
Solubility in water:	1 g/l (20 °C)
Solubility (other):	acetone: Soluble ethanol: Soluble
Partition coefficient (n-octanol/water):	2.61
Auto-ignition temperature:	420 °C
Decomposition temperature:	No data available.
Viscosity:	No data available.

Other information

Molecular weight:	131.39 g/mol (C_2HCl_3)

10. Stability and reactivity

Reactivity: No dangerous reaction known under conditions of normal use.

Chemical Stability:	Material is stable under normal conditions.
Possibility of Hazardous Reactions:	Hazardous polymerization does not occur.
Conditions to Avoid:	Heat, sparks, flames. Light. Moisture. Contact with incompatible materials.
Incompatible Materials:	Strong oxidizing agents. Alkalies. Caustics. Chemically active metals.
Hazardous Decomposition Products:	By heating and fire, toxic vapors/gases may be formed. Oxides of Carbon. Phosgene.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	May be harmful if swallowed.
Inhalation:	May be harmful if inhaled.
Skin Contact:	Causes skin irritation.
Eye contact:	Causes serious eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: LD 50 (Rat): 4,920 mg/kg

Dermal
Product: No data available.

Inhalation
Product: LC 50 (Rat, 4 h): 12000 ppm

Repeated Dose Toxicity
Product: No data available.

Skin Corrosion/Irritation
Product: Causes skin irritation.

Serious Eye Damage/Eye Irritation
Product: Causes serious eye irritation.

Respiratory or Skin Sensitization
Product: Not a skin sensitizer.

Carcinogenicity
Product: May cause cancer.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

TRICHLOROETHYLENE	Overall evaluation: 1. Carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens:

TRICHLOROETHYLENE	Reasonably Anticipated to be a Human Carcinogen.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ Cell Mutagenicity

In vitro
Product: Suspected of causing genetic defects.

In vivo
Product: Suspected of causing genetic defects.

Reproductive Toxicity
Product: No components toxic to reproduction

Specific Target Organ Toxicity - Single Exposure
Product: May cause respiratory irritation. May cause drowsiness or dizziness.

Specific Target Organ Toxicity - Repeated Exposure
Product: No data available.

Aspiration Hazard
Product: Not classified

Other Effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Specified substance(s):
TRICHLOROETHYLENE — LC 50 (Fathead minnow (Pimephales promelas), 96 h): 31.4 - 71.8 mg/l Mortality
LC 50 (Bluegill (Lepomis macrochirus), 96 h): 39 - 54 mg/l Mortality
EC 50 (Fathead minnow (Pimephales promelas), 96 h): 18.4 - 28.5 mg/l Intoxication

Aquatic Invertebrates
Product: No data available.

Specified substance(s):
TRICHLOROETHYLENE — LC 50 (Water flea (Daphnia magna), 48 h): 12 - 26 mg/l Mortality

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and Degradability

Biodegradation
Product: There are no data on the degradability of this product.

BOD/COD Ratio
Product: No data available.

Bioaccumulative Potential
Bioconcentration Factor (BCF)
Product: No data available on bioaccumulation.

Partition Coefficient n-octanol / water (log Kow)
Product: Log Kow: 2.61

Mobility in Soil: The product is water soluble and may spread in water systems.

Other Adverse Effects: Harmful to aquatic life with long lasting effects.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws.

Contaminated Packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN Number:	UN 1710
UN Proper Shipping Name:	Trichloroethylene
Transport Hazard Class(es)	
Class(es):	6.1
Label(s):	6.1
Packing Group:	III
Marine Pollutant:	No

IMDG

UN Number:	UN 1710
UN Proper Shipping Name:	TRICHLOROETHYLENE
Transport Hazard Class(es)	
Class(es):	6.1
Label(s):	6.1
EmS No.:	F-A, S-A
Packing Group:	III
Marine Pollutant:	No

IATA

UN Number:	UN 1710
Proper Shipping Name:	Trichloroethylene
Transport Hazard Class(es):	
Class(es):	6.1
Label(s):	6.1
Marine Pollutant:	No
Packing Group:	III

15. Regulatory information

US Federal Regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):
TRICHLOROETHYLENE Reportable quantity: 100 lbs.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

X	Acute (Immediate)	X	Chronic (Delayed)		Fire		Reactive		Pressure Generating

SARA 302 Extremely Hazardous Substance
None present or none present in regulated quantities.

SARA 304 Emergency Release Notification

Chemical Identity	RQ
TRICHLOROETHYLENE	100 lbs.

SARA 311/312 Hazardous Chemical

Chemical Identity	Threshold Planning Quantity
TRICHLOROETHYLENE	500 lbs

SARA 313 (TRI Reporting)

Chemical Identity	Reporting threshold for other users	Reporting threshold for manufacturing and processing
TRICHLOROETHYLENE	10000 lbs	25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)
TRICHLOROETHYLENE Reportable quantity: 100 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
None present or none present in regulated quantities.

US State Regulations

US. California Proposition 65
TRICHLOROETHYLENE Carcinogenic.
TRICHLOROETHYLENE Male reproductive toxin.
TRICHLOROETHYLENE Developmental toxin.

US. New Jersey Worker and Community Right-to-Know Act
TRICHLOROETHYLENE Listed

US. Massachusetts RTK - Substance List
TRICHLOROETHYLENE Listed

US. Pennsylvania RTK - Hazardous Substances
TRICHLOROETHYLENE Listed

US. Rhode Island RTK
TRICHLOROETHYLENE Listed

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EINECS, ELINCS or NLP:	On or in compliance with the inventory
Japan (ENCS) List:	On or in compliance with the inventory
China Inv. Existing Chemical Substances:	Not in compliance with the inventory.
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Japan ISHL Listing:	On or in compliance with the inventory
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16.Other information, including date of preparation or last revision

NFPA Hazard ID



Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue Date:	01-08-2015
Revision Date:	No data available.
Version #:	1.1
Further Information:	No data available.

Disclaimer:

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SAFETY DATA SHEET

Creation Date 10-Dec-2009 **Revision Date** 06-Nov-2015 **Revision Number** 2

1. Identification

Product Name **Tetrachloroethylene**

Cat No. : **AC167890000; AC167890010; AC167890025; AC167890100; AC167891000; AC167895000**

Synonyms Perchloroethylene

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
Skin Sensitization	Category 1
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, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
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
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
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
Take off contaminated clothing and wash before reuse
If skin irritation or rash 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 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
WARNING! This product contains a chemical known in the State of California to cause cancer.

3. Composition / information on ingredients

Component	CAS-No	Weight %
Tetrachloroethylene	127-18-4	>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 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. Obtain medical attention.

Ingestion Do not induce vomiting. Obtain medical attention.

Most important symptoms/effects Breathing difficulties. . May cause allergic skin reaction. Inhalation of high vapor

concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: 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 Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

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. Containers may explode when heated.

Hazardous Combustion Products
Chlorine 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	0	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing.

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. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Use only under a chemical fume hood. Wear personal protective equipment. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from sunlight.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH
Tetrachloroethylene	TWA: 25 ppm STEL: 100 ppm	(Vacated) TWA: 25 ppm (Vacated) TWA: 170 mg/m^3 Ceiling: 200 ppm TWA: 100 ppm	IDLH: 150 ppm

Component	Quebec	Mexico OEL (TWA)	Ontario TWAEV
Tetrachloroethylene	TWA: 25 ppm TWA: 170 mg/m³ STEL: 100 ppm STEL: 685 mg/m³	TWA: 100 ppm TWA: 670 mg/m³ TWA: 200 ppm TWA: 1250 mg/m³ STEL: 200 ppm STEL: 1340 mg/m³	TWA: 25 ppm STEL: 100 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 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	Characteristic, sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-22 °C / -7.6 °F
Boiling Point/Range	120 - 122 °C / 248 - 251.6 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	6.0 (Ether = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	18 mbar @ 20 °C
Vapor Density	No information available
Specific Gravity	1.625
Solubility	0.15 g/L water (20°C)
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 150°C
Viscosity	0.89 mPa s at 20 °C
Molecular Formula	C2 Cl4
Molecular Weight	165.83

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Exposure to moist air or water.

Incompatible Materials Strong acids, Strong oxidizing agents, Strong bases, Metals, Zinc, Amines

Hazardous Decomposition Products Chlorine, 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
Tetrachloroethylene	LD50 = 2629 mg/kg (Rat)	LD50 > 10000 mg/kg (Rat)	LC50 = 27.8 mg/L (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 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
Tetrachloroethylene	127-18-4	Group 2A	Reasonably Anticipated	A3	X	A3

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 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 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: 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
Tetrachloroethylene	Group II Chemical	Not applicable	Not applicable

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
Tetrachloroethylene	EC50: > 500 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 4.73 - 5.27 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: 11.0 - 15.0 mg/L, 96h static (Lepomis macrochirus) LC50: 8.6 - 13.5 mg/L, 96h static (Pimephales promelas) LC50: 12.4 - 14.4 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 100 mg/L 24 h EC50 = 112 mg/L 24 h EC50 = 120.0 mg/L 30 min	EC50: 6.1 - 9.0 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Insoluble 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 volatility.

Component	log Pow
Tetrachloroethylene	2.88

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.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Tetrachloroethylene - 127-18-4	U210	-

14. Transport information

DOT

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No	UN1897
Proper Shipping Name	TETRACHLOROETHYLENE
Hazard Class	6.1
Packing Group	III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Tetrachloroethylene	X	X	-	204-825-9	-		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 %
Tetrachloroethylene	127-18-4	>95	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)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Tetrachloroethylene	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Tetrachloroethylene	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
Tetrachloroethylene	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
Tetrachloroethylene	127-18-4	Carcinogen	14 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Tetrachloroethylene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant Y
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 10-Dec-2009
Revision Date 06-Nov-2015
Print Date 06-Nov-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 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

1. Identification

Product identifier: TOLUENE

Other means of identification
Product No.: 9457, 4483, V560, 8604, 9476, 9466, 9460, 9456, 9364, 9351, 9336, 8608

Recommended use and restriction on use

Recommended use: Not available.
Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company Name:	Avantor Performance Materials, Inc.
Address:	3477 Corporate Parkway, Suite 200 Center Valley, PA 18034
Telephone:	Customer Service: 855-282-6867
Fax:	
Contact Person:	Environmental Health & Safety
e-mail:	info@avantormaterials.com

Emergency telephone number:
24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard classification

Physical hazards

Flammable liquids	Category 2

Health hazards

Acute toxicity (Oral)	Category 4
Acute toxicity (Inhalation - vapor)	Category 4
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2A
Toxic to reproduction	Category 2
Specific target organ toxicity - single exposure	Category 3
Specific target organ toxicity - repeated exposure	Category 2
Aspiration hazard	Category 1

Environmental hazards

Acute hazards to the aquatic environment	Category 2

Label elements

Hazard symbol:



Signal word: Danger

Hazard statement:
Highly flammable liquid and vapor.
Harmful if swallowed or if inhaled.
Causes skin irritation.
Causes serious eye irritation.
Suspected of damaging fertility or the unborn child.
May cause respiratory irritation.
May cause drowsiness or dizziness.
May be fatal if swallowed and enters airways.
May cause damage to organs through prolonged or repeated exposure.
Toxic to aquatic life.

Precautionary statement

Prevention: 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/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. Use only outdoors or in a well-ventilated area. 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 water spray, foam, dry powder or carbon dioxide 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. 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. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do NOT induce vomiting.

Storage: Store locked up. Store in a well-ventilated place. Keep cool. Keep container tightly closed.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: Static accumulating flammable liquid can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite liquid and vapor. May cause flash fire or explosion.

3. Composition/information on ingredients

Substances

Chemical identity	Common name and synonyms	CAS number	Content in percent (%)*
TOLUENE		108-88-3	99 - 100%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Call a physician or poison control center immediately. Do NOT induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation: Move to fresh air. Get medical attention immediately.

Skin contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention.

Most important symptoms/effects, acute and delayed

Symptoms: Harmful if swallowed. May be fatal if swallowed. Harmful if inhaled. Irritating to eyes, respiratory system and skin.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General fire hazards: In case of fire and/or explosion do not breathe fumes.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Water spray, foam, dry powder or carbon dioxide.

Unsuitable extinguishing media: Avoid water in straight hose stream; will scatter and spread fire.

Specific hazards arising from the chemical: Vapors may cause a flash fire or ignite explosively. Vapors may travel considerable distance to a source of ignition and flash back. Prevent buildup of vapors or gases to explosive concentrations.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out. Water may be ineffective in fighting the fire. Fight fire from a protected location. Move containers from fire area if you can do so without risk.

Special protective equipment for fire-fighters:	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep unauthorized personnel away. Keep upwind. Use personal protective equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. See Section 8 of the MSDS for Personal Protective Equipment.
Methods and material for containment and cleaning up:	Eliminate all ignition sources if safe to do so. Take precautionary measures against static discharges. Stop leak if possible without any risk. Use only non-sparking tools. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.
Notification Procedures:	Prevent entry into waterways, sewer, basements or confined areas. Inform authorities if large amounts are involved.
Environmental precautions:	Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.

7. Handling and storage

Precautions for safe handling:	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. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Wear protective gloves/protective clothing/eye protection/face protection. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Wash hands thoroughly after handling.
Conditions for safe storage, including any incompatibilities:	Keep away from food, drink and animal feeding stuffs. Keep container tightly closed in a cool, well-ventilated place. Ground container and transfer equipment to eliminate static electric sparks. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids.

8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Chemical identity	Type	Exposure Limit values		Source
TOLUENE	TWA	20 ppm		US. ACGIH Threshold Limit Values (2011)
	STEL	150 ppm	560 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	REL	100 ppm	375 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	TWA	100 ppm	375 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	STEL	150 ppm	560 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	TWA	200 ppm		US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	Ceiling	300 ppm		US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)
	MAX. CONC	500 ppm		US. OSHA Table Z-2 (29 CFR 1910.1000) (02 2006)

Biological limit values

Chemical identity	Exposure Limit values	Source
TOLUENE (o-Cresol, with hydrolysis: Sampling time: End of shift.)	0.3 mg/g (Creatinine in urine)	ACGIH BEL (2011)
TOLUENE (toluene: Sampling time: Prior to last shift of work week.)	0.02 mg/l (Blood)	ACGIH BEL (2011)
TOLUENE (toluene: Sampling time: End of shift.)	0.03 mg/l (Urine)	ACGIH BEL (2011)

Appropriate engineering controls No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area. Use explosion-proof ventilation equipment.

Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection: Chemical resistant gloves

Other: Wear suitable protective clothing.

Respiratory protection: In case of inadequate ventilation use suitable respirator.

Hygiene measures: Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.

9. Physical and chemical properties

Appearance

Physical state:	Liquid
Form:	Liquid
Color:	Colorless
Odor:	Sweet aromatic odor
Odor threshold:	No data available.
pH:	No data available.
Melting point/freezing point:	-94.9 °C
Initial boiling point and boiling range:	110 °C
Flash Point:	4 °C (Closed Cup)
Evaporation rate:	2.24 (butyl acetate=1)
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	7.1 %(V)
Flammability limit - lower (%):	1.1 %(V)
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	3.8 kPa (25 °C)
Vapor density:	3.1 AIR=1
Relative density:	0.86 (20 °C)
Solubility(ies)	
Solubility in water:	0.7 g/l (23.3 °C)
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	2.73
Auto-ignition temperature:	480 °C
Decomposition temperature:	No data available.
Viscosity:	No data available.

Other information

Molecular weight:	92.14 g/mol (C7H8)

10. Stability and reactivity

Reactivity:	No dangerous reaction known under conditions of normal use.
Chemical stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	Hazardous polymerization does not occur.
Conditions to avoid:	Heat, sparks, flames.
Incompatible materials:	Strong oxidizing agents. Chlorine.
Hazardous decomposition products:	Thermal decomposition may release oxides of carbon.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	Harmful if swallowed.
Inhalation:	Harmful if inhaled. May cause irritation to the mucous membranes and upper respiratory tract.

Skin contact: Causes skin irritation.

Eye contact: Causes serious eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: LD 50 (Rat): 636 mg/kg

Dermal
Product: LD 50 (Rabbit): 12,124 mg/kg

Inhalation
Product: LC 50 (Mouse, 24 h): 400 mg/l
LC 50 (Rat, 4 h): 8,000 mg/l

Repeated dose toxicity
Product: No data available.

Skin corrosion/irritation
Product: Causes skin irritation.

Serious eye damage/eye irritation
Product: Causes serious eye irritation.

Respiratory or skin sensitization
Product: Not a skin sensitizer.

Carcinogenicity
Product: This substance has no evidence of carcinogenic properties.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ cell mutagenicity

In vitro
Product: No mutagenic components identified

In vivo
Product: No mutagenic components identified

Reproductive toxicity
Product: May damage fertility or the unborn child.

Specific target organ toxicity - single exposure
Product: Narcotic effect. Respiratory tract irritation.

Specific target organ toxicity - repeated exposure
Product: Peripheral nervous system Central nervous system. Kidneys. auditory organs

Aspiration hazard
Product: May be fatal if swallowed and enters airways.

Other effects: No data available.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish

Product: No data available.

Specified substance(s):

TOLUENE — LC 50 (Fathead minnow (Pimephales promelas), 96 h): 12.6 mg/l Mortality
LC 50 (Coho salmon,silver salmon (Oncorhynchus kisutch), 96 h): 5.5 mg/l Mortality

Aquatic invertebrates

Product: No data available.

Specified substance(s):

TOLUENE — EC 50 (Brine shrimp (Artemia sp.), 24 h): 22.1 - 54.1 mg/l Intoxication
EC 50 (Water flea (Daphnia magna), 48 h): 5.46 - 9.83 mg/l Intoxication

Chronic hazards to the aquatic environment:

Fish

Product: No data available.

Aquatic invertebrates

Product: No data available.

Toxicity to Aquatic Plants

Product: No data available.

Persistence and degradability

Biodegradation

Product: Expected to be readily biodegradable.

BOD/COD ratio

Product: No data available.

Bioaccumulative potential

Bioconcentration factor (BCF)

Product: Bioaccumulation is unlikely to be significant because of the low water solubility of this product.

Partition coefficient n-octanol / water (log Kow)

Product: Log Kow: 2.73

Mobility in soil: The product is insoluble in water and will spread on the water surface.

Other adverse effects: Toxic to aquatic organisms.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws. Residual vapors may explode on ignition; do not cut, drill, grind, or weld on or near this container.

Contaminated packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number:	UN 1294
UN proper shipping name:	Toluene
Transport hazard class(es)	
Class(es):	3
Label(s):	3
Packing group:	II
Marine Pollutant:	No

IMDG

UN number:	UN 1294
UN proper shipping name:	TOLUENE
Transport hazard class(es)	
Class(es):	3
Label(s):	3
EmS No.:	F-E, S-D
Packing group:	II
Marine Pollutant:	No

IATA

UN number:	UN 1294
Proper Shipping Name:	Toluene
Transport hazard class(es):	
Class(es):	3
Label(s):	3
Marine Pollutant:	No
Packing group:	II

15. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

TOLUENE Reportable quantity: 1000 lbs.

Superfund amendments and reauthorization act of 1986 (SARA)

Hazard categories

[X] Acute (Immediate) [X] Chronic (Delayed) [X] Fire [ ] Reactive [ ] Pressure Generating

SARA 302 Extremely hazardous substance

None present or none present in regulated quantities.

SARA 304 Emergency release notification

Chemical identity	RQ
TOLUENE	1000 lbs.

SARA 311/312 Hazardous chemical

Chemical identity	Threshold Planning Quantity
TOLUENE	500 lbs

SARA 313 (TRI reporting)

Chemical identity	Reporting threshold for other users	Reporting threshold for manufacturing and processing
TOLUENE	10000 lbs	25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

TOLUENE Reportable quantity: 1000 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

None present or none present in regulated quantities.

US state regulations

US. California Proposition 65

TOLUENE Developmental toxin.
TOLUENE Female reproductive toxin.

US. New Jersey Worker and Community Right-to-Know Act

TOLUENE Listed

US. Massachusetts RTK - Substance List

TOLUENE Listed

US. Pennsylvania RTK - Hazardous Substances

TOLUENE Listed

US. Rhode Island RTK

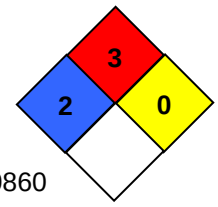
TOLUENE Listed

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EU EINECS List:	On or in compliance with the inventory
EU ELINCS List:	Not in compliance with the inventory.
Japan (ENCS) List:	On or in compliance with the inventory
EU No Longer Polymers List:	Not in compliance with the inventory.
China Inv. Existing Chemical Substances:	On or in compliance with the inventory
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Switzerland Consolidated Inventory:	Not in compliance with the inventory.
Japan ISHL Listing:	On or in compliance with the inventory
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16.Other information, including date of preparation or last revision

NFPA Hazard ID



Flammability
Health

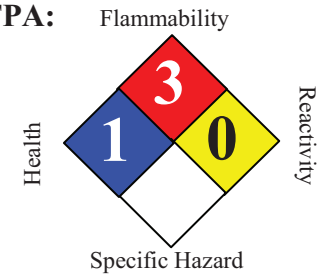


Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue date:	06-12-2014
Revision date:	No data available.
Version #:	1.0
Further information:	No data available.
Disclaimer:	THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET (MSDS/SDS) WAS PREPARED BY TECHNICAL PERSONNEL BASED ON DATA THAT THEY BELIEVE IN THEIR GOOD FAITH JUDGMENT IS ACCURATE. HOWEVER, THE INFORMATION PROVIDED HEREIN IS PROVIDED “AS IS,” AND AVANTOR PERFORMANCE MATERIALS MAKES AND GIVES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES REGARDING SUCH INFORMATION AND THE PRODUCT TO WHICH IT RELATES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION<(>,<)> WARRANTIES OF ACCURACY, COMPLETENESS, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY, STABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. THIS MSDS/SDS IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PROPERLY TRAINED PERSON USING THIS PRODUCT, AND IS NOT INTENDED TO BE COMPREHENSIVE AS TO THE MANNER AND CONDITIONS OF USE, HANDLING, STORAGE, OR DISPOSAL OF THE PRODUCT. INDIVIDUALS RECEIVING THIS MSDS/SDS MUST ALWAYS EXERCISE THEIR OWN INDEPENDENT JUDGMENT IN DETERMINING THE APPROPRIATENESS OF SUCH ISSUES. ACCORDINGLY, AVANTOR PERFORMANCE MATERIALS ASSUMES NO LIABILITY WHATSOEVER FOR THE USE OF OR RELIANCE UPON THIS INFORMATION. NO SUGGESTIONS FOR USE ARE INTENDED AS, AND NOTHING HEREIN SHALL BE CONSTRUED AS, A RECOMMENDATION TO INFRINGE ANY EXISTING PATENTS OR TO VIOLATE ANY FEDERAL, STATE, LOCAL, OR FOREIGN LAWS. AVANTOR PERFORMANCE MATERIALS REMINDS YOU THAT IT IS YOUR LEGAL DUTY TO MAKE ALL INFORMATION IN THIS MSDS/SDS AVAILABLE TO YOUR EMPLOYEES.

Safety Data Sheet
Gasoline, Unleaded

NFPA:



SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Gasoline, Unleaded			
Synonyms	:	Blend of Highly Flammable Petroleum Distillates, Regular, Mid-Grade, Premium, 888100008809			
SDS Number	:	888100008809	**Version**	:	1.1
Product Use Description	:	Fuel			
Company	:	For: Tesoro Refining & Marketing Co. 19100 Ridgewood Parkway, San Antonio, TX 78259			
Tesoro Call Center	:	(877) 783-7676	**Chemtrec (Emergency Contact)**	:	(800) 424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classifications :

Flammable Liquid – Category 1 or 2 depending on formulation.
Aspiration Hazard – Category 1
Carcinogenicity – Category 2
Specific Target Organ Toxicity (Repeated Exposure) – Category 2
Specific Target Organ Toxicity (Single Exposure) – Category 3
Skin Irritation – Category 2
Eye Irritation – Category 2B
Chronic Aquatic Toxicity – Category 2

Pictograms :



Signal Word : **Danger**

Hazard Statements

Extremely flammable liquid and vapor.
May be fatal if swallowed and enters airways – do not siphon gasoline by mouth.
Suspected of causing blood cancer if repeated over-exposure by inhalation and/or skin contact occurs.
May cause damage to liver, kidneys and nervous system by repeated and prolonged inhalation or skin contact. Causes eye irritation. Can be absorbed through skin.
May cause drowsiness or dizziness. Extreme exposure such as intentional inhalation may cause unconsciousness, asphyxiation and death.
Repeated or prolonged skin contact can cause irritation and dermatitis.

Harmful to aquatic life.

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, welding and hot surfaces.
No smoking.
Keep container tightly closed.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical equipment.
Use only non-sparking tools (if tools are used in flammable atmosphere).
Take precautionary measures against static discharge.
Wear gloves, eye protection and face protection (as needed to prevent skin and eye contact with liquid).
Wash hands or liquid-contacted skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Do not breathe vapors.
Use only outdoors or in a well-ventilated area.

Response : In case of fire: Use dry chemical, CO2, water spray or fire fighting foam to extinguish.
If swallowed: Immediately call a poison center, doctor, hospital emergency room, medical clinic or 911. Do NOT induce vomiting. Rinse mouth.
If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
If in eye: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If skin or eye irritation persists, get medical attention.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Get medical attention if you feel unwell.

Storage : Store in a well ventilated place. Keep cool. Store locked up. Keep container tightly closed . Use only approved containers. Some containers not approved for gasoline may dissolve and release flammable gasoline liquid and vapors.

Disposal : Dispose of contents/containers to approved disposal site in accordance with local, regional, national, and/or international regulations.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Gasoline, natural; Low boiling point naphtha	8006-61-9	10 - 30%
Toluene	108-88-3	10 - 30%
Xylene	1330-20-7	10 - 30%
Ethanol; ethyl alcohol	64-17-5	0-8.2%
Trimethylbenzene	25551-13-7	1 - 5%
Isopentane; 2-methylbutane	78-78-4	1 - 5%

Naphthalene	91-20-3	1 - 5%
Benzene	71-43-2	Less than 1.3%
Pentane	109-66-0	1 - 5%
Cyclohexane	110-82-7	1 - 5%
Ethylbenzene	100-41-4	1 - 5%
Butane	106-97-8	1 - 20%
Heptane [and isomers]	142-82-5	0.5 - 0.75%
N-hexane	110-54-3	0.5 - 0.75%

SECTION 4. FIRST AID MEASURES

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Contaminated leather, particularly footwear, must be discarded. Note that contaminated clothing may be a fire hazard. Seek medical advice if symptoms persist or develop.

Eye contact : Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek medical advice if symptoms persist or develop.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Obtain medical attention.

Notes to physician : Symptoms: Dizziness, Discomfort, Headache, Nausea, Kidney disorders, Liver disorders. Aspiration may cause pulmonary edema and pneumonitis. Swallowing gasoline is more likely to be fatal for small children than adults, even if aspiration does not occur.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray or fire fighting foam. 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. Keep containers and surroundings cool with water spray.

Specific hazards during fire fighting : Extremely flammable liquid and vapor. This material is combustible/flammable and is sensitive to fire, heat, and static discharge.

Special protective equipment for fire-fighters : 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.

Further information	:	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. Exposure to decomposition products may be a hazard to health. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	:	Evacuate personnel to safe areas. Ventilate the area. Remove all sources of ignition. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).
Environmental precautions	:	Discharge into the environment must be avoided. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for cleaning up	:	Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling :

Keep away from fire, sparks and heated surfaces. No smoking near areas where material is stored or handled. The product should only be stored and handled in areas with intrinsically safe electrical classification.

Hydrocarbon liquids including this product can act as a non-conductive flammable liquid (or static accumulators), and may form ignitable vapor-air mixtures in storage tanks or other containers. Precautions to prevent static-initated fire or explosion during transfer, storage or handling, include but are not limited to these examples:

(1) Ground and bond containers during product transfers. Grounding and bonding may not be adequate protection to prevent ignition or explosion of hydrocarbon liquids and vapors that are static accumulators.

(2) Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such gasoline or naphtha).

(3) Storage tank level floats must be effectively bonded.

For more information on precautions to prevent static-initated fire or explosion, see NFPA 77, Recommended Practice on Static Electricity (2007), and API Recommended Practice 2003, Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents (2008).

Conditions for safe storage, including incompatibilities : Keep away from flame, sparks, excessive temperatures and open flame. Use approved containers. Keep containers closed and clearly labeled. Empty or partially full product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition. Store in a well-ventilated area. The storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". 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".

Reports suggest that government-mandated ethanol, if present, may not be compatible with fiberglass gasoline tanks. Ethanol may dissolve fiberglass resin, causing engine damage and possibly allow leakage of explosive gasoline.

Keep away from food, drink and animal feed. Incompatible with oxidizing agents. Incompatible with acids.

No decomposition if stored and applied as directed. Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Store only in containers approved and labeled for gasoline.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA	Benzene	71-43-2	TWA	1 ppm
		71-43-2	STEL	5 ppm
		71-43-2	OSHA_ACT	0.5 ppm
OSHA Z1	Xylene	1330-20-7	PEL	100 ppm 435 mg/m3
	Ethanol; Ethyl alcohol	64-17-5	PEL	1,000 ppm 1,900 mg/m3
	Naphthalene	91-20-3	PEL	10 ppm 50 mg/m3
	Cyclohexane	110-82-7	PEL	300 ppm 1,050 mg/m3
	Ethylbenzene	100-41-4	PEL	100 ppm 435 mg/m3
	Heptane [and isomers]	142-82-5	PEL	500 ppm 2,000 mg/m3
	N-hexane	110-54-3	PEL	500 ppm 1,800 mg/m3
ACGIH	Toluene	108-88-3	TWA	50 ppm
	Xylene	1330-20-7	TWA	100 ppm
		1330-20-7	STEL	150 ppm
	Ethanol; Ethyl alcohol	64-17-5	TWA	1,000 ppm
	Trimethylbenzene	25551-13-7	TWA	25 ppm
	Isopentane; 2-Methylbutane	78-78-4	TWA	600 ppm
	Naphthalene	91-20-3	TWA	10 ppm
		91-20-3	STEL	15 ppm
	Benzene	71-43-2	TWA	0.5 ppm
		71-43-2	STEL	2.5 ppm
	Pentane	109-66-0	TWA	600 ppm
	Cyclohexane	110-82-7	TWA	100 ppm
	Ethylbenzene	100-41-4	TWA	100 ppm
		100-41-4	STEL	125 ppm
	Heptane [and isomers]	142-82-5	TWA	400 ppm
		142-82-5	STEL	500 ppm

	N-hexane	110-54-3	TWA	50 ppm

Engineering measures : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use only intrinsically safe electrical equipment approved for use in classified areas.

Eye protection : Safety glasses or goggles are recommended where there is a possibility of splashing or spraying. Ensure that eyewash stations and safety showers are close to the workstation location.

Hand protection : Gloves constructed of nitrile or neoprene are recommended. Consult manufacturer specifications for further information.

Skin and body protection : If needed to prevent skin contact, chemical protective clothing such as of DuPont TyChem®, Saranex or equivalent recommended based on degree of exposure. Flame resistant clothing such as Nomex ® is recommended in areas where material is stored or handled.

Respiratory protection : 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. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection. Use a NIOSH/ MSHA-approved positive-pressure supplied-air 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.

Work / Hygiene practices : Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Clear to straw colored liquid

Odor : Characteristic hydrocarbon-like

Odor threshold 0.5 - 1.1 ppm

pH : Not applicable

Melting point/freezing point About -101°C (-150°F)

Initial boiling point & range Boiling point varies: 30 – 200°C (85 – 392°F)

Flash point < -21°C (-5.8°F)

Evaporation rate : Higher initially and declining as lighter components evaporate

Flammability (solid, gas) : Flammable vapor released by liquid

Upper explosive limit	7.6 %(V)
Lower explosive limit	1.3 %(V)
Vapor pressure	345 - 1,034 hPa at 37.8 °C (100.0 °F)
Vapor density (air = 1)	Approximately 3 to 4
Relative density (water = 1)	0.8 g/mL
Solubility (in water)	Negligible
Partition coefficient (n-octanol/water)	2 – 7 as log Pow
Auto-ignition temperature	Approximately 250°C (480°F)
Decomposition temperature	Will evaporate or boil and possibly ignite before decomposition occurs.
Kinematic viscosity	0.64 to 0.88 mm²/s range reported for gasoline
Conductivity (conductivity can be reduced by environmental factors such as a decrease in temperature)	: Hydrocarbon liquids without static dissipater additive may have conductivity below 1 picoSiemens per meter (pS/m). The highest electro-static ignition risks are associated with "ultra-low conductivities" below 5 pS/m. See Section 7 for sources of information on defining safe loading and handling procedures for low conductivity products.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	: Vapors may form explosive mixture with air. Hazardous polymerization does not occur.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	Can react with strong oxidizing agents, peroxides, alkaline products and strong acids. Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.
Conditions to avoid	: Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Avoid static charge accumulation and discharge (see Section 7).
Hazardous decomposition products	: Ignition and burning can release carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

SECTION 11. TOXICOLOGICAL INFORMATION

Skin contact	: Irritating to skin. Can be partially absorbed through skin.
Eye contact	: Irritating to eyes.
Ingestion	: Aspiration hazard if liquid is inhaled into lungs, particularly from vomiting after ingestion. Aspiration may result in chemical pneumonia, severe lung damage, respiratory failure and even death. Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

Inhalation and further information

Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness, drowsiness, over excitation. Exposure to very high levels can result in unconsciousness and death.

Repeated over-exposure may cause liver and kidney injuries.
Components of the product may affect the nervous system.

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.
This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

Component:

Gasoline, natural; Low boiling point naphtha	8006-61-9	Acute oral toxicity: LD50 rat Dose: 18.8 mg/kg Acute inhalation toxicity: LC50 rat Dose: 20.7 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Moderate eye irritation
Toluene	108-88-3	Acute oral toxicity: LD50 rat Dose: 636 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 12,124 mg/kg Acute inhalation toxicity: LC50 rat Dose: 49 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may defat the skin and produce dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Xylene	1330-20-7	Acute oral toxicity: LD50 rat Dose: 2,840 mg/kg Acute dermal toxicity: LD50 rabbit Dose: ca. 4,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 6,350 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation

		Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethanol; Ethyl alcohol	64-17-5	Acute oral toxicity: LD50 rat Dose: 6,200 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 19,999 mg/kg Acute inhalation toxicity: LC50 rat Dose: 8,001 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Prolonged skin contact may cause skin irritation and/or dermatitis. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Mild eye irritation
Naphthalene	91-20-3	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute dermal toxicity: LD50 rat Dose: 2,501 mg/kg Acute inhalation toxicity: LC50 rat Dose: 101 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Carcinogenicity: N11.00422130
Benzene	71-43-2	Acute oral toxicity: LD50 rat Dose: 930 mg/kg Acute inhalation toxicity: LC50 rat Dose: 44 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Pentane	109-66-0	Acute oral toxicity: LD50 rat Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 364 mg/l Exposure time: 4 h Skin irritation: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Cyclohexane	110-82-7	Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 14 mg/l Exposure time: 4 h

		Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
Ethylbenzene	100-41-4	Acute oral toxicity: LD50 rat Dose: 3,500 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 15,500 mg/kg Acute inhalation toxicity: LC50 rat Dose: 18 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Mild skin irritation Eye irritation: Classification: Irritating to eyes. Result: Risk of serious damage to eyes.
Heptane [and isomers]	142-82-5	Acute oral toxicity: LD50 rat Dose: 15,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 103 g/m3 Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product. Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation
N-hexane	110-54-3	Acute oral toxicity: LD50 rat Dose: 25,000 mg/kg Acute dermal toxicity: LD50 rabbit Dose: 2,001 mg/kg Acute inhalation toxicity: LC50 rat Dose: 171.6 mg/l Exposure time: 4 h Skin irritation: Classification: Irritating to skin. Result: Skin irritation Eye irritation: Classification: Irritating to eyes. Result: Mild eye irritation Teratogenicity: N11.00418960

Carcinogenicity

NTP	:	Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2)
IARC	:	Gasoline, natural; Low boiling point naphtha (CAS-No.: 8006-61-9) Naphthalene (CAS-No.: 91-20-3) Benzene (CAS-No.: 71-43-2) Ethylbenzene (CAS-No.: 100-41-4)
OSHA	:	Benzene (CAS-No.: 71-43-2)
CA Prop 65	:	WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Toluene (CAS-No.: 108-88-3)

Benzene (CAS-No.: 71-43-2)

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

Component:

Toluene	108-88-3	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 13 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 11.5 mg/l Exposure time: 48 h Toxicity to algae: IC50 Species: Selenastrum capricornutum (green algae) Dose: 12 mg/l Exposure time: 72 h
Ethanol; Ethyl alcohol	64-17-5	Toxicity to fish: LC50 Species: Leuciscus idus (Golden orfe) Dose: 8,140 mg/l Exposure time: 48 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 9,268 - 14,221 mg/l Exposure time: 48 h
Isopentane; 2-Methylbutane	78-78-4	Toxicity to fish: LC50 Species: Oncorhynchus mykiss (rainbow trout) Dose: 3.1 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.3 mg/l Exposure time: 96 h
Naphthalene	91-20-3	Toxicity to algae: EC50 Species: Dose: 33 mg/l Exposure time: 24 h
Pentane	109-66-0	Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 9.74 mg/l Exposure time: 48 h
Cyclohexane	110-82-7	Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 3.78 mg/l Exposure time: 48 h

Heptane [and isomers]	142-82-5	Toxicity to fish: LC50 Species: Carassius auratus (goldfish) Dose: 4 mg/l Exposure time: 24 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 1.5 mg/l Exposure time: 48 h
N-hexane	110-54-3	Toxicity to fish: LC50 Species: Pimephales promelas (fathead minnow) Dose: 2.5 mg/l Exposure time: 96 h Acute and prolonged toxicity for aquatic invertebrates: EC50 Species: Daphnia magna (Water flea) Dose: 2.1 mg/l Exposure time: 48 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Dispose of container and unused contents in accordance with federal, state and local requirements.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name	: Petrol
UN-No.	: 1203
Class	: 3
Packing group	: II

TDG

Proper shipping name	: Gasoline
UN-No.	: UN1203
Class	: 3
Packing group	: II

IATA Cargo Transport

UN UN-No.	: UN1203
Description of the goods	: Gasoline
Class	: 3
Packaging group	: II
ICAO-Labels	: 3
Packing instruction (cargo aircraft)	: 364
Packing instruction (cargo aircraft)	: Y341

IATA Passenger Transport

UN UN-No.	: UN1203
Description of the goods	: Gasoline
Class	: 3

Packaging group	:	II
ICAO-Labels	:	3
Packing instruction (passenger aircraft)	:	353
Packing instruction (passenger aircraft)	:	Y341

IMDG-Code

UN-No.	:	UN 1203
Description of the goods	:	Gasoline
Class	:	3
Packaging group	:	II
IMDG-Labels	:	3
EmS Number	:	F-E S-E
Marine pollutant	:	No

SECTION 15. REGULATORY INFORMATION

OSHA Hazards : Flammable liquid
Highly toxic by ingestion
Moderate skin irritant
Severe eye irritant
Carcinogen

TSCA Status : On TSCA Inventory

DSL Status : . All components are on the Canadian DSL list.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)
The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

California Prop. 65 : WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Toluene	108-88-3
Benzene	71-43-2

SECTION 16. OTHER INFORMATION

Further information

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 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.

Revision Date : 08/09/2012

6, 8, 10, 12, 14, 16, 64, 68, 91, 112, 306, 1092, 1106, 1500, 1570, 1571, 1651, 1652, 1654, 1700, 1701, 1702, 1710, 1711, 1714, 1726, 1729, 1730, 1732, 1733, 1826, 1848, 1880, 1950

SAFETY DATA SHEET

Vinyl Chloride

Section 1. Identification

GHS product identifier : Vinyl Chloride

Chemical name : vinyl chloride

Other means of identification : chloroethylene; Ethene, chloro-; Chloroethene; Vinyl chloride, monomer; Ethene, chloro- (vinyl chloride); Vinyl chloride monomer; Monochloroethylene; Monochloroethene; Ethylene monochloride; VCM; VC

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : chloroethylene; Ethene, chloro-; Chloroethene; Vinyl chloride, monomer; Ethene, chloro- (vinyl chloride); Vinyl chloride monomer; Monochloroethylene; Monochloroethene; Ethylene monochloride; VCM; VC

SDS # : 001067

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
CARCINOGENICITY - Category 1
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (liver) - Category 2

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.
May cause cancer.
May cause damage to organs through prolonged or repeated exposure. (liver)

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 : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Do not breathe gas.

Section 2. Hazards identification

Response : Get medical attention if you feel unwell. 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. 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 : 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 : vinyl chloride

Other means of identification : chloroethylene; Ethene, chloro-; Chloroethene; Vinyl chloride, monomer; Ethene, chloro-(vinyl chloride); Vinyl chloride monomer; Monochloroethylene; Monochloroethene; Ethylene monochloride; VCM; VC

Product code : 001067

CAS number/other identifiers

CAS number : 75-01-4

Ingredient name	%	CAS number
vinyl chloride	100	75-01-4

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.

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.

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. 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

Section 4. First aid measures

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.

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)

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
halogenated compounds

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".

Section 6. Accidental release measures

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. Do not get in eyes or on skin or clothing. 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. 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. Do not breathe gas. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

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). Store locked up. 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
vinyl chloride	**ACGIH TLV (United States, 3/2017).** TWA: 1 ppm 8 hours. **OSHA PEL (United States, 6/2016).** 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.

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.

Section 8. Exposure controls/personal protection

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. 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. [COLORLESS GAS OR LIQUID (BELOW 7 F) WITH A PLEASANT ODOR AT HIGH CONCENTRATIONS. [NOTE: SHIPPED AS A LIQUEFIED COMPRESSED GAS.]

Color : Colorless.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Melting point : -153.8°C (-244.8°F)

Boiling point : -13.4°C (7.9°F)

Critical temperature : 158.45°C (317.2°F)

Flash point : Closed cup: -78°C (-108.4°F)
Open cup: -78°C (-108.4°F)

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 3.8%
Upper: 29.3%

Section 9. Physical and chemical properties

Vapor pressure : Not available.

Vapor density : 2.2 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.25

Gas Density (lb/ft ^{3}) : 0.16129 (21.1°C / 70 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 1.1 g/l

Partition coefficient: n-octanol/water : 1.38

Auto-ignition temperature : 472°C (881.6°F)

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 62.5 g/mole

Aerosol product

Heat of combustion : -18924336 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

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Section 11. Toxicological information

Classification

Product/ingredient name	OSHA	IARC	NTP
vinyl chloride	+	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
vinyl chloride	Category 2	Not determined	liver

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.

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 : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : May cause 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.

Section 11. Toxicological information

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
vinyl chloride	1.38	-	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.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Vinyl chloride; Ethene, chloro-	75-01-4	Listed	U043

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1086	UN1086	UN1086	UN1086	UN1086
UN proper shipping name	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED	VINYL CHLORIDE, STABILIZED

Section 14. Transport information

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 : **Reportable quantity** 1 lbs / 0.454 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.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: 150 kg.
Special provisions 21, B44, 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 Road or Rail Index Forbidden

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 Water Act (CWA) 307: vinyl chloride
Clean Air Act (CAA) 112 regulated flammable substances: vinyl chloride

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.

Section 15. Regulatory information

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	vinyl chloride	75-01-4	100
Supplier notification	vinyl chloride	75-01-4	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 can expose you to Vinyl chloride, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Ingredient name	No significant risk level	Maximum acceptable dosage level
Vinyl chloride	Yes.	-

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): This material is listed or exempted.

Malaysia : This material is listed or exempted.

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Taiwan : This material is listed or exempted.

Thailand : Not determined.

Turkey : This material is listed or exempted.

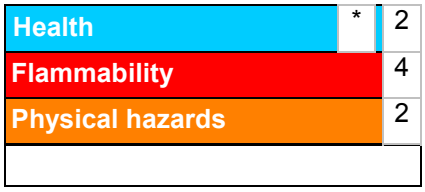
Section 15. Regulatory information

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	Expert judgment
GASES UNDER PRESSURE - Liquefied gas	Expert judgment
CARCINOGENICITY - Category 1	Expert judgment
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (liver) - Category 2	Expert judgment

History

Date of printing : 7/9/2018

Date of issue/Date of revision : 7/9/2018

Date of previous issue : 10/11/2016

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 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Section 16. Other information

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

Creation Date 13-Feb-2015 **Revision Date** 21-Feb-2014 **Revision Number** 3

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identification

Product Description: Xylene
Cat No. : **6601, 6615, 6655, 9900-5, 9900-55, 6601E**
Synonyms Dimethylbenzene; Methyltoluene
Molecular Formula C8H10

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Laboratory chemicals.
Uses advised against No Information available

1.3. Details of the supplier of the safety data sheet

Company
Richard Allan Scientific
A Subsidiary of Thermo Fisher Scientific
4481 Campus Drive
Kalamazoo, MI 49008
Tel: (800) 522-7270
E-mail address begel.sdsdesk@thermofisher.com

1.4. Emergency telephone number

Chemtrec US: (800) 424-9300
Chemtrec EU: 001 (202) 483-7616

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - Regulation (EC) No 1272/2008

Physical hazards

Flammable liquids	Category 3

Health hazards

Aspiration Toxicity	Category 1
Acute dermal toxicity	Category 4
Acute Inhalation Toxicity - Vapors	Category 4
Skin Corrosion/irritation	Category 2
Specific target organ toxicity - (repeated exposure)	Category 2

Environmental hazards
Based on available data, the classification criteria are not met

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Symbol(s) Xn - Harmful
R-phrase(s) R10 - Flammable
R38 - Irritating to skin
R20/21 - Harmful by inhalation and in contact with skin

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16.

2.2. Label elements



Signal Word **Danger**

Hazard Statements

H226 - Flammable liquid and vapor
H312 - Harmful in contact with skin
H332 - Harmful if inhaled
H315 - Causes skin irritation
H304 - May be fatal if swallowed and enters airways
H373 - May cause damage to organs through prolonged or repeated exposure

Precautionary Statements

P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P280 - Wear protective gloves/ protective clothing
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P312 - Call a POISON CENTER or doctor/ physician if you feel unwell
P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing
P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician
P331 - Do NOT induce vomiting
P362 - Take off contaminated clothing and wash before reuse
P260 - Do not breathe dust/fume/gas/mist/vapors/spray

2.3. Other hazards

No information available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No	EC-No.	Weight %	CLP Classification - Regulation (EC) No 1272/2008	DSD Classification - 67/548/EEC
Ethylbenzene	100-41-4	EEC No. 202-849-4	10 - 15	Flam. Liq. 2 (H225) Acute Tox. 4 (H332) Asp. Tox. 1 (H304) STOT RE 2 (H373) Aquatic Chronic 3 (H412)	F; R11 Xn; R20-48/20 R65
Xylenes (o-, m-, p- isomers)	1330-20-7	EEC No. 215-535-7	85	Acute Tox. 4 (H312) Acute Tox. 4 (H332) Skin Irrit. 2 (H315) Flam. Liq. 3 (H226)	R10 Xn; R20/21 Xi; R38
Toluene	108-88-3	EEC No. 203-625-9	0 - 0.5	Skin Irrit. 2 (H315) Repr. 2 (H361d) STOT SE 3 (H336) STOT RE 2 (H373) Asp. Tox. 1 (H304) Flam. Liq. 2 (H225)	F; R11 Xi; R38 Xn; R48/20-65 Repr.Cat.3; R63 R67
Benzene	71-43-2	EEC No. 200-753-7	0 - 0.01	Skin Irrit. 2 (H315) Eye Irrit. 2 (H319) Muta. 1B (H340) Carc. 1A (H350) STOT RE 1 (H372)	F; R11 Xi; R36/38 Carc.Cat.1; R45 Muta.Cat.2; R46 T; R48/23/24/25

				Asp. Tox. 1 (H304) Flam. Liq. 2 (H225)	Xn; R65

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

General Advice If symptoms persist, call a physician. 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. Immediate medical attention is required. Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. If symptoms persist, call a physician.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required. Call a physician immediately. SPEEDY ACTION IS CRITICAL, GET MEDICAL AID IMMEDIATELY. If symptoms persist, call a physician. If skin irritation persists, call a physician. Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately. Clean mouth with water and drink afterwards plenty of water. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Consult a physician.

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. Immediate medical attention is not required. Move to fresh air in case of accidental inhalation of vapors. If symptoms persist, call a physician.

Protection of First-aiders Use personal protective equipment.

4.2. Most important symptoms and effects, both acute and delayed

Breathing difficulties. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
CO_2, dry chemical, dry sand, alcohol-resistant foam. Cool closed containers exposed to fire with water spray.

Extinguishing media which must not be used for safety reasons
No information available.

5.2. Special hazards arising from the substance or mixture

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. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products

Carbon monoxide (CO), Carbon dioxide (CO_2), Hydrocarbons, Aldehydes.

5.3. Advice 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.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges. Do not get in eyes, on skin, or on clothing. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

6.2. Environmental precautions

Should not be released into the environment. See Section 12 for additional ecological information. Do not flush into surface water or sanitary sewer system. Prevent further leakage or spillage if safe to do so. Prevent product from entering drains.

6.3. Methods and material for containment and cleaning up

Remove all sources of ignition. Soak up with inert absorbent material. Take precautionary measures against static discharges. Keep in suitable, closed containers for disposal.

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Use only under a chemical fume hood. Wear personal protective equipment. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges. Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Do not ingest. Pay attention to flashback. No information available. Do not take internally.

7.2. Conditions for safe storage, including any incompatibilities

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Flammables area. Keep containers tightly closed in a cool, well-ventilated place. Keep in properly labeled containers.

7.3. Specific end use(s)

Use in laboratories

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Exposure limits

Component	European Union	The United Kingdom	France	Belgium	Spain
Ethylbenzene	TWA: 100 ppm 8 hr TWA: 442 mg/m³ 8 hr STEL: 200 ppm 15 min STEL: 884 mg/m³ 15 min Possibility of significant uptake through the skin	STEL: 125 ppm 15 min STEL: 552 mg/m³ 15 min TWA: 100 ppm 8 hr TWA: 441 mg/m³ 8 hr Skin	TWA / VME: 20 ppm (8 heures). restrictive limit TWA / VME: 88.4 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 100 ppm. restrictive limit STEL / VLCT: 442	TWA: 100 ppm 8 uren TWA: 442 mg/m³ 8 uren STEL: 125 ppm 15 minuten STEL: 551 mg/m³ 15 minuten Huid	STEL / VLA-EC: 200 ppm (15 minutos). STEL / VLA-EC: 884 mg/m³ (15 minutos). TWA / VLA-ED: 100 ppm (8 horas) TWA / VLA-ED: 441 mg/m³ (8 horas) Piel

			mg/m³. restrictive limit STEL / VLCT: 1500 mg/m³. Peau		
Xylenes (o-, m-, p-isomers)	TWA: 50 ppm 8 hr TWA: 221 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 442 mg/m³ 15 min Possibility of significant uptake through the skin	STEL: 100 ppm 15 min STEL: 441 mg/m³ 15 min TWA: 50 ppm 8 hr TWA: 220 mg/m³ 8 hr Skin	TWA / VME: 50 ppm (8 heures). restrictive limit TWA / VME: 221 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 100 ppm. restrictive limit STEL / VLCT: 442 mg/m³. restrictive limit STEL / VLCT: 1500 mg/m³. Peau	TWA: 50 ppm 8 uren TWA: 221 mg/m³ 8 uren STEL: 100 ppm 15 minuten STEL: 442 mg/m³ 15 minuten Huid	STEL / VLA-EC: 100 ppm (15 minutos). STEL / VLA-EC: 442 mg/m³ (15 minutos). TWA / VLA-ED: 50 ppm (8 horas) TWA / VLA-ED: 221 mg/m³ (8 horas) Piel
Toluene	TWA: 50 ppm 8 hr TWA: 192 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 384 mg/m³ 15 min Skin	STEL: 100 ppm 15 min STEL: 384 mg/m³ 15 min TWA: 50 ppm 8 hr TWA: 191 mg/m³ 8 hr Skin	TWA / VME: 20 ppm (8 heures). restrictive limit TWA / VME: 76.8 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 100 ppm. restrictive limit STEL / VLCT: 384 mg/m³. restrictive limit STEL / VLCT: 1500 mg/m³. Peau	TWA: 20 ppm 8 uren TWA: 77 mg/m³ 8 uren STEL: 100 ppm 15 minuten STEL: 384 mg/m³ 15 minuten Huid	STEL / VLA-EC: 100 ppm (15 minutos). STEL / VLA-EC: 384 mg/m³ (15 minutos). TWA / VLA-ED: 50 ppm (8 horas) TWA / VLA-ED: 192 mg/m³ (8 horas) Piel
Benzene	TWA: 1 ppm 8 hr measured or calculated in relation to a reference period of eight hours TWA: 3.25 mg/m³ 8 hr measured or calculated in relation to a reference period of eight hours Substantial contribution to the total body burden via dermal exposure possible	STEL: 3 ppm 15 min STEL: 9.75 mg/m³ 15 min TWA: 1 ppm 8 hr TWA: 3.25 mg/m³ 8 hr Carc. Skin	TWA / VME: 1 ppm (8 heures). restrictive limit TWA / VME: 3.25 mg/m³ (8 heures). restrictive limit TWA / VME: 1000 mg/m³ (8 heures). STEL / VLCT: 1500 mg/m³. Peau	TWA: 1 ppm 8 uren TWA: 3.25 mg/m³ 8 uren Huid	TWA / VLA-ED: 1 ppm (8 horas) TWA / VLA-ED: 3.25 mg/m³ (8 horas) Piel

Component	Italy	Germany	Portugal	The Netherlands	Finland
Ethylbenzene	TWA: 100 ppm 8 ore. TWA: 442 mg/m³ 8 ore. STEL: 200 ppm 15 minuti. Breve termine STEL: 884 mg/m³ 15 minuti. Breve termine Pelle	TWA: 20 ppm (8 Stunden). AGW - exposure factor 2 TWA: 88 mg/m³ (8 Stunden). AGW - exposure factor 2 TWA: 20 ppm (8 Stunden). MAK TWA: 88 mg/m³ (8 Stunden). MAK Höhepunkt: 40 ppm Höhepunkt: 176 mg/m³ Haut	STEL: 200 ppm 15 minutos STEL: 884 mg/m³ 15 minutos TWA: 100 ppm 8 horas TWA: 442 mg/m³ 8 horas Pele	huid STEL: 430 mg/m³ 15 minuten TWA: 215 mg/m³ 8 uren	TWA: 50 ppm 8 tunteina TWA: 220 mg/m³ 8 tunteina STEL: 200 ppm 15 minuutteina STEL: 880 mg/m³ 15 minuutteina Iho
Xylenes (o-, m-, p-isomers)	TWA: 50 ppm 8 ore. pure TWA: 221 mg/m³ 8 ore. pure STEL: 100 ppm 15 minuti. Breve termine pure STEL: 442 mg/m³ 15 minuti. Breve termine pure Pelle	TWA: 100 ppm (8 Stunden). AGW - exposure factor 2 TWA: 440 mg/m³ (8 Stunden). AGW - exposure factor 2 TWA: 100 ppm (8 Stunden). MAK all isomers TWA: 440 mg/m³ (8 Stunden). MAK all isomers	STEL: 100 ppm 15 minutos STEL: 442 mg/m³ 15 minutos TWA: 50 ppm 8 horas TWA: 221 mg/m³ 8 horas Pele	huid STEL: 442 mg/m³ 15 minuten TWA: 210 mg/m³ 8 uren	TWA: 50 ppm 8 tunteina TWA: 220 mg/m³ 8 tunteina STEL: 100 ppm 15 minuutteina STEL: 440 mg/m³ 15 minuutteina Iho

		Höhepunkt: 200 ppm Höhepunkt: 880 mg/m³ Haut Haut all isomers			
Toluene	TWA: 50 ppm 8 ore. TWA: 192 mg/m³ 8 ore. Pelle	TWA: 50 ppm (8 Stunden). AGW - exposure factor 4 TWA: 190 mg/m³ (8 Stunden). AGW - exposure factor 4 TWA: 50 ppm (8 Stunden). MAK TWA: 190 mg/m³ (8 Stunden). MAK Höhepunkt: 200 ppm Höhepunkt: 760 mg/m³ Haut	STEL: 100 ppm 15 minutos STEL: 384 mg/m³ 15 minutos TWA: 50 ppm 8 horas TWA: 192 mg/m³ 8 horas Pele	STEL: 384 mg/m³ 15 minuten TWA: 150 mg/m³ 8 uren	TWA: 25 ppm 8 tunteina TWA: 81 mg/m³ 8 tunteina STEL: 100 ppm 15 minuutteina STEL: 380 mg/m³ 15 minuutteina Iho
Benzene	TWA: 1 ppm 8 ore. TWA: 3.25 mg/m³ 8 ore. Pelle	Haut	STEL: 2.5 ppm 15 minutos TWA: 0.5 ppm 8 horas Pele	huid TWA: 3.25 mg/m³ 8 uren	TWA: 1 ppm 8 tunteina TWA: 3.25 mg/m³ 8 tunteina Iho

Component	Austria	Denmark	Switzerland	Poland	Norway
Ethylbenzene	Haut MAK-KZW: 200 ppm 15 Minuten MAK-KZW: 880 mg/m³ 15 Minuten MAK-TMW: 100 ppm 8 Stunden MAK-TMW: 440 mg/m³ 8 Stunden	TWA: 50 ppm 8 timer TWA: 217 mg/m³ 8 timer Hud	Haut/Peau STEL: 50 ppm 15 Minuten STEL: 220 mg/m³ 15 Minuten TWA: 50 ppm 8 Stunden TWA: 220 mg/m³ 8 Stunden	STEL: 400 mg/m³ 15 minutach TWA: 200 mg/m³ 8 godzinach	TWA: 5 ppm 8 timer TWA: 20 mg/m³ 8 timer STEL: 10 ppm 15 minutter. STEL: 30 mg/m³ 15 minutter. Hud
Xylenes (o-, m-, p-isomers)	Haut MAK-KZW: 100 ppm 15 Minuten MAK-KZW: 442 mg/m³ 15 Minuten MAK-TMW: 50 ppm 8 Stunden MAK-TMW: 221 mg/m³ 8 Stunden	TWA: 25 ppm 8 timer TWA: 109 mg/m³ 8 timer Hud	Haut/Peau STEL: 200 ppm 15 Minuten STEL: 870 mg/m³ 15 Minuten TWA: 100 ppm 8 Stunden TWA: 435 mg/m³ 8 Stunden	TWA: 100 mg/m³ 8 godzinach	TWA: 25 ppm 8 timer TWA: 108 mg/m³ 8 timer STEL: 37.5 ppm 15 minutter. STEL: 135 mg/m³ 15 minutter. Hud
Toluene	Haut MAK-KZW: 100 ppm 15 Minuten MAK-KZW: 380 mg/m³ 15 Minuten MAK-TMW: 50 ppm 8 Stunden MAK-TMW: 190 mg/m³ 8 Stunden	TWA: 25 ppm 8 timer TWA: 94 mg/m³ 8 timer Hud	Haut/Peau STEL: 200 ppm 15 Minuten STEL: 760 mg/m³ 15 Minuten TWA: 50 ppm 8 Stunden TWA: 190 mg/m³ 8 Stunden	STEL: 200 mg/m³ 15 minutach TWA: 100 mg/m³ 8 godzinach	TWA: 25 ppm 8 timer TWA: 94 mg/m³ 8 timer STEL: 37.5 ppm 15 minutter. STEL: 141 mg/m³ 15 minutter. Hud
Benzene	TRK-KZW: 4 ppm 15 Minuten TRK-KZW: 12.8 mg/m³ 15 Minuten Haut TRK-TMW: 1 ppm TRK-TMW: 3.2 mg/m³	TWA: 0.5 ppm 8 timer TWA: 1.6 mg/m³ 8 timer Hud	Haut/Peau TWA: 0.5 ppm 8 Stunden TWA: 1.6 mg/m³ 8 Stunden	TWA: 1.6 mg/m³ 8 godzinach	TWA: 1 ppm 8 timer TWA: 3 mg/m³ 8 timer STEL: 3 ppm 15 minutter. STEL: 6 mg/m³ 15 minutter.

Component	Bulgaria	Croatia	Ireland	Cyprus	Czech Republic
Ethylbenzene	TWA: 435 mg/m³ STEL : 545 mg/m³ Skin notation	kože TWA-GVI: 100 ppm 8 satima. TWA-GVI: 442 mg/m³ 8 satima. STEL-KGVI: 200 ppm 15 minutama. STEL-KGVI: 884 mg/m³ 15 minutama.	TWA: 100 ppm 8 hr. TWA: 442 mg/m³ 8 hr. STEL: 200 ppm 15 min STEL: 884 mg/m³ 15 min Skin	Skin-potential for cutaneous absorption STEL: 200 ppm STEL: 884 mg/m³ TWA: 100 ppm TWA: 442 mg/m³	TWA: 200 mg/m³ 8 hodinách. Potential for cutaneous absorption Ceiling: 500 mg/m³
Xylenes (o-, m-, p-	TWA: 50 ppm	kože	TWA: 50 ppm 8 hr.	Skin-potential for	TWA: 200 mg/m³ 8

isomers)	TWA: 221.0 mg/m³ STEL : 100 ppm STEL : 442 mg/m³ Skin notation	TWA-GVI: 50 ppm 8 satima. TWA-GVI: 221 mg/m³ 8 satima. STEL-KGVI: 100 ppm 15 minutama. STEL-KGVI: 442 mg/m³ 15 minutama.	TWA: 221 mg/m³ 8 hr. STEL: 100 ppm 15 min STEL: 442 mg/m³ 15 min Skin	cutaneous absorption STEL: 100 ppm STEL: 442 mg/m³ TWA: 50 ppm TWA: 221 mg/m³	hodinách. Potential for cutaneous absorption Ceiling: 400 mg/m³
Toluene	TWA: 50 ppm TWA: 192.0 mg/m³ STEL : 100 ppm STEL : 384.0 mg/m³ Skin notation	kože TWA-GVI: 50 ppm 8 satima. TWA-GVI: 192 mg/m³ 8 satima. STEL-KGVI: 100 ppm 15 minutama. STEL-KGVI: 384 mg/m³ 15 minutama.	TWA: 50 ppm 8 hr. TWA: 192 mg/m³ 8 hr. STEL: 384 mg/m³ 15 min STEL: 100 ppm 15 min Skin	Skin-potential for cutaneous absorption STEL: 100 ppm STEL: 384 mg/m³ TWA: 50 ppm TWA: 192 mg/m³	TWA: 200 mg/m³ 8 hodinách. Potential for cutaneous absorption Ceiling: 500 mg/m³
Benzene	TWA: 3.25 mg/m³ Skin notation	kože TWA-GVI: 1 ppm 8 satima. TWA-GVI: 3.25 mg/m³ 8 satima.	TWA: 1 ppm 8 hr. TWA: 3 mg/m³ 8 hr. STEL: 3 ppm 15 min STEL: 9 mg/m³ 15 min Skin	Skin-potential for cutaneous absorption TWA: 1 ppm TWA: 3.25 mg/m³	TWA: 3 mg/m³ 8 hodinách. Potential for cutaneous absorption Ceiling: 10 mg/m³

Component	Estonia	Gibraltar	Greece	Hungary	Iceland
Ethylbenzene	Nahk TWA: 100 ppm 8 tundides. TWA: 442 mg/m³ 8 tundides. STEL: 200 ppm 15 minutites. STEL: 884 mg/m³ 15 minutites. Ceiling: 0.01 ppm 5 min	Skin notation TWA: 100 ppm 8 hr TWA: 442 mg/m³ 8 hr STEL: 200 ppm 15 min STEL: 884 mg/m³ 15 min	STEL: 125 ppm STEL: 545 mg/m³ TWA: 100 ppm TWA: 435 mg/m³	STEL: 884 mg/m³ 15 percekben. CK TWA: 442 mg/m³ 8 órában. AK lehetséges borön keresztüli felszívódás	STEL: 200 ppm STEL: 884 mg/m³ TWA: 50 ppm 8 klukkustundum. TWA: 200 mg/m³ 8 klukkustundum. Skin notation Ceiling: 100 ppm Ceiling: 400 mg/m³
Xylenes (o-, m-, p-isomers)	Nahk TWA: 50 ppm 8 tundides. TWA: 221 mg/m³ 8 tundides. STEL: 100 ppm 15 minutites. STEL: 442 mg/m³ 15 minutites.	Skin notation TWA: 50 ppm 8 hr pure TWA: 221 mg/m³ 8 hr pure STEL: 100 ppm 15 min pure STEL: 442 mg/m³ 15 min pure	skin - potential for cutaneous absorption STEL: 150 ppm STEL: 650 mg/m³ TWA: 100 ppm TWA: 435 mg/m³	STEL: 442 mg/m³ 15 percekben. CK TWA: 221 mg/m³ 8 órában. AK lehetséges borön keresztüli felszívódás	STEL: 100 ppm STEL: 442 mg/m³ TWA: 25 ppm 8 klukkustundum. TWA: 109 mg/m³ 8 klukkustundum. Skin notation Ceiling: 50 ppm Ceiling: 218 mg/m³
Toluene	Nahk TWA: 50 ppm 8 tundides. TWA: 192 mg/m³ 8 tundides. STEL: 100 ppm 15 minutites. STEL: 384 mg/m³ 15 minutites.	Skin notation TWA: 50 ppm 8 hr TWA: 192 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 384 mg/m³ 15 min	skin - potential for cutaneous absorption STEL: 100 ppm STEL: 384 mg/m³ TWA: 50 ppm TWA: 192 mg/m³	STEL: 380 mg/m³ 15 percekben. CK TWA: 190 mg/m³ 8 órában. AK lehetséges borön keresztüli felszívódás	STEL: 50 ppm STEL: 188 mg/m³ TWA: 25 ppm 8 klukkustundum. TWA: 94 mg/m³ 8 klukkustundum. Skin notation Ceiling: 50 ppm Ceiling: 188 mg/m³
Benzene	Nahk TWA: 0.5 ppm 8 tundides. TWA: 1.5 mg/m³ 8 tundides. STEL: 3 ppm 15 minutites. STEL: 9 mg/m³ 15 minutites.		skin - potential for cutaneous absorption TWA: 1.0 ppm TWA: 3.19 mg/m³	lehetséges borön keresztüli felszívódás Ceiling: 3 mg/m³ MK	TWA: 0.5 ppm 8 klukkustundum. TWA: 1.6 mg/m³ 8 klukkustundum. Skin notation Ceiling: 1 ppm Ceiling: 3.2 mg/m³

Component	Latvia	Lithuania	Luxembourg	Malta	Romania
Ethylbenzene	skin - potential for cutaneous exposure STEL: 200 ppm STEL: 884 mg/m³ TWA: 100 ppm	TWA: 100 ppm IPRD TWA: 442 mg/m³ IPRD Oda STEL: 200 ppm STEL: 884 mg/m³	Possibility of significant uptake through the skin TWA: 100 ppm 8 Stunden TWA: 442 mg/m³ 8	possibility of significant uptake through the skin TWA: 100 ppm TWA: 442 mg/m³ STEL: 200 ppm 15	Skin notation TWA: 100 ppm 8 ore TWA: 442 mg/m³ 8 ore STEL: 200 ppm 15 minute

	TWA: 442 mg/m³		Stunden STEL: 200 ppm 15 Minuten STEL: 884 mg/m³ 15 Minuten	minuti STEL: 884 mg/m³ 15 minuti	STEL: 884 mg/m³ 15 minute
Xylenes (o-, m-, p-isomers)	skin - potential for cutaneous exposure STEL: 100 ppm STEL: 442 mg/m³ TWA: 50 ppm TWA: 221 mg/m³	TWA: 50 ppm IPRD TWA: 200 mg/m³ IPRD Oda STEL: 100 ppm STEL: 450 mg/m³	TWA: 50 ppm 8 Stunden TWA: 221 mg/m³ 8 Stunden STEL: 100 ppm 15 Minuten STEL: 442 mg/m³ 15 Minuten	possibility of significant uptake through the skin TWA: 50 ppm TWA: 221 mg/m³ STEL: 100 ppm 15 minuti STEL: 442 mg/m³ 15 minuti	Skin notation TWA: 50 ppm 8 ore TWA: 221 mg/m³ 8 ore STEL: 100 ppm 15 minute STEL: 442 mg/m³ 15 minute
Toluene	skin - potential for cutaneous exposure STEL: 40 ppm STEL: 150 mg/m³ TWA: 14 ppm TWA: 50 mg/m³	TWA: 50 ppm IPRD TWA: 192 mg/m³ IPRD Oda STEL: 100 ppm STEL: 384 mg/m³	Possibility of significant uptake through the skin TWA: 50 ppm 8 Stunden TWA: 192 mg/m³ 8 Stunden STEL: 100 ppm 15 Minuten STEL: 384 mg/m³ 15 Minuten	possibility of significant uptake through the skin TWA: 50 ppm TWA: 192 mg/m³ STEL: 100 ppm 15 minuti STEL: 384 mg/m³ 15 minuti	Skin notation TWA: 50 ppm 8 ore TWA: 192 mg/m³ 8 ore STEL: 100 ppm 15 minute STEL: 384 mg/m³ 15 minute
Benzene	skin - potential for cutaneous exposure TWA: 1 ppm TWA: 3.25 mg/m³	TWA: 1 ppm IPRD TWA: 3.25 mg/m³ IPRD Oda STEL: 6 ppm STEL: 19 mg/m³	TWA: 1 ppm 8 Stunden TWA: 3.25 mg/m³ 8 Stunden		Skin notation TWA: 1 ppm 8 ore TWA: 3.25 mg/m³ 8 ore

Component	Russia	Slovak Republic	Slovenia	Sweden	Turkey
Ethylbenzene	TWA: 50 mg/m³ STEL: 150 mg/m³ vapor	Ceiling: 884 mg/m³ Potential for cutaneous absorption TWA: 100 ppm TWA: 442 mg/m³	TWA: 100 ppm 8 urah TWA: 442 mg/m³ 8 urah Koža STEL: 200 ppm 15 minutah STEL: 884 mg/m³ 15 minutah	STV: 100 ppm 15 minuter STV: 450 mg/m³ 15 minuter LLV: 50 ppm 8 timmar. LLV: 200 mg/m³ 8 timmar.	Deri TWA: 100 ppm 8 saat TWA: 442 mg/m³ 8 saat STEL: 200 ppm 15 dakika STEL: 884 mg/m³ 15 dakika
Xylenes (o-, m-, p-isomers)	TWA: 50 mg/m³ 2-,3- and 4- isomers STEL: 150 mg/m³ vapor	Ceiling: 442 mg/m³ Potential for cutaneous absorption TWA: 50 ppm TWA: 221 mg/m³	TWA: 50 ppm 8 urah TWA: 221 mg/m³ 8 urah Koža STEL: 100 ppm 15 minutah STEL: 442 mg/m³ 15 minutah	STV: 100 ppm 15 minuter STV: 442 mg/m³ 15 minuter LLV: 50 ppm 8 timmar. LLV: 221 mg/m³ 8 timmar. Hud	Deri TWA: 50 ppm 8 saat TWA: 221 mg/m³ 8 saat STEL: 100 ppm 15 dakika STEL: 442 mg/m³ 15 dakika
Toluene	TWA: 50 mg/m³ STEL: 150 mg/m³ vapor	Ceiling: 384 mg/m³ Potential for cutaneous absorption TWA: 50 ppm TWA: 192 mg/m³	TWA: 50 ppm 8 urah TWA: 192 mg/m³ 8 urah Koža STEL: 200 ppm 15 minutah STEL: 384 mg/m³ 15 minutah	STV: 100 ppm 15 minuter STV: 384 mg/m³ 15 minuter LLV: 50 ppm 8 timmar. LLV: 192 mg/m³ 8 timmar. Hud	Deri TWA: 50 ppm 8 saat TWA: 192 mg/m³ 8 saat STEL: 100 ppm 15 dakika STEL: 384 mg/m³ 15 dakika
Benzene	TWA: 5 mg/m³ Skin notation STEL: 15 mg/m³ vapor	TWA: 1.0 ppm 8 hodinách TWA: 3.25 mg/m³ 8 hodinách Potential for cutaneous absorption STEL: 5.0 ppm 15 minútach STEL: 16.25 mg/m³ 15 minútach	TWA: 1 ppm 8 urah TWA: 3.25 mg/m³ 8 urah Koža STEL: 4 ppm 15 minutah STEL: 13 mg/m³ 15 minutah	STV: 3 ppm 15 minuter STV: 9 mg/m³ 15 minuter LLV: 0.5 ppm 8 timmar. LLV: 1.5 mg/m³ 8 timmar. Hud	

Biological limit values

Component	European Union	United Kingdom	France	Spain	Germany
Ethylbenzene			Mandelic acid: 1500	Mandelic acid plus	Mandelic acid plus

			mg/g creatinine urine end of shift at end of workweek	Phenylglyoxylic acid: 700 mg/g Creatinine urine end of workweek	Phenylglyoxylic acid: 300 mg/g urine (end of shift)
Xylenes (o-, m-, p-isomers)		Methyl hippuric acid: 650 mmol/mol creatinine urine Post shift	Methylhippuric acid: 1500 mg/g creatinine urine end of shift	Methylhippuric acids: 1 g/g Creatinine urine end of shift	Xylene: 1.5 mg/L whole blood (end of shift all isomers) Methylhippuric(tolur-)acid: 2000 mg/L urine (end of shift all isomers)
Toluene			Toluene: 1 mg/L blood end of shift Hippuric acid: 2500 mg/g creatinine urine end of shift	o-Cresol: 0.5 mg/L urine end of shift Hippuric acid: 1.6 g/g Creatinine urine end of shift Toluene: 0.05 mg/L blood start of last shift of workweek	Toluene: 600 µg/L whole blood (end of shift) o-Cresol: 1.5 mg/L urine (end of several shifts after hydrolysis; for long-term exposures)
Benzene			Muconic acid: 5 mg/L urine end of shift	S-Phenylmercapturic acid: 0.045 mg/g urine end of exposure or end of shift trans,trans-Muconic acid: 2 mg/L urine end of exposure or end of shift Total benzene: 5 µg/L blood end of exposure or end of shift	

Component	Italy	Finland	Denmark	Bulgaria	Romania
Ethylbenzene		Mandelic acid: 5.2 mmol/L urine end of shift at end of workweek.		Mandelic acid and Phenylglyoxylic acid - together: 2000 mg/g Creatinine urine at the end of exposure or end of shift Possible significant absorption through the skin	Mandelic acid: 1.5 g/g Creatinine urine end of work week
Xylenes (o-, m-, p-isomers)		Methylhippuric acid: 5.0 mmol/L urine end of shift.			Methylhippuric acid: 3 g/L urine end of shift
Toluene		Toluene concentrated: 500 nmol/L blood prior to shift.		Hippuric acid: 1.6 mmol/mmol Creatinine urine at the end of exposure or end of shift	Hippuric acid: 2 g/L urine end of shift o-Cresol: 3 mg/L urine end of shift
Benzene				Trans, trans-Muconic acid: 2.0 mg/L urine at the end of exposure or end of shift Possible significant absorption through the skin S-Phenyl Mercapturic acid: 0.045 mg/g Creatinine urine at the end of exposure or end of shift Possible significant absorption through the skin	S-Phenylmercapturic acid: 25 µg/g Creatinine urine end of shift total Phenols: 50 mg/L urine end of shift

Component	Gibraltar	Latvia	Slovak Republic	Luxembourg	Turkey
Ethylbenzene			2 and 4-Ethylphenol: 12 mg/L urine end of exposure or work shift also after all work shifts for long-term exposure Mandelic acid and phenylglycolic acid: 1600 mg/L urine end of exposure or work shift		

			also after all work shifts for long-term exposure		
Xylenes (o-, m-, p-isomers)			Xylene: 1.5 mg/L blood end of exposure or work shift all isomers Methylhippuric acid: 2000 mg/L urine end of exposure or work shift		
Toluene		Hippuric acid: 1.6 g/g Creatinine urine end of shift Toluene: 0.05 mg/l blood end of shift	Toluene: 600 µg/L blood end of exposure or work shift o-Cresol: 1.5 mg/L urine after all work shifts for long-term exposure o-Cresol: 1.5 mg/L urine end of exposure or work shift Hippuric acid: 1600 mg/g creatinine end of exposure or work shift		
Benzene		Phenol: 25 µg/g Creatinine urine end of shift			

Monitoring methods
BS EN 14042:2003 Title Identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents.

Derived No Effect Level (DNEL) No information available

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				
Inhalation				

Predicted No Effect Concentration (PNEC) No information available.

8.2. Exposure controls

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.
Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source

Personal protective equipment

Eye Protection Safety glasses with side-shields (European standard - EN 166)

Hand Protection Protective gloves

Glove material	Breakthrough time	Glove thickness	EU standard	Glove comments
Disposable gloves	See manufacturers recommendations	-	EN 374	(minimum requirement)

Skin and body protection Long sleeved clothing Apron Impervious gloves

Inspect gloves before use.
Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information)
Ensure gloves are suitable for the task: Chemical compatability, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.
Remove gloves with care avoiding skin contamination.

Respiratory Protection When workers are facing concentrations above the exposure limit they must use

	appropriate certified respirators. To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly
Large scale/emergency use	In case of insufficient ventilation wear suitable respiratory equipment
Small scale/Laboratory use	Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. When RPE is used a face piece Fit Test should be conducted
Hygiene Measures	When using, do not eat, drink or smoke. Provide regular cleaning of equipment, work area and clothing.
Environmental exposure controls	No information available.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Clear, Colorless	
Physical State	Liquid	
Odor	aromatic	
Odor Threshold	No data available	
pH	No data available	
Melting Point/Range	-47.2 °C / -53 °F	
Softening Point	No data available	
Boiling Point/Range	136.7 - 143.3 °C / 278 - 290 °F	
Flash Point	27.7 °C / 82 °F	**Method -** No information available
Evaporation Rate	No information available	
Flammability (solid,gas)	No information available	
Explosion Limits	**Lower** 1.1 vol % **Upper** 7.0 vol %	
Vapor Pressure	9 mmHg @ 25 °C	
Vapor Density	3.66 (Air = 1.0)	(Air = 1.0)
Specific Gravity / Density	No data available 0.87	
Bulk Density	No data available	
Water Solubility	No information available	
Solubility in other solvents	No information available	

Partition Coefficient (n-octanol/water)

Component	**log Pow**
Ethylbenzene	3.118
Xylenes (o-, m-, p- isomers)	3.15
Toluene	2.65
Benzene	1.83

Autoignition Temperature	527 °C / 980.6 °F
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

Molecular Formula	C8H10
Molecular Weight	106.17

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

None known, based on information available

10.2. Chemical stability

Stable under normal conditions

10.3. Possibility of hazardous reactions

Hazardous Polymerization Hazardous polymerization does not occur.
Hazardous Reactions No information available.

10.4. Conditions to avoid

Incompatible products. Heat, flames and sparks.

10.5. Incompatible materials

Strong oxidizing agents. Strong acids.

10.6. Hazardous decomposition products

Carbon monoxide (CO). Carbon dioxide (CO_2). Hydrocarbons. Aldehydes.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information No acute toxicity information is available for this product

(a) acute toxicity;
Oral No data available
Dermal No data available
Inhalation No data available

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ethylbenzene	3500 mg/kg (Rat)	15400 mg/kg (Rabbit)	17.2 mg/L (Rat) 4 h
Xylenes (o-, m-, p- isomers)	3500 mg/kg (Rat)	4350 mg/kg (Rabbit) 1700 mg/kg (Rabbit)	29.08 mg/L [MOE Risk Assessment Vol.1, 2002]
Toluene	> 5000 mg/kg (Rat)	12000 mg/kg (Rabbit)	26700 ppm (Rat) 1 h
Benzene	810 mg/kg (Rat) 1800 mg/kg (Rat)	8200 mg/kg (Rabbit)	44.66 mg/L (Rat) 4 h

(b) skin corrosion/irritation; No data available

(c) serious eye damage/irritation; No data available

(d) respiratory or skin sensitization;
Respiratory No data available
Skin No data available

(e) germ cell mutagenicity; No data available

(f) carcinogenicity; No data available

The table below indicates whether each agency has listed any ingredient as a carcinogen

Component	EU	UK	Germany	IARC
Ethylbenzene				Group 2B
Benzene	Carc Cat. 1A		Cat. 1	Group 1

(g) reproductive toxicity; No data available
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.

(h) STOT-single exposure; No data available

(i) STOT-repeated exposure; No data available

Target Organs Eyes, Skin, Central nervous system (CNS), Liver, Kidney, Respiratory system.

(j) aspiration hazard; No data available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals. See actual entry in RTECS for complete information

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity effects Do not empty into drains.

Component	Freshwater Fish	Water Flea	Freshwater Algae	Microtox
Ethylbenzene	9.6 mg/L LC50 96 h 9.1 - 15.6 mg/L LC50 96 h 32 mg/L LC50 96 h 7.55 - 11 mg/L LC50 96 h 4.2 mg/L LC50 96 h 11.0 - 18.0 mg/L LC50 96 h	1.8 - 2.4 mg/L EC50 48 h	2.6 - 11.3 mg/L EC50 72 h 438 mg/L EC50 > 96 h 4.6 mg/L EC50 = 72 h 1.7 - 7.6 mg/L EC50 96 h	EC50 = 9.68 mg/L 30 min EC50 = 96 mg/L 24 h
Xylenes (o-, m-, p- isomers)	30.26 - 40.75 mg/L LC50 96 h 780 mg/L LC50 96 h 23.53 - 29.97 mg/L LC50 96 h 7.711 - 9.591 mg/L LC50 96 h 19 mg/L LC50 96 h 13.1 - 16.5 mg/L LC50 96 h 13.5 - 17.3 mg/L LC50 96 h 2.661 - 4.093 mg/L LC50 96 h 13.4 mg/L LC50 96 h	0.6 mg/L LC50 = 48 h 3.82 mg/L EC50 = 48 h		EC50 = 0.0084 mg/L 24 h
Toluene	50-70 mg/L LC50 96 h 5-7 mg/L LC50 96 h 15-19 mg/L LC50 96 h 28 mg/L LC50 96 h 12 mg/L LC50 96 h	11.5 mg/L EC50 = 48 h 5.46 - 9.83 mg/L EC50 48 h	12.5 mg/L EC50 = 72 h 433 mg/L EC50 > 96 h	EC50 = 19.7 mg/L 30 min
Benzene	70000 - 142000 µg/L LC50 96 h 22330 - 41160 µg/L LC50 96 h 28.6 mg/L LC50 96 h 22.49 mg/L LC50 96 h 5.3 mg/L LC50 96 h 10.7 - 14.7 mg/L LC50 96 h	10 mg/L EC50 = 48 h 8.76 - 15.6 mg/L EC50 48 h	29 mg/L EC50 = 72 h	

12.2. Persistence and degradability No information available

Component	Degradability
Toluene 108-88-3 (0 - 0.5)	86% (20d)

12.3. Bioaccumulative potential No information available

Component	log Pow	Bioconcentration factor (BCF)
Ethylbenzene	3.118	15
Xylenes (o-, m-, p- isomers)	3.15	0.6 - 15
Toluene	2.65	90
Benzene	1.83	3.5 - 4.4

12.4. Mobility in soil .

12.5. Results of PBT and vPvB assessment No data available for assessment.

12.6. Other adverse effects

Endocrine Disruptor Information	This product does not contain any known or suspected endocrine disruptors
Persistent Organic Pollutant	This product does not contain any known or suspected substance
Ozone Depletion Potential	This product does not contain any known or suspected substance

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues / Unused Products	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.
Contaminated Packaging	Empty remaining contents. Dispose of in accordance with local regulations. Do not re-use empty containers.
European Waste Catalogue (EWC)	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific.
Other Information	Waste codes should be assigned by the user based on the application for which the product was used.

SECTION 14: TRANSPORT INFORMATION

IMDG/IMO

14.1. UN number	UN1307
14.2. UN proper shipping name	XYLENES
14.3. Transport hazard class(es)	3
14.4. Packing group	III

ADR

14.1. UN number	UN1307
14.2. UN proper shipping name	XYLENES
14.3. Transport hazard class(es)	3
14.4. Packing group	III

IATA

14.1. UN number	UN1307
14.2. UN proper shipping name	XYLENES
14.3. Transport hazard class(es)	3
14.4. Packing group	III

14.5. Environmental hazards	No hazards identified
14.6. Special precautions for user	No special precautions required
14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable, packaged goods

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories Australia X = listed China Canada The product is classified and labeled according to EC directives or corresponding national laws The product is classified and labeled in accordance with Directive 1999/45/EC Europe TSCA Korea Philippines Japan

Component	EINECS	ELINCS	NLP	TSCA	DSL	NDSL	PICCS	ENCS	IECSC	AICS	KECL
Ethylbenzene	202-849-4	-		X	X	-	X	X	X	X	X
Xylenes (o-, m-, p- isomers)	215-535-7	-		X	X	-	X	X	X	X	X

Toluene	203-625-9	-		X	X	-	X	X	X	X	X
Benzene	200-753-7	-		X	X	-	X	X	X	X	X

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)
Toluene		Use restricted. See item 48. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details)	
Benzene		Use restricted. See item 5. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details) Use restricted. See item 28. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details) Use restricted. See item 29. (see *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32006R1907:EN:NOT* for restriction details)	

National Regulations

Component	Germany - Water Classification (VwVwS)	Germany - TA-Luft Class
Ethylbenzene	WGK 1	
Xylenes (o-, m-, p- isomers)	WGK 2	
Toluene	WGK 2	
Benzene	WGK 3	Krebserzeugende Stoffe - Class III : 1 mg/m³ (Massenkonzentration)

Component	France - INRS (Tables of occupational diseases)
Ethylbenzene	Tableaux des maladies professionnelles (TMP) - RG 84
Xylenes (o-, m-, p- isomers)	Tableaux des maladies professionnelles (TMP) - RG 4bis,RG 84
Toluene	Tableaux des maladies professionnelles (TMP) - RG 4bis,RG 84
Benzene	Tableaux des maladies professionnelles (TMP) - RG 4,RG 4bis,RG 84

Take note of Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2005 Amendment.
Take note of Dir 94/33/EC on the protection of young people at work
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

15.2. Chemical safety assessment

A Chemical Safety Assessment/Report (CSA/CSR) has not been conducted

SECTION 16: OTHER INFORMATION

Full text of R-phrases referred to under sections 2 and 3
R10 - Flammable
R11 - Highly flammable
R20 - Harmful by inhalation
R38 - Irritating to skin
R45 - May cause cancer
R46 - May cause heritable genetic damage
R63 - Possible risk of harm to the unborn child
R65 - Harmful: may cause lung damage if swallowed
R67 - Vapors may cause drowsiness and dizziness

R20/21 - Harmful by inhalation and in contact with skin
R36/38 - Irritating to eyes and skin
R48/20 - Harmful: danger of serious damage to health by prolonged exposure through inhalation
R48/23/24/25 - Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed

Full text of H-Statements referred to under sections 2 and 3
H226 - Flammable liquid and vapor
H225 - Highly flammable liquid and vapor
H312 - Harmful in contact with skin
H332 - Harmful if inhaled
H315 - Causes skin irritation
H304 - May be fatal if swallowed and enters airways
H373 - May cause damage to organs through prolonged or repeated exposure

Legend

CAS - Chemical Abstracts Service
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
IECSC - Chinese Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japanese Existing and New Chemical Substances
AICS - Australian Inventory of Chemical Substances
NZIoC - New Zealand Inventory of Chemicals

WEL - Workplace Exposure Limit
ACGIH - American Conference of Governmental Industrial Hygienists
DNEL - Derived No Effect Level
RPE - Respiratory Protective Equipment
LC50 - Lethal Concentration 50%
NOEC - No Observed Effect Concentration
PBT - Persistent, Bioaccumulative, Toxic
TWA - Time Weighted Average
IARC - International Agency for Research on Cancer
PNEC - Predicted No Effect Concentration
LD50 - Lethal Dose 50%
EC50 - Effective Concentration 50%
POW - Partition coefficient Octanol:Water
vPvB - very Persistent, very Bioaccumulative

ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road
IMO/IMDG - International Maritime Organization/International Maritime Dangerous Goods Code
OECD - Organisation for Economic Co-operation and Development
BCF - Bioconcentration factor
ICAO/IATA - International Civil Aviation Organization/International Air Transport Association
MARPOL - International Convention for the Prevention of Pollution from Ships
ATE - Acute Toxicity Estimate
VOC - Volatile Organic Compounds

Key literature references and sources for data
Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Training Advice
Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.

Creation Date	13-Feb-2015
Revision Date	21-Feb-2014
Revision Summary	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

Version 5.8
Revision Date 10/12/2015
Print Date 05/01/2016

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Zinc

Product Number : 96454
Brand : Sigma-Aldrich

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)
Combustible dust,
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)

May form combustible dust concentrations in air
H410 Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)
P273 Avoid release to the environment.
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

Combustible dust

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : Zn
Molecular weight : 65.39 g/mol

Hazardous components

Component		Classification	Concentration
Zinc powder (stabilized)			
CAS-No. EC-No. Index-No.	7440-66-6 231-175-3 030-001-01-9	Aquatic Acute 1; Aquatic Chronic 1; H410	<= 100 %
Zinc oxide			
CAS-No. EC-No. Index-No.	1314-13-2 215-222-5 030-013-00-7	Aquatic Acute 1; Aquatic Chronic 1; H410	>= 5 - < 10 %

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.

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
Special powder against metal fire Dry sandUse water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable extinguishing media
Water

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.
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

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

Component	CAS-No.	Value	Control parameters	Basis
Zinc oxide	1314-13-2	TWA	2.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	metal fume fever		
		STEL	10.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		metal fume fever		

		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	15.000000 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	15.000000 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. 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
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
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	odourless
c)	Odour Threshold	No data available
d)	pH	Not applicable
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	Not applicable
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	Not applicable
l)	Vapour density	No data available
m)	Relative density	7.133 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	Not applicable
p)	Auto-ignition temperature	does not ignite
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	During processing, dust may form explosive mixture in air.
t)	Oxidizing properties	No data available

9.2 Other safety information

Bulk density	1.8 - 3.2 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
Dust may form explosive mixture in air.

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Acids and 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
No data available (Zinc powder (stabilized))

Inhalation: No data available (Zinc powder (stabilized))

Dermal: No data available (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

Skin corrosion/irritation
No data available (Zinc powder (stabilized))

Serious eye damage/eye irritation
No data available (Zinc powder (stabilized))

Respiratory or skin sensitisation
Did not cause sensitisation on laboratory animals. (Zinc powder (stabilized))

Germ cell mutagenicity
No data available (Zinc powder (stabilized))

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 (Zinc powder (stabilized))

No data available (Zinc powder (stabilized))

Specific target organ toxicity - single exposure
No data available (Zinc powder (stabilized))

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available (Zinc powder (stabilized))

Additional Information
RTECS: ZG8600000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Effects due to ingestion may include:, chills, dry throat, sweet taste, Fever, Cough, Nausea, Vomiting, Weakness, Contact with eyes or skin may cause:, Irritation (Zinc powder (stabilized))

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 450 µg/l - 96 h (Zinc powder (stabilized))
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 0.068 mg/l - 48 h (Zinc powder (stabilized))
	mortality NOEC - Daphnia (water flea) - 0.101 - 0.14 mg/l - 7 d (Zinc powder (stabilized))

12.2 Persistence and degradability

The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Bioaccumulation	Algae - 7 d at 16 °C - 5 µg/l (Zinc powder (stabilized))
	Bioconcentration factor (BCF): 466

12.4 Mobility in soil

No data available (Zinc powder (stabilized))

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.

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. (Zinc powder (stabilized))
Reportable Quantity (RQ): 1020 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. (Zinc powder (stabilized))
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Zinc powder (stabilized))

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
Zinc oxide	1314-13-2	2007-03-01
Zinc powder (stabilized)	7440-66-6	1993-04-24

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Zinc powder (stabilized)	7440-66-6	1993-04-24
Zinc oxide	1314-13-2	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

Full text of H-Statements referred to under sections 2 and 3.

	May form combustible dust concentrations in air
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
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:	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: 5.8 Revision Date: 10/12/2015 Print Date: 05/01/2016

ATTACHMENT H

Jobsite Safety Inspection Checklist

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ATTACHMENT H

JOBSITE SAFETY INSPECTION CHECKLIST

Client: _____ Inspection Date: _____

Site: _____ Inspector: _____

Employees: _____

Notes:_____
_____
_____

Check one of the following: **A:** Acceptable **NA**: Not Applicable **D**: Deficiency

	A	NA	D	Remarks
GENERAL				
Appropriate PPE being worn by Langan employees and subcontractors?				
Air monitoring instruments calibrated daily and results recorded on the Daily Instrument Calibration check sheet?				
Air monitoring readings recorded on the air monitoring data sheet/field log book?				
Incident reporting procedures known?				
Site security an issue?				
Vehicle /pedestrian traffic issue?				
Adequate size/type fire extinguisher supplied?				
Evidence that drilling operator is responsible for the safety of his rig.				
First Aid kit available?				
PERSONAL PROTECTIVE EQUIPMENT				
Eye Protection?				
Head protection?				
Safety Shoes?				
Safety vests?				
Hand protection?				
Other?				
Deficiencies??				
HOUSEKEEPING				
Work area kept clean/tidy to minimize potential hazards?				
Waste being disposed of quickly and properly				
Adequate lighting for job?				
Portable water available?				
HAND TOOLS				
Are tools in good condition and properly used? (INSPECT)				
Are proper tools being used?				
Are tools safety stored when not in use?				
Have tools been inspected prior to use?				
Are employees familiar with using tools?				
Is additional PPE required for tools? Available?				
POWER TOOLS				
Are tools in good condition and properly used? (INSPECT)				
Are tools properly grounded?				
Safety guards in place and used correctly?				
Competent instruction / supervision?				
Cords include in inspection?				

HAZWOPER				
Employees have current 40-hr./8-hr./Supervisor HAZWOPER training?				
Project staff medically cleared to work in hazardous waste sites and fit-tested to wear respirators, if needed?				
Respiratory protection readily available?				
Subcontract workers have current 40-hr./8-hr./Spvsr. HAZWOPER training, as appropriate?				
Subcontract workers medically cleared to work on site, and fit-tested for respirator wear?				
Subcontract workers have respirators readily available?				
HEALTH & SAFETY PLAN				
HASP available on site for inspection?				
Health & Safety Compliance agreement (in HASP) appropriately signed by Langan employees and subcontractors?				
Hospital route map with directions posted on site?				
Emergency Notification List posted on site?				
Personnel trained in CPR/First Aid on site?				
MSDSs readily available, and all workers knowledgeable about the specific chemicals and compounds to which they may be exposed?				
Project site safe practices ("Standing Orders") posted?				
Health & Safety Incident Report forms available?				
Decontamination procedures being followed as outlined in HASP?				
UNDERGROUND UTILITY				
Mark outs of underground utilities done prior to initiating any subsurface activities?				
Underground utilities located and authorities contacted before digging?				
Visually observed mark-outs?				
Is subsurface work within three feet of underground utilities?				
- Is so, is or was soft dig techniques used?				
Drilling performed in areas free from underground utilities?				
EXCAVATION / TRENCH				
Are excavations/trenches over 5 feet deep sloped, shored or a trench box used?				
Operations supervised by a Competent Person?				
Is Competent Person preforming daily inspections of excavation/trench?				
Adequate barricades in place?				
Have underground utilities been identified?				
Ladders / means of egress in trench with 25-foot of every worker?				
Has PE designed or approved protective system?				
Excavated material and other objects placed more than 2 feet away from excavation edge?				
Public protected from exposure to open excavation?				
CONFINED / PERMIT-ENTRY CONFINED SPACE				
People entering the excavation regarding it as a permit-required confined space and following appropriate procedures?				
Confined space entry permit is completed and posted?				
All persons knowledgeable about the conditions and characteristics of the confined space?				
All persons engaged in confined space operations have been trained in safe entry and rescue (non-entry)?				
Full body harnesses, lifelines, and hoisting apparatus available for rescue needs?				
Attendant and/or supervisor certified in basic first aid and CPR?				
Confined space atmosphere checked before entry and continuously while the work is going on?				
Results of confined space atmosphere testing recorded?				
Evidence of coordination with off-site rescue services to perform entry rescue, if needed?				
ELECTRICAL SAFETY				
Equipment at least 10 feet from overhead power lines?				
Is equipment grounded?				
GFCI used and tested where required?				
Are extension cords rated for this work being used and are they properly maintained?				
Electrical dangers posted at site?				

FLAMMABLE LIQUIDS				
Are flammable liquids used at site?				
Are flammable liquids stored in appropriate containers?				
Are flammable liquids kept away from combustion sources?				
Do flammable liquid containers have warning labels?				
LADDERS				
Are ladders used at site?				
Were ladders inspected prior to use?				
Are ladders in good working condition?				
Are ladders secured to prevent slipping, sliding or falling?				
Do side rails extend three feet above top of landing area?				
Are top two steps of stepladders being used?				
Is extension on ladder facing out?				
Are ladders sufficient for task?				
Are ladders sufficient for task?				

Unsafe acts observed? _____

Additional remarks _____

Notes:_____

Distribution: Project Manager - Name: _____
Health & Safety Officer - Name: _____
Health & Safety Manager- Name: Anthony Moffa, CHMM

ATTACHMENT I

Langan Guidelines

LANGAN

ATTACHMENT I

LANGAN GUIDELINES

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 carrying 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 insure 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 signalman 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 J

NYSDEC DER-10 CAMP

LANGAN

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion 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 over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/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 techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50° C (14 to 122° F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX F

Generic NYSDEC Community Air Monitoring Plan

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New York State Department of Health Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area and when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.
Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required at one upwind and two downwind stations for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** bases or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background

conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion 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 over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m3 or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work with Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.

APPENDIX G

Site Management Forms

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SITE INSPECTION CHECKLIST

Site Name: 550 Tenth Avenue Filling Station Site Location: New York, NY Project Number: 100674402

Inspector Name: _____ Date: _____ Weather Conditions: _____

Reason for Inspection (i.e., routine, severe condition, etc.): _____

Check one of the following:
(Y: Yes N: No N/A: Not Applicable)

		Y	N	N/A	Normal Situation	Remarks
	General					
1	What are the current site conditions?	-	-	-		
2	Are all applicable site records (e.g., documentation of construction activity, most current easement, etc.) complete and up to date?					
	Environmental Easement					
3	Has site use (Restricted-Residential) remained the same?					
4	Does it appear that all environmental easement restrictions have been followed?					
	Building Slab					
5	Are there any indications of a breach in the building slab 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 the breaching of the building slab, on-site at the time of this inspection?					
9	If YES to number 8, is there documentation that the Soil 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 Institutional Controls (ICs) for the site, additional remarks must be provided and, where applicable, documentation attached to this checklist detailing additional inspection and repair activities.**

Additional remarks: _____

Minimum Inspection Schedule:

- Site-wide inspections will be conducted annually, per certification year, at a minimum.
- Additional inspections will also be conducted at times of severe weather condition events.
- All inspection events will use this checklist.