Known for excellence.
Built on trust.

Interim Remedial Measure Work Plan

19-27 Clay Street, 29 Clay Street & 60-62 Commercial Street
Brooklyn, NY 11222
BCP Site No. C224390

January 2025
File No. 41.0163279.00 and 41.0163305.00

PREPARED FOR:

CLAY PROPERTIES LLC
134 North 4th Street
Brooklyn, NY 11249

GOLDBERG-ZOINO ASSOCIATES OF NEW YORK P.C.
D/B/A GZA GEOENVIRONMENTAL OF NEW YORK
104 West 29th Street, 10th Floor | New York, NY 10001
212-594-8140

Copyright© 2025 GZA GeoEnvironmental of New York

Known for excellence.
Built on trust.

January 10, 2025
File Nos. 41.0163279.00 and 41.0163305.00

Ms. Jennifer Gonzalez
New York State Department of Environmental Conservation
Division of Environmental Remediation
47-40 21st Street
Long Island City, NY 11101

Re: Interim Remedial Measure Work Plan
19-27 Clay Street, 29 Clay Street & 60-62 Commercial Street
Brooklyn, NY 11222
NYSDEC BCP No. C224390

Dear Ms. Gonzalez:

On behalf of the Clay Properties LLC (Volunteer/Owner), Goldberg-Zoino Associates of New York P.C. d/b/a GZA GeoEnvironmental of New York (GZA) is pleased to submit this Interim Remedial Measure (IRM) Work Plan (WP) for the above-referenced properties (Site) managed under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site Nos. C224390.

This IRMWP details the initial phase in the remediation and redevelopment of the Site and summarizes the nature and extent of contamination as evaluated from data gathered during the Remedial Investigation (RI) performed in August-September 2024. Should you have any questions, please contact Victoria Whelan at (631) 793-8821 or Victoria.Whelan@gza.com or Mark Hutson at (646) 929-8955 or Mark.Hutson@gza.com.

Very truly yours,
GZA GEOENVIRONMENTAL OF NEW YORK

Mark Hutson, P.G.
Senior Project Manager

Stephen M. Kline, P.E.
Consultant Reviewer

Victoria Whelan, P.G.
Vice President

TABLE OF CONTENTS

LIST OF ACRONYMS iv
CERTIFICATIONS vi
1.0 INTRODUCTION 1
1.1 Objectives 1
1.2 Site Location and Description 2
1.3 Proposed Redevelopment Plan 2
1.4 Description of Surrounding Properties 2
1.5 Summary of the Interim Remedial Measures 3
2.0 SUMMARY OF ENVIRONMENTAL CONDITIONS 4
2.1 Summary Remedial Investigations Performed 4
2.2 Chemical Analytical Work Performed 5
2.3 Geological and Hydrogeological Conditions 6
2.4 Remedial Investigation Findings 8
3.0 DESCRIPTION OF INTERIM REMEDIAL MEASURES 16
3.1 Building Demolition 18
3.2 DNAPL Recovery Well Installation, Gauging and Recovery 19
3.3 Groundwater Injections 21
3.4 Temporary Soil Vapor Extraction System 22
3.5 Contained-In Determination Sampling and Delineation 23
4.0 General IRM Information 24
4.1 Governing Documents 25
4.1.1.1 Odor Control Plan 26
4.1.1.2 Dust Control Plan 27
4.1.1.3 Other Nuisances 27
4.2 Remedial Performance Evaluation 29
5.0 Green and Sustainable Remediation 30
6.0 Reporting and Record Keeping 31
6.1 Daily and Monthly Reports 31
6.2 Construction Completion Report (CCR) 33
7.0 SCHEDULE 33

TABLES

TABLE 1 SAMPLE COLLECTION SUMMARY
TABLE 2A VOLATILE ORGANIC COMPOUNDS IN SOIL – 2023 NYCOER RI
TABLE 2B VOLATILE ORGANIC COMPOUNDS IN SOIL – 2024 NYSDEC RI
TABLE 3A SEMI-VOLATILE ORGANIC COMPOUNDS IN SOIL – 2023 NYCOER RI
TABLE 3B SEMI-VOLATILE ORGANIC COMPOUNDS IN SOIL – 2024 NYSDEC RI
TABLE 4A TOTAL METALS IN SOIL – 2023 NYCOER RI
TABLE 4B TOTAL METALS IN SOIL – 2024 NYSDEC RI
TABLE 5A PESTICIDES, HERBICIDES, AND POLYCHLORINATED BIPHENYLS IN SOIL – 2023 NYCOER RI
TABLE 5B PESTICIDES, HERBICIDES, AND POLYCHLORINATED BIPHENYLS IN SOIL – 2024 NYSDEC RI
TABLE 6A PER- AND POLYFLUOROALKYL SUBSTANCES IN SOIL – 2023 NYCOER RI
TABLE 6B PER- AND POLYFLUOROALKYL SUBSTANCES IN SOIL – 2024 NYSDEC RI
TABLE 7A VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER – 2023 NYCOER RI
TABLE 7B VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER – 2024 NYSDEC RI
TABLE 8A SEMI-VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER – 2023 NYCOER RI
TABLE 8B SEMI-VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER – 2024 NYSDEC RI
TABLE 9A TOTAL METALS IN GROUNDWATER– 2023 NYCOER RI
TABLE 9B TOTAL METALS IN GROUNDWATER– 2024 NYSDEC RI
TABLE 10A PESTICIDES, HERBICIDES, AND POLYCHLORINATED BIPHENYLS IN GROUNDWATER – 2023 NYCOER RI
TABLE 10B PESTICIDES, HERBICIDES, AND POLYCHLORINATED BIPHENYLS IN GROUNDWATER – 2024 NYSDEC RI
TABLE 11A PER- AND POLYFLUOROALKYL SUBSTANCES IN GROUNDWATER – 2023 NYCOER RI
TABLE 11B PER- AND POLYFLUOROALKYL SUBSTANCES IN GROUNDWATER – 2024 NYSDEC RI
TABLE 12A VOLATILE ORGANIC COMPOUNDS IN SOIL VAPOR AND OUTDOOR AIR – 2023 NYCOER RI
TABLE 12B VOLATILE ORGANIC COMPOUNDS IN SOIL VAPOR – 2024 NYSDEC RI
TABLE 13 VOLATILE ORGANIC COMPOUNDS IN INDOOR AND OUTDOOR AIR – 2024 NYSDEC RI

FIGURES

FIGURE 1 SITE LOCATION MAP
FIGURE 2 AERIAL MAP
FIGURE 3 PROPERTY LAND USE MAP
FIGURE 4 SAMPLING LOCATION MAP
FIGURE 5A SUBSURFACE PROFILE LAYOUT MAP
FIGURE 5B SUBSURFACE PROFILE A-A'
FIGURE 5C SUBSURFACE PROFILE B-B'
FIGURE 5D SUBSURFACE PROFILE C-C'
FIGURE 6 GROUNDWATER CONTOUR MAP
FIGURE 7 2023 NYCOER RI SOIL RESULTS
FIGURE 8A-8D 2024 NYSDEC RI SOIL RESULTS
FIGURE 9 2023 NYCOER RI GROUNDWATER SAMPLING RESULTS
FIGURE 10A-10B 2024 NYSDEC RI GROUNDWATER SAMPLING RESULTS
FIGURE 11 2023 NYCOER RI SOIL VAPOR AND AMBIENT AIR SAMPLING RESULTS
FIGURE 12 2024 NYSDEC RI SOIL VAPOR, INDOOR AIR, AND AMBIENT AIR SAMPLING RESULTS
FIGURE 13 PROPOSED RECOVERY WELL AND ADDITIONAL SOIL BORING LOCATION MAP
FIGURE 14 PROPOSED IN-SITU INJECTION LOCATION PLAN
FIGURE 15 PROPOSED SOIL VAPOR EXTRACTION TREATMENT AREA MAP

APPENDICES

APPENDIX A	COMMUNITY AIR MONITORING PLAN
APPENDIX B	PROVECTUS PRODUCT SPECIFICATIONS AND PROPOSAL
APPENDIX C	QUALITY ASSURANCE PROTECTION PLAN
APPENDIX D	SVE PILOT TEST WORKPLAN
APPENDIX E	CONSTRUCTION HEALTH AND SAFETY PLAN
APPENDIX F	MATERIALS MANAGEMENT PLAN
APPENDIX G	GREEN AND SUSTAINABLE REMEDIATION CLIMATE SCREEN CHECKLIST AND ENVIRONMENTAL FOOTPRINT ANALYSIS

LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AGV	Air Guidance Values
ASTM	American Society for Testing and Materials
AWQS	Ambient Water Quality Standards
BCA	Brownfield Clean-up Agreement
BGS	Below Ground Surface
BOA	Brownfield Opportunity Area
BTOC	Below Top of Casing
CAMP	Community Air Monitoring Plan
CCR	Construction Completion Report
CHASP	Construction Health and Safety Plan
Cr^{6+}	Hexavalent Chromium
CSOP	Contractors Site Operation Plan
CVOCs	Chlorinated Volatile Organic Compounds
DCR	Declaration of Covenants and Restrictions
DER	Department of Environmental Remediation
DNAPL	Dense Non-Aqueous Phase Liquid
DUSR	Data Usability Summary Report
ECs/ICs	Engineering and Institutional Controls
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FER	Final Engineering Report
ft	Feet
ft^2	Square Feet
GC	General Contractor
GPS	Global Positioning System
GZA	GZA GeoEnvironmental of New York
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
LNAPL	Light Non-Aqueous Phase Liquid
MCG/M^3	Micrograms per Cubic Meter
NOC	Notice of Completion
NYC VCP	New York City Voluntary Clean-up Program
NYC DEP	New York City Department of Environmental Protection
NYC DOB	New York City Department of Buildings
NYC DOF	New York City Department of Finance

Acronym	Definition
NYC OER	New York City Office of Environmental Remediation
NYCRR	New York Codes Rules and Regulations
NYS DEC	New York State Department of Environmental Conservation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
NYS ELAP	Environmental Laboratory Accreditation Program
ORP	Oxygen Release Compound
OSHA	United States Occupational Health and Safety Administration
PBS	Petroleum Bulk Storage
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PE	Professional Engineer
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
PPM	Parts Per Million
QA/QC	Quality Assurance/ Quality Control
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RECs	Recognized Environmental Condition
RI	Remedial Investigation
RIR	Remedial Investigation Report
RMZ	Residual Management Zone
Sanborn	Sanborn Fire Insurance Map
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SHWS	Solid Hazardous Waste Site
SMMP	Soils/ Materials Management Plan
SQ FT	Square Feet
SVI	Soil Vapor Intrusion (Guideline)
SVOC	Semi-Volatile Organic Compound
TCE	Trichloroethene
TOGS	Technical and Operational Guidance Series
TCLP	Toxicity Characteristic Leaching Procedure
UST	Underground Storage Tank
VOC	Volatile Organic Compound

CERTIFICATIONS

I, Stephen M. Kline, certify that I am currently a NYS registered professional engineer and that this Interim Remedial Measures Work Plan for 19-27 Clay Street & 60-62 Commercial Street and 29 Clay Street BCP Site was prepared in accordance with applicable statutes and regulations and in substantial conformance with the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10).

Stephen M. Kline, PE	January 10, 2025	
NYS Professional Engineer # 080431	Date	Signature

I, Victoria D. Whelan, certify that I am currently a Qualified Environmental Professional as defined in 6 New York Codes, Rules, and Regulations (NYCRR) Part 375 and that this Interim Remedial Measures Work Plan was prepared in accordance with all applicable statutes and regulations and substantial conformance with New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10).

Victoria Whelan, PG	January 10, 2025	
NYS Professional Geologist #0318	Date	Signature

INTERIM REMEDIAL MEASURE WORK PLAN

1.0 INTRODUCTION

The current owner, Clay Properties, LLC (Volunteer/Owner), has entered into an agreement with the New York State Department of Environmental Conservation (NYSDEC) under the New York State Brownfield Cleanup Program (BCP) to investigate and remediate the properties located at 19-27 Clay Street, 29 Clay Street and 60-62 Commercial Street (BCP Site No. C224390) in the Greenpoint neighborhood of Kings County, New York (herein referred to as the Site).

Goldberg-Zoino Associates of New York P.C. d/b/a GZA GeoEnvironmental of New York (GZA) has prepared this Interim Remedial Measure (IRM) Work Plan (WP) on behalf of the Owner to detail the initial phase in the remediation and redevelopment of the Site.

This IRMWP summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigations (RI), performed in February 2023 (2023 NYCOER RI) and August-September 2024 (2024 NYSDEC RI). These data are presented in the Remedial Investigation Report (RIR) dated October 2024.

The remedial activities described in this document are consistent with the procedures defined in NYSDEC Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10) issued May 3, 2010, with revisions dated April 9, 2019, and comply with applicable standards, criteria, and guidance. The remedy described in this document also complies with applicable Federal, State, and local laws, regulations, and requirements.

1.1 Objectives

Based on the data collected during the RI, it was determined that an IRM would need to be completed to begin immediate source removal, mitigate the exposure to future construction workers and eliminate the pathway for sub-grade vapors to migrate off-site.

The IRMWP is designed to begin the more immediate remedial action items prior to approval of the Remedial Action Workplan (RAWP). The Volunteer respectfully requests approval of the IRMWP so that remediation efforts can begin prior to full-scale construction at the Site and prior to completion of the final NYSDEC-decision making with respect to the Remedial Measures to be required at the Site. The RAWP is scheduled to be submitted to the NYSDEC in December 2024. Under the project schedule, the Volunteer seeks to begin demolition of the existing building at the Site as early as December 2024 and begin construction of the proposed superstructure in March 2025.

This IRMWP was developed based on Site data compiled to date, including RI data collected by Preferred Environmental Services (Preferred) in February 2023 and GZA in August-September 2024.

1.2 Site Location and Description

The Site is located in the Greenpoint neighborhood of Brooklyn, New York. A topographic map showing the location of the Site is provided as **Figure 1**. The Site is comprised of three contiguous parcels as described below:

Address	Block and Lot	Land Use	Parcel Size	Current Use
19-27 Clay Street	Block 2482 Lot 9	Industrial / Manufacturing / Dense Residential (M1-2/R6)	0.15 acres	2-story warehouse building.
60-62 Commercial Street	Block 2482 Lot 10		0.087 acres	Storage yard, parking
29 Clay Street	Block 2482 Lot 53		0.22 acres	Vacant Lot

A Site Plan with an aerial of the Site is included in **Figure 2**.

1.3 Proposed Redevelopment Plan

This project encompasses investigating and remediating the Site under the NYSDEC Brownfield Cleanup Program, while redeveloping it as a residential property. The redevelopment plan includes demolishing the existing 10,200 square foot (SF) warehouse building and constructing a new 47,779 SF, 5- story residential building.

1.4 Description of Surrounding Properties

The surrounding properties were assessed during previous Phase I Environmental Site Assessments and during subsequent investigation events. At the present time, the surrounding properties remain a mix of residential and industrial/manufacturing land uses. The Site is bound to the north (across Commercial Street) by an asphalt-paved storage yard for equipment and vehicles by the New York City Transit Authority (NYCTA); to the east by a 1-story warehouse and a new 7-story residential building (NYSDEC BCP Site No. C224153); to the south (across Clay Street) by the Former NuHart Plastics Site (NYSDEC BCP Site No. C224287); and to the west by a mixed-use development currently under construction (NYSDEC BCP Site No. C244278). A figure showing the vicinity property land use with a 500-ft buffer around the Site is included as **Figure 3**.

1.5 Summary of the Interim Remedial Measures

The proposed IRM is consistent with protection of public health and the environment for the intended future use of the property. The IRM will consist of the following:

1. Site mobilization involving Site security set-up, equipment mobilization and utility mark outs.
2. Performance of a CAMP for particulates and VOCs.
3. Install five DNAPL recovery wells (designated RW-01 through RW-05) in the area of observed DNAPL during the RI.
4. Install three additional soil borings and a potential DNAPL recovery well (RW-06) east/northeast of MW-11.
5. Gauge and recover DNAPL in the newly installed recovery wells. DNAPL will be recovered using Vacuum Enhanced Fluid Recovery (VEFR). The recovered material will be handled as hazardous waste in accordance with local laws and regulations.
6. Groundwater injections to address contamination in soil and groundwater, primarily for chlorinated VOCs, above the soil cleanup objectives and groundwater above the NYSDEC TOGS 1.1.1 AWQS.
7. Installation of a temporary SVE treatment system to limit the off-Site migration of elevated concentrations of VOCs in soil vapor.
8. Demolition of the existing warehouse on Lot 9. The existing slab will remain in place during the IRM; the soil beneath the warehouse will be managed under the RAWP.
9. A sampling program to potentially allow for disposal of a portion of the site soils as non-hazardous waste through a Contained-In Determination from the NYSDEC Division of Solid and Hazardous Waste. A Contained-In Determination Workplan will be submitted separately from this IRM.
10. Waste management may include temporarily storing soil and groundwater in 55-gallon drums in preparation for off-Site disposal and in accordance applicable laws and regulations.
11. Daily and Monthly field reports to the NYSDEC and the NYSDOH will be submitted during the IRM activities.

All deviations from this IRMWP will be reported to NYSDEC and NYSDOH. Deviations must be approved by NYSDEC.

2.0 SUMMARY OF ENVIRONMENTAL CONDITIONS

The Volunteer performed a preliminary Remedial Investigation (RI) at the Site in February 2023 associated with the E-designation requirements for the New York City Office of Environmental Remediation (NYCOER) prior to entering into the NYSDEC BCP. The findings of the 2023 NYCOER RI are summarized in the October 2024 RIR.

Once in the NYSDEC BCP, the Site was fully characterized in August and September 2024. GZA performed the RI in accordance with the RIWP for BCP Site No. C224390 dated June 24, 2024, and revised July 2, 2024; and the RIWP for BCP Site No. C224408 dated July 29, 2024, both of which were approved by NYSDEC on August 2, 2024; and the Quality Assurance Project Plan (QAPP), dated June 2024. During the implementation, GZA communicated field observations and evaluations with the NYSDEC Project Manager and approved deviations were implemented in accordance with the additional NYSDEC requirements. Details of the RI conducted in August-September 2024 are summarized in the following subsections.

The 2024 NYSDEC RI was performed to evaluate Site data and information necessary to develop this IRMWP, and the subsequent RAWP, in a manner that will render the Site protective of public health and the environment during construction and renders the Site consistent with the contemplated end use. RI activities included the following scope of work: (i) delineation of the horizontal and vertical extent of impacted soils, groundwater, and soil vapor on Site; (ii) assessment of the potential fate and transport of contaminants; and (iii) data collection to allow for evaluation of potential remedial alternatives for exposure mitigation. The Remedial Investigation Report (RIR) did include both investigations to represent the full site characterization.

2.1 Summary Remedial Investigations Performed

The RI is summarized in the following sections and included the following activities:

- Conducted a geophysical survey to scan for subsurface anomalies that may be indicative of unidentified underground storage tanks (USTs) and utilities in the vicinity of the proposed boring locations;
- Advanced 31 soil borings to depths ranging from 5 to 45 feet below ground surface (ft bgs) across the Site;
- Excavated one shallow test pit using hand tools to investigate the existing trench on 29 Clay Street;
- Collected 100 discrete samples, 42 composite samples, and additional Quality Assurance/Quality Control (QA/QC) samples for laboratory analyses;
- Installed 11 permanent monitoring well clusters. Each cluster is comprised of two or three, 1- or 2-inch diameter monitoring wells to varying depths: shallow, intermediate, and deep;
- Conducted an elevation survey of the permanent monitoring wells to develop a groundwater contour map.

- Collected 19 groundwater samples from the shallow and intermediate wells, 11 groundwater samples from the deep wells, and additional QA/QC samples for laboratory analyses;
- Installation of 12 soil vapor points down to four (4) ft bgs;
- Collected 12 soil vapor samples and additional QA/QC samples for laboratory analyses;
- Collected four ambient air samples (indoor and outdoor);
- Managed investigation derived waste (IDW) during RI activities.
- Performed community air monitoring during RI activities in accordance with CAMP and added additional CAMP as needed and requested by NYSDEC.

RI Sample locations are shown on **Figure 4**.

2.2 Chemical Analytical Work Performed

Soil Laboratory Analyses

Soil samples were containerized and analyzed at a New York State Department of Health ELAP-certified laboratory, York Analytical Laboratories of Richmond Hill, NY (York).

The soil samples were analyzed for the following:

- Target compound list (TCL) VOCs (includes 1,4 Dioxane) by EPA Method 8260C (rev. 2006);
- TCL Semi-Volatile Organic Compounds (SVOCs) by EPA Method 8270D (rev. 2007);
- Target Analyte List (TAL) Metals by EPA Method 6010C (rev. 2007) including Hexavalent Chromium and Total Cyanide;
- Polychlorinated biphenyls (PCBs) by EPA Method 8082A (rev. 2007);
- Pesticides by EPA Method 8081B (rev. 2000);
- Herbicides by EPA Method 8151A (rev. 2000); and
- Per- and Polyfluoroalkyl substances (PFAS) by EPA Method 1633 (2023).

In total, 100 discrete soil samples were analyzed for VOCs and 42 composite soil samples were collected for full suite analysis. Additional duplicate and QA/QC samples were also collected, as required by the site-specific QAPP.

Completed sample labels were affixed to the side of the laboratory provided sample bottles. Once the sample bottles were filled, they were immediately placed in the cooler with ice to maintain the samples at below 4^{o}C and transported, via courier to York, under proper chain-of-custody procedures for analysis.

Groundwater Laboratory Analyses

Sampling equipment and procedures for PFAS sample collection generally followed EPA Method 1633 PFAS Field Sampling Guidelines. Groundwater samples were stored at or below 4°C and transported under proper chain of custody procedures to York to be analyzed for the following:

- TCL VOCs by EPA Method 8260C (rev. 2006);
- TCL SVOCs by EPA Method 8270D (rev. 2007);
- Total and dissolved TAL Metals by EPA Method 6010C/6020/7470 (rev. 2007);
- Cyanide by EPA Method 9010/9012B (rev. 2004);
- Mercury by EPA Method 7471B (rev. 2007);
- Pesticides by EPA Method 8081B (rev. 2000);
- PCBs by EPA Method 8082A (rev. 2000);
- 1,4-Dioxane by EPA Method SW 846 8260 (isotope dilution for 1-4 Dioxane); and
- PFAS by EPA Method 1633 (2023).

In total, 11 groundwater samples from the deep screened wells were analyzed for VOCs only and 19 samples from the shallow and intermediate wells were collected for full-suite analysis. Purge water was containerized in 55-gallon drums and stored on-Site prior to disposal off-Site. Other investigative derived waste was containerized and temporarily stored in a centralized location for off-site disposal.

Soil Vapor, Indoor and Outdoor Air Laboratory Analyses

The soil vapor samples were collected with a laboratory-supplied 6-liter Summa canister equipped with an 8-hour flow regulator calibrated for less than 0.2 liters per minute. Following completion of the purging and the helium tracer test, dedicated polyethylene/HDPE tubing was used to connect the probe to a laboratory-supplied 6-liter Summa canister for sampling. Summa canisters were transported via courier to York and the samples were analyzed for the following:

- TCL VOCs by EPA Method TO-15

The indoor air/ambient air samples were collected with a laboratory-supplied 6-liter Summa canister equipped with an 8-hour flow regulator calibrated for less than 0.2 liters per minute. After approximately eight hours, the summa canister flow regulator was closed and detached. Summa canisters were transported via courier to York and analyzed for the following:

- TCL VOCs by EPA Method TO-15

2.3 Geological and Hydrogeological Conditions

Based on our review of the 1776-7 Original High and Low Grounds, Salt Marsh and Shorelines in the City of Brooklyn Map, the Site lies within the border line of the original shoreline of Newtown

Creek. With development, the shoreline was extended west and north by backfilling and raising grades to develop the street grid. Fill used to raise grades is underlain by clayey silts and silty sands.

In September 2024, DPK Land Surveying (DPK) conducted a survey of the Site which showed that the ground elevation ranges (proximate to monitoring wells) from elevations (EL) 14.52 feet above mean sea level (amsl) relative to the North American Vertical Datum 1988 (NAVD88) at the western portion of the Site, to EL 15.51 feet amsl at the eastern portion of the Site. The topographic gradient at the Site slopes generally down from east to west (See **Figure 1**). The nearest water bodies are Newtown Creek located approximately 600 feet to the north, and the East River located approximately 800 feet to the west, of the Site.

Based on Bedrock Engineering Geologic Maps of New York County and Parts of Kings and Queens Counties, New York, and Parts of Bergen and Hudson Counties, New Jersey, dated 1990, the bedrock near the Subject Property consists of interbedded units of gray thinly laminated muscovite-biotite-quartz schist, and white to pinkish with light green weathering gneiss. During this RI, bedrock was encountered at approximately EL -25 feet amsl, which is approximately 40 ft bgs.

Soil and Rock Conditions

Based on the results of our subsurface exploration program during the 2024 NYSDEC RI, the subsurface conditions at the Site generally consist of the following observed soil profile.

- SURFACE COVER: Surface cover consisting of concrete was encountered at each soil boring location. The concrete was approximately 4 to 10-inches in thickness.

- FILL: Fill, consisting of dark brown/black/gray/tan fine to coarse sand containing construction debris, such as bricks, concrete, cinders/asphalt millings, was encountered below the Surface Cover in the borings extending to depths of up to approximately 4 ft bgs.

- SAND: Sand stratum was encountered below the fill in most locations, extending to approximately 20 ft bgs. The Sand stratum generally consisted of brown fine to coarse sand, with varying levels of silt and gravel.

- SILTY SAND: A silty sand stratum was also encountered below the fill in some borings and below the sand layer in some of the borings. In some borings, the silty sand stratum extended to termination depths of approximately 39 ft bgs. The stratum consists of light brown/brown silty sand with varying levels of gravel.

- SILTY CLAY / CLAYEY SILT: A silt/clay stratum was encountered interbedded between the sand and silty sand stratum and extended to depths ranging from approximately 15 to 22 ft bgs (approximately 0.5 feet to 4 feet thick) in some of the shallow borings, and between

26 to 32 ft bgs in some of the deep borings (approximately between 2 and 5 feet thick). The stratum consists of brown/dark gray silty clay and clayey silt, and trace fine sand. The thicker shallow layers of silty clay were primarily encountered in the southern portion of the site.

- DECOMPOSED ROCK: Decomposed rock stratum was encountered underlying the sand and silty sand stratum to depths ranging from 37 ft bgs to boring termination depth of 45 ft bgs. Decomposed rock is identified as material that has retained the parent bedrock features.

The subsurface condition at the Site is typical of a subsurface tidal waterbody. The Site was historically part of the shoreline of Newtown Creek, which received intermittent inflow and outflow of discharges. The subsurface profiles are shown included as **Figures 5A to 5D**.

Groundwater Conditions

GZA performed a synoptic groundwater well gauging event at the shallow wells on September 5, 2024. The groundwater elevation data from specific shallow wells (i.e., MW-01S to MW-8S and MW-10S) were used to prepare a groundwater contour map with measurements presented in EL amsl relative to the NAVD88. During this groundwater gauging event, depth to groundwater (i.e., from the top of casing [TOC]) ranged from 8.20 ft bgs to 11.72 ft bgs (EL 4.77 ft to 6.85 ft amsl), excluding MW-09S and MW-11S. At the time of the gauging event, MW-09S and MW-11S were observed to have not fully recharged after well development, and therefore; were not included in the groundwater contours.

The groundwater elevation data shows that groundwater flows generally from east to west across the Site, towards the East River. The groundwater contour map from the shallow wells is included as **Figure 6**.

2.4 Remedial Investigation Findings

The following sections detail the contamination conditions that exist at the Site in soil, groundwater, and soil vapor based on RI findings. The RI Sampling Summary is presented in **Table 1**. Soil analytical results were compared to 6 NYCRR Part 375 Unrestricted Use SCOs (UUSCOs), Restricted-Residential Use SCOs (RRUSCOs), and Protection of Groundwater Resources SCOs (PGSCOs). Perfluoroalkyl substances in soil were compared to 6 NYCRR Part 375-6 Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS) Guidance values. Groundwater analytical results were compared to the NYSDEC Technical Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) & Guidance Values and Groundwater Effluent Limitations. Elevated concentrations of analytes in soil vapor and ambient are presented.

2023 NYCOER RI Soil Sampling Results

Volatile Organic Compounds

- The chlorinated solvent, Trichloroethylene (TCE), was detected in one shallow sample above the UUSCO and PGSCOs and one sample above the UUSCO, RRUSCO, and PGSCOs.

Semi-Volatile Organic Compounds

- Polycyclic aromatic hydrocarbons (PAHs) (i.e., benzo(a)anthracene [max of 15 mg/kg], benzo(a)pyrene [max of 13.1 mg/kg], benzo(b)fluoranthene [max of 12 mg/kg], benzo(k)fluoranthene [max of 10.9 mg/kg], chrysene [max of 13.9 mg/kg], dibenzo(a,h)anthracene [max of 1.59 mg/kg], indeno(1,2,3-cd)pyrene [max of 8.73 mg/kg] were detected in three (2) shallow samples either above UUSCOs, PGSCOs, and/or RUSCOs. Phenol was detected in one shallow sample above the PGSCO.

Metals

- Metals specifically arsenic (max of 15.3 mg/kg), copper (max of 311 mg/kg), lead, nickel (max of 36.8 mg/kg), mercury (max of 0.193 mg/kg), zinc (max of 1,400 mg/kg), were detected in one to nine (9) soil samples above UUSCOs, but below RRUSCOs or PGSCOs. Barium (max of 513 mg/kg) and cadmium (max of 6.14 mg/kg) were detected above UUSCOs and RRUSCOs in one sample. Lead (max of 6,870 mg/kg) were detected in four samples and manganese (max of 3,260 mg/kg) in one sample above the UUSCOs, RRUSCOs, and PGSCOs.

Polychlorinated biphenyls

- PCBs were detected in one sample above the UUSCO and one sample above the UUSCO, RRUSCO, and PGWSCO.

Pesticides

- The pesticides 4,4'-DDT was detected in three samples above the UUSCO, 4,4'-DDE in two samples above the UUSCO, and Dieldrin was detected in one sample above the UUSCO, RRUSCO, and PGSCO in one sample.

Per and Polyfluoroalkyl Substances

- PFAS were either below detection limits of were detected below their respective UUSCOs, RRUSCOs, or PGSCOs. Note that only two shallow soils samples were targeted for analysis during the 2023 Remedial Investigation.

The soil analytical results for the 2023 Remedial Investigation are summarized in **Tables 2A, 3A, 4A, 5A and 6A**. **Figure 7** shows the soil sample locations and spider diagrams summarizing exceedances of UUSCOs, RRUSCOs, and PGSCOs.

2024 NYSDEC RI Soil Sampling Results

Volatile Organic Compounds

- Acetone (max of 0.067 mg/kg), 1,1,1-Trichloroethane (max of 36 mg/kg), cis-1,2-Dichloroethylene (max of 3.8 mg/kg), ethyl benzene, methylene chloride (max of 3.1 mg/kg), n-butylbenzene (max of 21 mg/kg), n-propylbenzene (max of 30 mg/kg), naphthalene (max of 21 mg/kg), sec-butylbenzene (max of 17 mg/kg), toluene, vinyl chloride (max of 0.0810 mg/kg), xylene were detected above UUSCOs and PGSCOs, but below RRUSCOs in some samples.

- Several Chlorinated VOCs, including TCE (max of 57,000 mg/kg) and PCE (max of 120 mg/kg) were detected above UUSCOs, RRUSCOs, and PGSCOs in some samples.

- Petroleum hydrocarbons, specifically xylene (max of 2,700 mg/kg), 1,2,4-trimethylbenzene (max of 410 mg/kg), 1,3,5-Trimethylbenzene (max of 120 mg/kg), ethyl benzene (max of 410 mg/kg), and toluene (max of 1,100 mg/kg), were detected above UUSCOs PGSCOs, and RRUSCOs in some samples.

Semi-Volatile Organic Compounds

- Polycyclic aromatic hydrocarbons (PAHs), specifically benzo(a)anthracene (max of 6.63 mg/kg), benzo(a)pyrene (max of 7.36 mg/kg), benzo(b)fluoranthene (max of 5.7 mg/kg), benzo(k)fluoranthene (max of 6.29 mg/kg), chrysene (max of 6.83 mg/kg), dibenzo(a,h)anthracene (max of 0.88 mg/kg), and indeno(1,2,3-cd)pyrene (max of 4.18 mg/kg), were detected above UUSCOs, PGSCOs, and/or RRUSCOs in the shallow samples.

Metals

- Zinc (max of 1,060 mg/kg) was detected above UUSCOs, but below RRUSCOs and PGSCOs in some samples. Selenium was detected above UUSCOs and PGSCOs, but below RRUSCOs in one sample. Cadmium (max of 5.31 mg/kg) were detected above UUSCOs and RRUSCOs, but below PGSCOs in one sample.

- Arsenic (max of 43.6 mg/kg), barium (max of 1,010 mg/kg), copper (max of 2,620 mg/kg), lead (max of 3,560 mg/kg), and nickel (max of 443 mg/kg) were detected above the UUSCOs, RRUSCOs, and PGSCOs in some samples.

Pesticides and polychlorinated biphenyls

- Pesticides and PCBs were either below their detection limits or detected below their respective UUSCOs, RRUSCOs and PGSCOs

Per and Polyfluoroalkyl Substances

- PFOS (max of 4.96 micrograms per kilogram [ug/kg]) was detected above UUSCOs in seven soil samples and detected above UUSCOs and PGSCOs in three soil samples.
- PFOA (max of 0.804 ug/kg) was detected in two soil samples above UUSCOs.

DNAPL

1. DNAPL was observed in two wells in the central portion of Lot 53. DNAPL was first observed in SB-35 at a depth of 16-18 feet bgs. In consultation with the NYSDEC, several step out borings were advanced to assess the nature and extent of the plume. DNAPL was subsequently observed in SB-35_E (15 -17 feet bgs), SB-35_S (15-18 feet bgs) and SB-35_10W (18-22 feet bgs). The DNAPL seems to be isolated to an interval located approximately 7-9 feet above a clay layer identified in the central and southern portions of Lot 9 and Lot 53. The DNAPL appears to vary between 2 and 4 feet of thickness in the area of assumed DNAPL, as observed in the soil borings.

The soil analytical results for the 2024 NYSDEC RI are summarized in **Tables 2B, 3B, 4B, 5B and 6B**. **Figures 8A to 8D** show the soil sample locations and spider diagrams summarizing exceedances of UUSCOs, RRUSCOs, and PGSCOs.

2023 NYCOER RI Groundwater Sampling Results

Volatile Organic Compounds

- Concentrations of chlorinated VOCs, 1,1,2-Trichloroethane, 1,1-Dichloroethylene, chloroform, cis-1,2-dichloroethylene, PCE, trans-1,2-dichloroethylene, TCE, and vinyl chloride exceeded TOGS 1.1.1 AWQS in groundwater samples. Note, not all chlorinated VOCs exceeded the TOGS 1.1.1 AWQS for each groundwater sample.

- No petroleum-related VOCs exceeded the TOGS 1.1.1 AWQS during this sampling event.

Semi-Volatile Organic Compounds

- Polycyclic aromatic hydrocarbons (PAHs) (i.e., benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene) were detected above TOGS 1.1.1 AWQS in one

groundwater samples. Hexachlorobutadiene was also detected above TOGS 1.1.1 AWQS in one groundwater sample.

Metals

- Total metals including copper, lead, magnesium, manganese, mercury, and sodium were detected above the NYSDEC TOGS 1.1.1 AWQS. Dissolved metals including lead, manganese, and sodium were detected above the TOGS 1.1.1 AWQS.

Pesticides

- No pesticides were detected above the TOGS 1.1.1 AWQS from the monitoring wells sampled in the 2023 NYCOER RI.

Polychlorinated Biphenyls

- No PCBs were detected above the TOGS 1.1.1 AWQS from the monitoring wells sampled in the 2023 NYCOER RI.

Perfluoroalkyl Substances

- PFAS were not detected above the NYSDEC guidance values from the monitoring wells sampled in the 2023 NYCOER RI.

The groundwater analytical results for the 2023 Remedial Investigation are summarized in **Tables 7A, 8A, 9A, 10A,** and **11A**. **Figure 9** shows the groundwater sample locations and spider diagram summarizing exceedances of NYSDEC TOGS 1.1.1 AWQS.

2024 NYCOER RI Groundwater Sampling Results

Volatile Organic Compounds

- Petroleum-related VOCs including 1,2,4-Trimethylbenzene, benzene, ethylbenzene, isopropylbenzene, methyl tert-butyl ether (MTBE), naphthalene, n-propylbenzene, o-xylene, p-isopropyltoluene, styrene, toluene, and total xylenes were detected in four shallow groundwater wells, three intermediate groundwater wells, and six deep groundwater monitoring wells above the NYSDEC TOGS 1.1.1 AWQS. Note, not all petroleum-related VOCs were detected in every sample above the TOGS 1.1.1 AWQS. The maximum concentrations are as follows: 1,2,4-Trimethylbenzene at 526 micrograms per liter (µg/L) in MW-10S, benzene at 2.92 µg/L in MW-01M, ethylbenzene at 2,260 µg/L in MW-10S, isopropylbenzene at 29.5 µg/L in MW-10S, MTBE at 27.3 µg/L in MW-09S, naphthalene at 92.5 µg/L in MW-10S, n-propylbenzene at 48 µg/L in MW-10S, , o-xylene at 2,850 µg/L in MW-10S, p-isopropyltoluene at 5.6 µg/L in MW-10D, styrene at 90.5 µg/L in MW-10S, toluene at 5,570 in MW-10S, and total xylenes at 9,660 µg/L in MW-10S.

- Chlorinated-related VOCs including 1,1,1-Trichloroethane, 1,1,2,2-trichloroethane, 1,1,2-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethylene, 1,2,3-trichlorpropane, 1,2-dichloroethane, chloroform, cis-1,2-dichloroethylene, methylene chloride, PCE, trans-1,2-

dichloroethylene, TCE, and vinyl chloride were detected in all collected groundwater samples above the NYSDEC TOGS 1.1.1 AWQS. Note, not all chlorinated-related VOCs were detected in every sample above the TOGS 1.1.1 AWQS. The maximum concentrations are as follows: 1,1,1-Trichloroethane at 134 µg/L in MW-10S, 1,1,2,2-trichloroethane at 9.01 in MW-11S, 1,1,2-trichloroethane at 60.5 µg/L in MW-07M, 1,1-dichloroethane at 16.5 µg/L MW-06D, 1,1-dichloroethylene at 106 µg/L in MW-06D, 1,2,3-trichlorpropane at 2.9 µg/L in MW-07M, 1,2-dichloroethane at 8.3 in MW-01M, chloroform at 36.5 µg/L, cis-1,2-dichloroethylene at 48,000 in MW-06D, methylene chloride at 37 µg/L in MW-10S, PCE at 532 µg/L in MW-10S, trans-1,2-dichloroethylene at 179 µg/L in MW-06D, TCE at 208,000 µg/L in MW-01D, and vinyl chloride at 385 µg/L in MW-06D.

Semi-Volatile Organic Compounds

- The PAHs, Benzo(b)fluoranthene and chrysene, were detected in one shallow groundwater monitoring well above the TOGS 1.1.1 AWQS
- 1,4-Dioxane was detected in six shallow groundwater monitoring wells (max of 4.69 µg/L) and five intermediate groundwater monitoring wells (max of 39.5 µg/L) above the TOGS 1.1.1 AWQS.
- Phenol was detected in one shallow groundwater monitoring well above the TOGS 1.1.1 AWQS.
- Naphthalene was detected in one shallow groundwater monitoring well above the TOGS 1.1.1 AWQS.

Metals

- Total Chromium was detected in one shallow and one intermediate groundwater monitoring well, and dissolved Chromium was detected in one shallow groundwater monitoring well above the TOGS 1.1.1 AWQS.
- Total copper was detected in one intermediate groundwater monitoring well above the TOGS 1.1.1 AWQS.
- Total Lead was detected in seven shallow groundwater monitoring wells (max of 5,310 µg/L) and one intermediate groundwater monitoring well above the TOGS 1.1.1 AQWS.
- Total Magnesium was detected in two shallow (max of 86,700 µg/L) and five intermediate (max of 165,000 µg/L) groundwater monitoring wells, and dissolved Magnesium was detected in one shallow and five intermediate (max of 128,000 µg/L) groundwater monitoring wells above the TOGS 1.1.1 AWQS.
- Total Manganese was detected in all shallow (max of 6,210 µg/L) and all intermediate (max of 11,400 µg/L) groundwater monitoring wells, and dissolved Manganese was detected in seven shallow (max of 3,150 µg/L) and all intermediate (max of 11,500 µg/L) groundwater monitoring wells above the TOGS 1.1.1 AWQS.

- Total Nickel was detected in two shallow (max of 282 µg/L) and one intermediate groundwater monitoring well above the TOGS 1.1.1 AWQS.
- Total Sodium was detected in nine shallow (max of 179,000 µg/L) and all intermediate (max of 160,000 µg/L) groundwater monitoring wells, and dissolved Sodium was detected in nine shallow (max of 220,000 µg/L) and all intermediate (max of 178,000 µg/L) groundwater monitoring wells above the TOGS 1.1.1 AWQS.
- Total and dissolved Zinc was detected in one shallow and one intermediate groundwater monitoring well above the TOGS 1.1.1 AWQS
- Total Cadmium was detected in one shallow and two intermediate (max of 19 µg/L) groundwater monitoring wells, and dissolved Cadmium was detected in one shallow and one intermediate groundwater monitoring well above the TOGS 1.1.1 AWQS.
- Total Selenium was detected in three shallow (max of 98.3 µg/L) and one intermediate groundwater monitoring well, and dissolved selenium was detected in three shallow (max of 111 µg/L) and three intermediate (max of 34 µg/L) groundwater monitoring wells above the TOGS 1.1.1 AWQS.
- Total Mercury was detected in one shallow and one intermediate groundwater monitoring well above the TOGS 1.1.1 AWQS

Pesticides

- No pesticides were detected above the TOGS 1.1.1 AWQS from the monitoring wells sampled in the 2024 RI.

Herbicides

- No herbicides were detected above the TOGS 1.1.1 AWQS from the monitoring wells sampled in the 2024 RI.

Polychlorinated Biphenyls

- No PCBs were detected above the TOGS 1.1.1 AWQS from the monitoring wells sampled in the 2024 RI.

Perfluoroalkyl Substances

- PFOS was detected in seven shallow groundwater monitoring wells (max of 124 nanograms per liter (ng/L)) and six intermediate groundwater monitoring wells (max of 447 ng/L) in concentrations greater than the NYSDEC Part 375 Remedial Program for PFAS.
- PFOA was detected in eight shallow groundwater monitoring wells (max of 624 ng/L) and eight intermediate groundwater monitoring wells (max of 543 ng/L) in concentrations greater than the NYSDEC Part 375 Remedial Program for PFAS.
- Perfluoroheptanoic acid (PFHpA) was detected in one intermediate groundwater monitoring well in a concentration greater than the NYSDEC Part 375 Remedial Program for PFAS.

- Perfluorohexanesulfonic acid (PFHxs) was detected in one shallow and one intermediate monitoring well in concentrations greater than the NYSDEC Part 375 Remedial Program for PFAS.

The groundwater analytical results for the 2024 Remedial Investigation are summarized in **Tables 7B, 8B, 9B, 10B, and 11B**. **Figures 10A and 10B** show the groundwater sample locations and spider diagrams summarizing exceedances of NYSDEC TOGS 1.1.1 AWQS.

2023 NYCOER RI Soil Vapor and Ambient Air Analytical Results

Soil Vapor – Volatile Organic Compounds

- PCE (max of 430 µg/m^3) was detected at elevated concentrations in five soil vapor samples.
- TCE (max of 740,000 µg/m^3) was detected at elevated concentrations in each of the nine soil vapor samples.
- 1,1,1 TCA (max of 200 µg/m^3) was detected at elevated concentrations in one soil vapor samples.
- Carbon tetrachloride (max of 9,200 µg/m^3) was detected at elevated concentrations in two soil vapor samples.

Outdoor / Ambient Air – Volatile Organic Compounds

- VOCs were either not detected or detected at low level concentrations in the two outdoor air samples.

See **Table 12A** and **Figure 11** for the 2023 NYCOER RI vapor and outdoor air concentrations.

2024 NYSDEC RI Soil Vapor and Ambient Air Analytical Results

Soil Vapor – Volatile Organic Compounds

- PCE (max of 55,000 µg/m^3) was detected at elevated concentrations in six soil vapor samples.
- TCE (max of 3,900,000 µg/m^3) was detected at elevated concentrations in each of the 14 soil vapor samples.
- 1,1,1 TCA (max of 3,600 µg/m^3) was detected at elevated concentrations in 10 soil vapor samples.
- 1,1-DCE (max of 45 µg/m^3), was detected at elevated concentration in one soil vapor sample.
- Cis-1,1-DCE (max of 1,300 µg/m^3) was detected at elevated concentrations in seven soil vapor samples.
- Carbon tetrachloride (max of 900 µg/m^3) was detected at elevated concentrations in seven soil vapor samples.

- Benzene (max of 230 µg/m^3), cyclohexane (max of 160 µg/m^3), n-heptane (max of 810 µg/m^3), and n-hexane (max of 1,600 µg/m^3) were detected at elevated concentration in one soil vapor sample.

Indoor Air and Ambient Air – Volatile Organic Compounds

- 1,2,4-Trimethylbenzene (max of 2.0 µg/m^3), cyclohexane (max of 3.30 µg/m^3), naphthalene (max of 6.0 µg/m^3), n-heptane (max of 13.0 µg/m^3), o-xylene (max of 2.2 µg/m^3), PCE (max of 3.1 µg/m^3), and toluene (max of 10 µg/m^3), were detected at an elevated concentrations in one outdoor air sample. Benzene (max of 2.5 µg/m^3) was detected at an elevated concentrations in one indoor air sample.
- Carbon tetrachloride was detected at elevated concentrations in all the indoor air samples (max of 0.54 µg/m^3) and all the outdoor air samples (max of 1.1 µg/m^3).

2. TCE was detected at elevated concentrations at all the indoor air samples (max of 3.10 µg/m^3) and all outdoor air samples (max of 4.20 µg/m^3).

The 2024 NYSDEC RI soil vapor results are summarized in **Table 12B**. The indoor air, and ambient air analytical results are summarized in **Table 13**. **Figure 12** shows the sample locations and spider diagrams summarizing the results.

3.0 DESCRIPTION OF INTERIM REMEDIAL MEASURES

The proposed IRM is consistent with protection of public health and the environment. The IRM is designed to begin immediate source removal, eliminate the potential for hazardous waste exposure to future construction workers and the eliminate the pathway for sub-grade soil vapor to migrate off-site.

The IRM is a component of, but does not constitute, the overall remedy for the Site. The remaining remedial elements will be put forth in a RAWP including excavation of unsaturated soils exceeding PGSCOs and confirmation endpoint sampling. Final grading and final soil placement will be part of the final remedy for the entire Site and is not anticipated to be part of the IRM. The final remedy for the Site is anticipated to be Track 4 Restricted Residential Use SCOs.

The IRM will consist of the following:

1. Site mobilization involving Site security set-up, equipment mobilization and utility mark outs.
2. Performance of a CAMP for particulates and VOCs.
3. Install five DNAPL recovery wells (designated RW-01 through RW-05) in the area of observed DNAPL during the RI.
4. To further delineate the nature and extent of DNAPL, three additional soil borings and a potential DNAPL recovery well (RW-06) will be installed east/northeast of MW-11. The installation of the recovery wells and the advancement of the delineation soil borings will

occur during the same mobilization. The locations of the recovery wells and soil borings are presented on **Figure 13**.

5. Gauge and recover DNAPL in the newly installed recovery wells. DNAPL will be recovered using Vacuum Enhanced Fluid Recovery (VEFR). The recovered material will be handled as hazardous waste in accordance with local laws and regulations. DNAPL recovery will begin prior to any proposed injections in the area of the plume. DNAPL recovery rates and volume will be evaluated in conjunction with the NYSDEC and NYSDOH prior to commencing groundwater injections.

6. Groundwater injections to remedy soil and groundwater, primarily for chlorinated VOCs, above the soil cleanup objectives and groundwater above the NYSDEC TOGS 1.1.1 AWQS. The location of the proposed injection locations are presented on **Figure 14**. A copy of the Provectus Design Proposal is included in **Appendix B**.

7. Installation of a temporary SVE treatment system to limit the off-Site migration of elevated concentrations of VOCs in soil vapor.

8. Demolition of the existing warehouse on Lot 9. The existing slab will remain in place during the IRM; the soil beneath the warehouse will be managed under the RAWP.

9. A sampling program to potentially allow for disposal of a portion of the site soils as non-hazardous waste through a Contained-In Determination from the NYSDEC Division of Solid and Hazardous Waste. A Contained-In Determination Workplan will be submitted separately from this IRM.

10. Waste management will include temporarily storing soil, groundwater, and DNAPL generated during the remedial activities in 55-gallon drums or larger capacity storage containers (totes, double walled tanks, etc.) in preparation for off-Site disposal. Utilizing larger capacity containers for the fluids helps to lessen the chance for spilling any material when transferring from the Vac Truck to the storage container. Additionally, all storage containers used to store soil, groundwater, and DNAPL generated during the remedial activities will be staged on appropriately sized secondary containment in the form of spill pallets (or equivalent) pending removal from the Site. All waste generated from the Site will be stored and handled by standard industry practices for handling hazardous waste and in accordance applicable laws and regulations.

11. Daily and Monthly field reports to the NYSDEC and the NYSDOH will be submitted during the IRM activities.

Additional remedial items will be included in a RAWP. The remedial items will include, but are not limited to, hotspot excavation, additional source area injections, installation of an active sub-slab depressurization system (SSDS) and a final site cover.

All deviations from this IRMWP will be reported to NYSDEC and NYSDOH. Deviations must be approved by NYSDEC. Implementation of the IRMWP will be documented in daily and monthly reports, and in a Construction Completion Report.

3.1 Building Demolition

The Site currently contains one structure, a 2-story warehouse building that comprises the entirety of the 19-27 Clay Street (Block 2482 Lot 9) lot. The other two parcels, Lots 10 and 53, do not contain permanent structures. Under this IRM, the 2-story warehouse on Lot 9 is proposed to be demolished for redevelopment purposes.

It is anticipated that the building demolition work would proceed using customary methods pursuant to a demolition permit issued by the NYC Department of Buildings (DOB). The demolition scope is limited to removal of the warehouse within the lot lines of Lot 9. The 2nd story of the warehouse and the ground floor are currently unoccupied.

During the demolition, various building materials will be removed from the Site, including the walls, elevated utility piping, and general construction debris. However, the existing concrete slab on-grade and adjacent sidewalk along Clay Street will remain in place and unbroken. This will allow for the successful implementation of the IRM without exposing the Site soils underneath the existing building to workers or the community. No soil and/or sub-grade material will be removed from beneath the existing warehouse during the IRM.

Clay Properties LLC will employ a building demolition contractor to implement the building demolition under the IRM. The building demolition contractor will undergo the following, but not limited to, procedures for demolition as required by the NYCDOB:

- Pre-demolition surveys of hazardous building materials such as lead containing paint, asbestos containing materials, and/or materials containing PCBs will be conducted in accordance with applicable federal and state regulations and will not affect the remediation schedule.
- The contractor shall either abate or encapsulate all identified hazardous building materials in a controlled manner prior to building demolition. Abatement will be performed under appropriate containment. Abatement materials will be collected and disposed off-site in accordance with applicable federal and state regulations.
- Demolition of the building superstructure, excluding the existing slab on-grade.
- The demolition contractor will demobilize after the existing building area has been left in safe and stable conditions.

During building demolition, GZA will implement CAMP as outlined in **Appendix A**. All construction and demolition (C&D) disposed during the demolition will be recorded and reported as part of the Green and Sustainable Remediation (GSR) requirement of the Final Engineering Report (FER) for the Site.

3.2 DNAPL Recovery Well Installation, Gauging and Recovery

During the RI, DNAPL was encountered as free product and staining in soil borings SB-35, SB-35-S, SB-35-N, and SB-35-E from approximately 15 feet to 25 ft bgs at varying intervals. SB-35-20E contained a DNAPL sheen from approximately 20 to 21 ft bgs. The intermediate groundwater wells, screened from approximately 15 to 25 feet below ground surface, at MW-10M (SB-35) and MW-11M (SB-35-20E) DNAPL was observed while purging groundwater prior to sampling on September 9, 2024, and the wells were therefore not sampled.

GZA proposes to drill additional soil borings to the east and northeast of MW-11. During a site visit by GZA on October 10, 2024, 3.42 feet of DNAPL was observed in MW-11M from 20.30 feet to 23.72 feet below top of casing (ft btoc). No measurable DNAPL was observed in any of the other on-Site wells.

To delineate to the east and northeast of MW-11, GZA proposes to drill three additional soil borings (SB-39, SB-40, and SB-41). SB-39 and SB-40 will be drilled 10 and 20 feet east of MW-11/SB-35-20E, respectively. SB-41 will be drilled approximately 20 feet north of SB-40. These delineation borings will be drilled to 25 feet below ground surface, or to the identifiable clay layer, whichever is shallower. SB-39 will potentially be converted to a recovery well (RW-06) as described below, if DNAPL is observed in the associated soil boring. If there is no indication of DNAPL in SB-39, then RW-06 will not be drilled. GZA field personnel will use a Photo-Ionization Detector (PID) equipped with a 10.6 eV lamp, as well as visual and olfactory senses, to detect presence of DNAPL in the soil. The locations of the proposed delineation borings are shown on **Figure 13**.

GZA will collect three discrete soil samples from each soil boring. One sample will be collected approximately 6-inches above the groundwater interface, one in the location of the highest PID readings and visual/olfactory impacts, and one at terminal depth of the soil boring. Samples will be collected for VOCs via USEPA Method 8260 only and submitted to an ELAP-certified laboratory.

To recover DNAPL, five DNAPL recovery wells (designated RW-01 through RW-05) will be installed. A sixth DNAPL recovery well, RW-06, will be installed if DNAPL is encountered in the SB-39 delineation boring as described above. MW-10M and MW-11M will not be used for extraction. These wells were not installed with sumps and are therefore not expected to be effective during DNAPL extraction. However, if significant quantities of DNAPL is observed in MW-10M and MW-11M, it will be removed during the product recovery events.

The DNAPL extraction wells will be installed with a 2-foot solid PVC sump at the base set above the clay layer. During the RI, it was identified that the depth of clay below ground surface generally increases from south to north across the 29 Clay Street Lot. The thickness of clay also generally decreases moving south to north across the Lot. Therefore, the final depth of the extraction wells may be field adjusted based on a soil boring drilled in the location of the proposed extraction wells prior to installation. Based on information from the RI, the approximate depth of the extraction wells will be 25 ft bgs. The extraction well will contain a 10-

foot 0.02-inch schedule 40 PVC screen above the 1-foot solid PVC sump. A solid PVC riser will extend to above the ground surface. All PVC material will be 4-inch diameter. It is not proposed to collect any additional soil samples during soil boring drilling for this task. The locations of the proposed recovery wells are shown on **Figure 13**.

One week after installation of the DNAPL extraction wells, a sub-contractor with VEFR capabilities will be contracted to conduct a high-volume extraction event from the newly installed wells and any existing wells containing DNAPL. Emissions from the truck's blower will be run through carbon filtration prior to release to the atmosphere. Influent and effluent VOC concentrations will be measured and recorded throughout each product recovery event and additional carbon will be stored onsite in case break through occurs and replacement is necessary. All extracted fluids will be temporarily staged on secondary containment onsite pending removal and transport to a disposal facility permitted to accept the waste. It is proposed to conduct high-volume extraction events bi-weekly for at least three months.

As shown on **Figure 13**, the assumed DNAPL plume area is estimated at approximately 1,050 SF. This is based on current Site knowledge from the RI. The extent of the assumed plume may increase based on the DNAPL delineation investigation discussed prior in **Section 3.2**. To estimate the volume of DNAPL in the plume, GZA assumed an 8-foot vertical extent of DNAPL uniformly across the assumed plume and an effective soil porosity of 0.25. The soil in this area is predominantly a mixture of sand and silt. Based on these assumptions, the volume of DNAPL in the plume is approximately 2,100 cubic feet (280 gallons). During DNAPL recovery, GZA initially estimates that approximately 80% of the free DNAPL is recoverable, totaling 224 gallons.

DNAPL transmissivity evaluations will be conducted as part of each DNAPL monitoring event during the IRM to help refine potential rate of recovery and related frequency of collection. These evaluations will include depth to water, volume of DNAPL at each extraction well, MW-10M, and MW-11M before and after each high-volume extraction event. An in-line flow meter will be used to measure the volume of extracted fluids from each extraction well. After extraction from each well, the volume of liquid will be measured in the truck and based on the measurements, the percentage of oil and water can be determined. This information will be used to make recommendations regarding the continuation, modification, or suspension of DNAPL monitoring and/or collection at each extraction well location. The DNAPL recovery plan will not be discontinued or modified without prior approval from the NYSDEC.

Investigation-derived waste, including soil cuttings, needing to be managed on-site will be containerized in properly labeled DOT approved 55-gallon drums (or equivalent) for future off-site disposal at a permitted facility. 55-gallon drums will be stored on spill containment pallets on-Site. All boreholes which require drill cuttings disposal will be backfilled with cement grout. Disposable sampling equipment including spoons, gloves, bags, paper towels, etc. that come in contact with environmental media will be double bagged and disposed as municipal trash dumpster as non-hazardous trash, unless it the sampling equipment comes in contact with

DNAPL or soil with heavy odors. Sampling equipment that comes into contact with DNAPL or soil with heavy odors will be stored in 55-gallon drums for off-Site disposal of hazardous solid waste.

3.3 Groundwater Injections

The August-September 2024 RI identified TCE concentrations between 14.4 µg/L to 175,000 µg/L in shallow groundwater between 5 and 25 feet below ground surface (ft bgs) and 7.78 µg/L to 208,000 µg/L in deep groundwater from approximately 30 to 40 ft bgs. The highest concentration in the shallow groundwater is located at the target hotspot area at MW-10. The highest concentrations in the deep groundwater are downgradient of MW-10, at MW-01 and MW-06.

Other VOC exceedances of the NYSDEC Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values (TOGS 1.1.1 AWQS) include the chlorinated VOCs 1,1,1-Trichloroethane, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, 1,1-Dichloroethane, 1,1-Dichloroethylene, 1,2,3-Trichloropropane, 1,2-Dichloroethane, chloroform, cis-1,2-dichloroethylene, methylene chloride, tetrachloroethylene (PCE), trans-1,2-dichloroethylene, and vinyl chloride. Petroleum VOC exceedances of the TOGS 1.1.1 AWQS include 1,3,5-Trimethylbenzene, benzene, ethyl benzene, isopropylbenzene, methyl-tert-butyl ether (MTBE), naphthalene, n-propylbenzene, o-xylenes, p-isopropyltoluene, sec-butylbenzene, styrene, toluene, and xylenes. The exceedances of petroleum related VOCs are primarily in the location of the source area in MW-10 and MW-11 with diminishing concentrations in downgradient wells MW-01, MW-03, and MW-06.

The injection plan includes a combination of Emulsified Zero Valent Iron (EZVI) In-Situ Chemical Reduction (ISCR) injections for short-term targeting of elevated levels of chlorinated solvents. Additional ISCR injections utilizing a combination of natural antimethanogenic compounds, organic carbon sources, EZVI, chemical oxygen scavengers, and vitamin/mineral sources for long-term targeting of residual contaminants using the Provectus-IR® ISCR Reagent product will be used. Technical data sheets for the EZVI ISCR and Provectus-IR® products are included in **Appendix B**. The proposed injection layout plan is included as **Figure 14**. The injection plan will be implemented in two phases (Phase 1/Phase 2) as discussed below.

Phase 1 injections will begin on the 19-27 Clay Street Lot (Lot 9) and 60-62 Commercial Street Lots at the locations shown on **Figure 14**. This will include EZVI ISCR injections at approximately 10-foot spacing at varying depth intervals below ground surface (10-13', 15-18', 20-23', 25-28', 30-33', and 35-38') at the locations of MW-01, MW-03, MW-05, and north of MW-04. Phase 1 injections will also include Provectus-IR® ISCR injections at approximately 20-foot spacing at the same depth intervals. Phase 1 injections will begin prior to demolition of the warehouse on Lot 9.

Due to advancements in injection technologies and methodologies, most overburden target zones that are less than 100 ft in depth are conducive to direct push chemical injections. Specifically, this Site is a heterogeneous mixture of sand, sandy silt and silt that has been

investigated with direct push technology, which allows slurries (e.g., Provect-IR) and viscous emulsions (e.g., EZVI) to be applied.

Injection point spacings were determined by evaluating the subsurface geology, depth of injection, proposed reagent, dosage of reagent per injection point, and Provectus's experience applying this technology successfully at Sites with similar subsurface geology. At 20-ft spacing between borings, a 10-foot overlapping radii of influence (ROI) will be established. The injection point spacing goals are to ensure lateral connectivity between the injection points, vertical distribution with the targeted intervals, and limiting reagent loss due to overdosing in tight spacing To evaluate ROI, GZA will monitor the existing monitoring well network to confirm the proposed ROI was achieved. The GZA field engineer will visually check the groundwater for the injection slurry.

A total of 81,000 lbs of Provect-IR and 8,000 USG of EZVI-CH4 will be applied. The Provect-IR will be mixed with approximately 40,500 USG of water; the EZVI-CH4 does not require dilution with water. The reactions associated with the reagents and the contaminants of interest in addition to the inclusion of antimethanogenic reagents within the blends will inhibit gas generation. The reagents are non-hazardous and do not react with or negatively impact subsurface structures/infrastructure, utilities, monitoring wells, or other subsurface remediation systems. Additional details are presented in **Appendix B**.

Phase 2 injections on 29 Clay Street (Lot 53) will not commence until satisfactory DNAPL removal has been achieved. This will be determined through approval by the NYSDEC following the results of DNAPL gauging and recovery. The Phase 2 injection plan includes EZVI ISCR injections at approximately 12-foot spacing at varying depth intervals below ground surface, as described in the Phase 1 injection plan, and Provectus-IR® ISCR injections at approximately 20-foot spacing at the same depth intervals across the entire area.

A round of groundwater sampling will be conducted approximately 8 weeks following Phase 1 injections. For this initial groundwater monitoring, all on-Site wells will be sampled. Samples will be collected for VOCs via USEPA Method 8260 and submitted to an ELAP-certified laboratory. Groundwater samples will be collected in accordance with the Quality Assurance Project Plan (QAPP) located in **Appendix C**.

Decisions regarding timing of injections and results of the groundwater monitoring will be communicated to the NYSDEC.

3.4 Temporary Soil Vapor Extraction System

To prevent off-Site migration of contaminants in soil vapor, a temporary SVE system will be installed along the northern and eastern borders of Lot 53 and the eastern boundary of Lot 10. Location of the proposed temporary SVE area is shown on **Figure 15**.

Prior to installation of the SVE system, an SVE Pilot Test will be conducted to determine final design. To design the temporary SVE system, the subsurface airflow pathways and extraction flow rates must be properly understood. The airflow field developed is dependent on many factors: the level of applied vacuum, available screen interval in the vadose zone, porosity, soil air permeability and its spatial variation, and depth to groundwater. The pilot test will assist to evaluate the applicability of SVE technology; obtain design parameters included the radius of influence (ROI), applied vacuum, sustainable flowrates, vapor contaminant loadings; and promote remedial efficiency associated with the system. The SVE Pilot Test Workplan is included as **Appendix D**.

The temporary SVE system will include a dedicated remediation trailer that will house a blower, granular activated carbon (GAC), and a discharge stack. The analytical results from the RI soil vapor investigation and results from the SVE pilot test will be used to air model the expected discharge to properly size the amount of carbon and height/location of the discharge stack. The discharge location will be located at least 10-feet from any operable windows and permanent/semi-permanent occupied space, or further if determined necessary through air modeling. The temporary SVE system will continue operation through construction, or until concentrations of soil vapor have reduced to acceptable levels as determined by the NYSDEC and NYSDOH through confirmatory soil vapor sampling. The temporary SVE system components will be designed to remain in place or be re-used as a permanent SVE system post-construction, if continued soil vapor treatment is required.

3.5 Contained-In Determination Sampling and Delineation

The remediation and redevelopment of the Site will require excavation of soil and pumping of groundwater. Based on the anticipated locations of excavations, soil samples will be collected to determine whether management of excavated soil and some groundwater from the Site can potentially be managed as a non-hazardous waste.

Soil samples will be collected using Direct-Push technology or test pits to an approximate terminal depth of the water table, dependent on final excavation requirements for remediation and redevelopment. Soils exceeding PGSCOs above the water table will be addressed in the RAWP. Soil samples will be collected in accordance with the QAPP included as **Appendix C**. A GZA representative will oversee all soil boring activities; log (characterize) the lithology and screen the subsurface earth materials samples with a PID. Visual and olfactory conditions will be noted for all samples.

Prior to commencing the Contained-In Determination sampling, a Contained-In Determination Workplan will be sent to the NYSDEC Division of Materials Management, Bureau of Hazardous Waste Management and the Division of Environmental Remediation outlining the proposed scope of work. The data collected as part of the 2023 NYCOER RI, the 2024 NYSDEC RI, and the

above-referenced sampling will be utilized for the contained-in determination. The Contained-In Determination Workplan will describe the estimated total soil disposal volumes for the project, the locations of the proposed delineations and samples, and a full list of analyses and quantities of samples. Work for the Contained-In Determination will occur following the NYSDEC Division of Division of Materials Management and Division of Environmental Remediation approval of the Contained-In Determination Workplan.

4.0 GENERAL IRM INFORMATION

Agency Notification

The NYSDEC will be notified in writing at least seven (7) business days prior to the initiation of the on-site work and during the fieldwork. All applicable local agencies will also be notified prior to the initiation of site work. NYSDEC will have the opportunity to participate in all remediation project status meetings (adequate notice of these meetings will be provided).

Prior to the implementation of any ground intrusive activities, a request for a complete utility mark-out of the subject property will be submitted as required by New York State Department of Labor regulations. Confirmation of underground utility locations will be secured and a field check of the utility mark-out will be conducted prior to the initiation of work. Any utilities on the Site will be protected (as necessary) by the contractor.

Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings (NYCDOB) construction code requirements or according to specific variances issued by that agency. NYSDEC will be notified of any variances issued by the NYCDOB. No remedial work will be conducted on the weekend (Saturday or Sunday) unless expressly permitted by NYSDEC. NYSDEC reserves the right to deny alternate remedial construction hours.

Site Security

Site access will be controlled by a construction entrance and site management. The Site currently has an 8-foot-high chain-link fence topped with barbed wire around the northern, western, and eastern portion of the parking lot area. Once the existing building is demolished, a construction fence will be placed around the southern, western, and eastern portion of the former building. The construction fence will be an 8-foot-high driven post chain link fence with fabric. The construction entrance will be along River Ave at the southwestern section of the parking lot area. The construction entrance will be locked, and a security guard will be present at the entrance weekdays from 7am to 5pm.

Agency Approvals

All permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction. Approval of this IRM by NYSDEC does not constitute satisfaction of these requirements and will not be a substitute for any required permit. Deviation from work plans will be reviewed and approved by the NYSDEC prior to performing the remedial tasks.

4.1 Governing Documents

Governing documents and procedures included in the IRMWP include a Site- specific Construction Health and Safety Plan (CHASP), a Community Air Monitoring Plan (CAMP), a Quality Assurance Project Plan (QAPP), fluid management procedures, and contractors' site operations and quality control procedures. Highlights of these documents and procedures are provided in the following sections.

Construction Health & Safety Plan

The information contained in the CHASP pertains directly to the remedial activities presented in this Work Plan and does not include general or Site-specific construction related or general industry safety information. The General Contractor (GC) is responsible for the safety of Site construction personnel during and after the remedial activities are completed. The construction Site Safety Coordinator will be a qualified representative of the GC or appointee.

During remedial activities, a representative of GZA will be present for additional health and safety observation. The Volunteer and GZA will have the authority to address any issue of concern which includes the ability to require the immediate cessation of any remediation work that is being improperly performed or that is resulting in excessive dust, odors, or other potential issues of concern. Remedial work performed under this work plan will be in compliance with applicable health and safety laws and regulations, including Site and United States Occupational Health and Safety Administration (OSHA) worker safety requirements and Hazardous Waste Operations and Emergency Response (HAZWOPER) requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential health and safety risks. The parties performing the remedial construction work will document that performance of the work is in compliance with the CHASP and applicable laws and regulations. The CHASP pertains to remedial and invasive work performed at the Site until the issuance of the notice of completion (NOC). The CHASP is included as **Appendix E**.

Field personnel involved in remedial excavation activities will participate in training required under 29 CFR 1910.120, including 40-hour Hazardous Waste Operations and Response Training (HAZWOPER) and annual 8-hour refresher training. A designated Site Safety Officer will be responsible for maintaining workers training records. Other intrusive site work training requirements will be evaluated for chemical exposures during the Job Hazard Analyses.

Personnel entering any remediation work area (exclusion zone) will be trained in the provisions of the CHASP and be required to sign a CHASP acknowledgment form. Site-specific training will be provided to field personnel and additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the Site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a logbook or other specific form.

An emergency contact sheet with names and phone numbers is included in the CHASP. That document will define the specific project contacts for use in case of emergency.

All remedial work performed under this plan will be in full compliance with governmental requirements, including Site and worker safety requirements mandated by Federal OSHA.

The Volunteer and associated parties preparing the remedial documents submitted to the State and those performing the construction work, are completely responsible for the preparation of an appropriate Health and Safety Plan and for the appropriate performance of work according to that plan and applicable laws.

Materials Management Plan

A Materials Management Plan has been prepared to address proper handling and disposal of IDW generated during the IRM. IDW generated during the IRM will include soil, groundwater, DNAPL, and solid waste. All manifests of disposed waste during the IRM will be included in the CCR (see **Appendix F** for the Materials Management Plan).

The Site has a current United States Environmental Protection Agency (USEPA) Identification Number, NY0000374314, which will remain and used for disposal of media through the IRM work.

Odor, Dust, and Nuisance Control Plan

The Construction Completion Report will include the following certification by the Remedial Engineer: “I certify that all invasive work during the remediation and all invasive redevelopment work were conducted in accordance with dust and odor suppression methodology defined in the IRM Work Plan.”

4.1.1.1 Odor Control Plan

This odor control plan is capable of controlling emissions of nuisance odors off-Site (we note that there will not be residents or tenants on the property during the IRM). Odor controls will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of odor suppressants to cover exposed odorous soils. If nuisance odors develop and cannot otherwise be controlled, additional means to eliminate them will include: (d)

use of chemical odorant suppressants in spray or misting systems. The proposed odor suppressant for this Site is BioSolve® Pinkwater (or equivalent). The contractor who uses BioSolve® Pinkwater (or equivalent) for odor suppression will fully understand the manufacturer's specifications prior to usage.

If nuisance odors are identified, 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 all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Volunteer's Remedial Engineer, who is responsible for certifying the Final Engineering Report.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

4.1.1.2 Dust Control Plan

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

- Water will be available on-site at suitable supply and pressure for use in dust control.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- 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 spraying.

4.1.1.3 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 and will conform, at a minimum, to NYCDEP noise control standards.

Community Air Monitoring Plan (CAMP)

Real-time air monitoring for VOCs and particulate levels at the perimeter of the exclusion zone or work area will be performed in accordance with the CAMP (see also **Appendix A**).

Continuous air monitoring will be required during ground intrusive activities and other activities where equipment is disturbing the ground surface. Ground intrusive activities include, but are not limited to, soil/fill excavation and handling, test pitting or trenching, grading of existing Site soils and the installation of soil borings or monitoring wells.

VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the Site perimeter on a continuous basis during earthwork activities unless otherwise specified in the CAMP. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. Wind direction will be evaluated using an on-site meteorological tower (RM Young sensors) that measures wind speed, direction, dry-bulb temperature, and relative humidity. A central computer system will receive information from the meteorological system and compute a two-minute average wind speed and direction value. The VOC monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will 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 will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will 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 will be halted, the source of vapors will be identified, corrective actions will be taken to abate emissions, and monitoring will be continued. After these steps, work activities will 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 will be shut down until the source of the problem is identified and corrective action is taken to reduce organic vapor levels.

4. Fifteen-minute readings will be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored at the Site perimeter and in work zones on a continuous basis during earthwork. The particulate monitoring will 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 will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration will be visually assessed during all work activities. Visible dust from the work area will trigger the initiation of dust suppression procedures.

1. 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 will be employed. Work will 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.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work will be stopped, and a re-evaluation of activities initiated. Work will 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.

3. Readings will be recorded and be available for the NYSDEC and NYSDOH to review.

Any exceedances of CAMP action levels and corrective measures taken must be reported to NYSDEC and NYSDOH project managers, within 24 hours of occurring. In addition, the Daily Reports with note all action level exceedances and corrective actions with CAMP data summary tables.

4.2 Remedial Performance Evaluation

Performance of the IRM will include the following:

- Groundwater samples will be collected to evaluate the effectiveness of the remedy and analyzed for the following:
    - TCL VOCs by EPA Method 8260C
    - Total Fe
    - Chloride

- Sulfate
- Nitrate and Nitrite
- Total Organic Carbon
- Ethane and Ethene

- Groundwater parameters will be collected during each sampling event including:
  - Temp, pH, ORP, DO
- Influent and effluent vapor stream will be screened with a PID and samples will be collected from the SVE system biweekly for the first month to evaluate the effectiveness of the carbon treatment and to evaluate carbon breakthrough. After the first month, samples will be collected monthly and after the second month, quarterly samples will be collected.

Quality Assurance / Quality Control

A QAPP (see **Appendix C**) was prepared to ensure that field sampling procedures, selected analytical methods, and chemical analytical data are of sufficient quality to meet the intended usage. The sampling program has been designed to evaluate end-point soil samples. Soil gas and groundwater has been extensively evaluated during the Remedial Investigation (RI) and it is not anticipated that further soil gas and groundwater sampling will be performed.

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for the data generated.

GZA will collect Quality Assurance/Quality Control (QA/QC) samples to: (1) check sample bottle preparation; (2) evaluate contamination introduced during transport; (3) evaluate the effectiveness of field decontamination procedures; and (4) evaluate the "reproducibility and accuracy of the laboratory analytical procedures. QA/QC samples will be collected at the frequency outlined in **Appendix C** - QAPP.

5.0 GREEN AND SUSTAINABLE REMEDIATION

According to the NYSDEC DER-31 Green Remediation guidance document, green remediation approaches will be considered during site remediation. GZA, the general contractor, and other subcontractors will incorporate sustainability practices to reduce the environmental footprint of the investigation and cleanup. In accordance with ASTM E2893-16e1, the Green and Sustainable Remediation (GSR) goals for the project include the following:

- To minimize total energy use and maximize use of renewable energy,
- To minimize air pollutants and greenhouse gas emissions,
- To minimize water, use and impact to water resources,
- To reduce, reuse and recycle materials and waste; and
- To protect land and ecosystems.

GZA will incorporate best management practices to lower our environmental footprint during the investigation and remediation phase of the project. GZA will incorporate the following practicable measures during the planned scope of work:

1. Limit the use of generators, excavation equipment, and vehicles to reduce emissions.
2. Minimize truck travel for disposal of waste generated during the IRM implementation by selecting local disposal facilities.
3. Minimize waste disposal by reusing soil/fill that does not exhibit visual, olfactory, or PID evidence of contamination to backfill excavated areas.
4. Manage onsite resources and materials efficiently.
5. Use local subcontractors during IRM implementation to minimize vehicle emissions during commute.
6. Request IRM implementation subcontractors to use clean diesel equipment to reduce emissions.
7. Request project staff and subcontractors to use public transportation during IRM implementation to the extent practicable.
8. Reducing waste, increasing recycling, and increasing reuse of materials that otherwise be considered waste.

A climate screen checklist and an environmental footprint analysis have been completed for the project and are attached in **Appendix F.**

6.0 REPORTING AND RECORD KEEPING

6.1 Daily and Monthly Reports

Daily reports providing a general summary of activities for each day of active remedial work will be emailed to the NYSDEC Project Manager by noon of the following day. The daily reports will include:

- Project number and statement of the activities and an update of progress made, and locations of work performed;
- Quantities of material imported and exported from the Site;
- Status of waste management;
- A summary of all citizen complaints, with relevant details (basis of complaint, actions taken, etc.);
- Emergencies related to the Site, if any;
- A summary of CAMP data, noting any action level exceedances, corrective actions taken; and,
- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with the NYSDEC Project Manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to NYSDEC of emergencies (accidents, spills), requests for changes to the IRMWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the IRMWP will be communicated directly to the NYSDEC project manager by personal communication.

Monthly reports will be submitted to the NYSDEC and NYSDOH on the 10th day of the following month. Monthly reports will provide an update of progress made during the reporting period, a summary of the daily reports, any analytical data received during the reporting period and a summary of activities scheduled for the next reporting period.

Daily and monthly reports will be included as attachments to the CCR.

Record Keeping and Photo Documentation

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by NYSDEC staff. Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the CCR in digital format.

Complaint Management

Complaints from the public will be promptly reported to the NYSDEC. Complaints will be addressed, and outcomes will also be reported to NYSDEC in daily reports. Notices to NYSDEC will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

Deviations from the Interim Remedial Measure Work Plan

Changes to and deviations from the IRMWP will be reported to the NYSDEC Project Manager and will be documented in daily reports and reported in the CCR. The process to be followed if there are any deviations from the IRMWP will include a request for approval for the change from NYSDEC noting the following:

- Reasons for deviating from the approved IRMWP;
- Effect of the deviations on overall remedy; and
- Determination that the IRM with the deviation(s) is protective of public health and the environment.

Notification will be provided to the NYSDEC Project Manager by telephone and email for conditions requiring immediate action (e.g., conditions judged to be a danger to on-site personnel or the surrounding community).

6.2 Construction Completion Report (CCR)

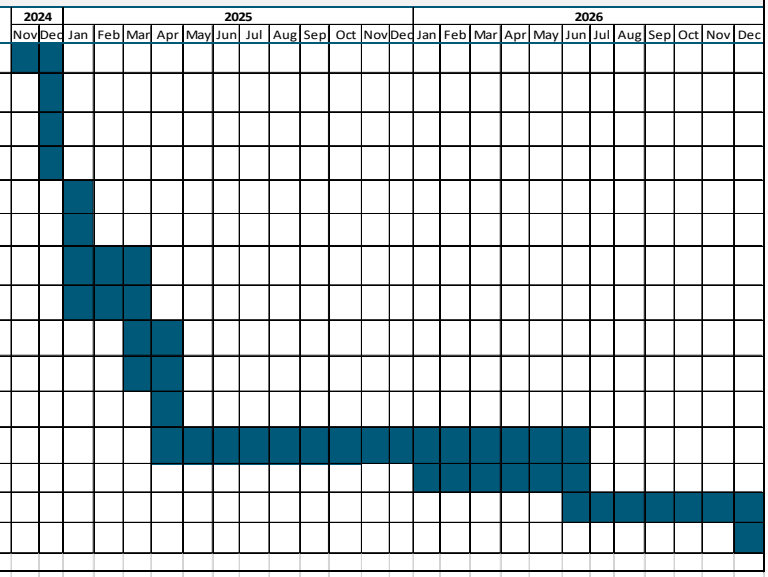
Detailed information regarding the IRM (e.g., description of the construction activities, waste disposal documentation, backfill documentation, photographic documentation, etc.) will be included in the CCR to be prepared following receipt of all data, the data usability summary reports (DUSR), and all final disposal documentation. The CCR will be submitted within approximately 30 days after the completion of IRM activities and receipt of DUSRs

7.0 SCHEDULE

The chart on the following page presents a schedule for the project milestones. If the schedule for remediation and redevelopment activities changes, it will be updated and submitted to NYSDEC, as necessary.

BROWNFIELD CLEANUP PROGRAM
Clay Properties, LLC

Project Milestones	Start	End
RIR Complete	11/10/2024	11/30/2024
NYSDEC Review and Approval of IRM	11/1/24	11/30/2024
Public Comment Period for IRM	12/3/2024	1/3/2025
Submit RAWP to NYSDEC for review and approval	12/27/2024	
Address IRM Public Comments and final IRM approval	1/3/2025	1/15/2025
Mobilization for IRM	1/20/2025	1/21/2025
IRM Implementation - pumping, SVE installation, soil sampling and groundwater injections	1/21/2025	3/7/2025
NYSDEC and NYSDOH Review of RAWP, Submission of Revisions and 45-Day Comment Period	1/15/2025	3/15/2025
Building Demolition	3/1/2025	3/30/2025
Approval of the RAWP, Issuance of Decision Document	4/1/2025	4/30/2025
Pre-construction Meeting with NYSDEC	4/1/2025	4/1/2025
RAWP Implementation (Phase 2 injections on 29 Clay, excavation, SVE conversion, groundwater sampling)	4/1/2025	6/15/2026
Preparation of FER and SMP	1/1/2026	6/1/2026
NYSDEC Review of FER and SMP	6/1/2026	12/16/2026
Issuance of COC	12/16/2026	12/16/2026



* The chart above presents a schedule for the proposed BCP Project Implementation and Reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to NYSDEC, as necessary.

TABLES

Table 1 - Sample Collection Summary
Remedial Investigation Report

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

GZA Sample ID (Sample Depths)	Tax Lot Location	Date Collected	Sample Depth Interval (ft.)	Boring Completion Depth (ft. bgs)	TCL VOCs	TCL SVOCs	Pesticides	Herbicides	PCBs	PFAS	TAL Metals	1,4 Dioxane
Soil Samples												
SB-15 (1-3')	LOT 9	8/8/2024	1-3	25	X	X	X	X	X	X	X	X
SB-15 (5-7')		8/8/2024	5-7	25	X	X	X	X	X	X	X	X
SB-15 (21')		8/8/2024	21	25	X							
SB-15 (25')		8/8/2024	25	25	X							
SB-16 (1-3')		8/8/2024	1-3	45	X	X	X	X	X	X	X	X
SB-16 (5-7')		8/8/2024	5-7	45	X	X	X	X	X	X	X	X
SB-16 (20.5')		8/8/2024	20.5	45	X							
SB-16 (45')		8/13/2024	45	45	X							
SB-17 (1-3')		8/9/2024	1-3	20	X	X	X		X	X	X	X
SB-17 (5-7')		8/9/2024	5-7	20	X	X	X		X	X	X	X
SB-17 (17')		8/9/2024	17	20	X							
SB-18 (1-3')		8/14/2024	1-3	40	X	X	X		X	X	X	X
SB-18 (5-7')		8/14/2024	5-7	40	X	X	X		X	X	X	X
SB-18 (36')		8/14/2024	36	40	X							
SB-19 (1-3')	LOT 10	8/15/2024	1-3	45	X	X	X		X	X	X	X
SB-19 (5-7')		8/15/2024	5-7	45	X	X	X		X	X	X	X
SB-19 (13')		8/15/2024	13	45	X							
SB-19 (36')		8/15/2024	36	45	X							
SB-20 (1-3')	LOT 9	8/8/2024	1-3	20	X	X	X	X	X	X	X	X
SB-20 (5-7')		8/8/2024	5-7	20	X	X	X	X	X	X	X	X
SB-20 (19.5')		8/8/2024	19.5	20	X							
SB-21 (3')		8/9/2024	3	5	X							
SB-22 (3')		8/9/2024	3	5	X							
SB-23 (3')		8/9/2024	3	5	X							
SB-24 (1-3')		8/8/2024	1-3	20	X	X	X	X	X	X	X	X
SB-24 (5-7')		8/8/2024	5-7	20	X	X	X	X	X	X	X	X
SB-24 (17')		8/8/2024	17	20	X							
SB-25 (1-3')		8/8/2024	1-3	20	X	X	X	X	X	X	X	X
SB-25 (6-8')		8/8/2024	6-8	20	X	X	X	X	X	X	X	X
SB-25 (10.5')		8/8/2024	10.5	20	X							
SB-26 (1-3')		8/9/2024	1-3	20	X	X	X	X	X	X	X	X
SB-26 (5-7')		8/9/2024	5-7	20	X	X	X	X	X	X	X	X
SB-26 (17.5')		8/9/2024	17.5	20	X							
SB-27 (1-3')		8/9/2024	1-3	20	X	X	X	X	X	X	X	X
SB-27 (6-8')		8/9/2024	6-8	20	X	X	X	X	X	X	X	X

TABLE NOTES:

ft	feet
bgs	Below ground surface
SB	Soil boring
IA	Ambient Indoor Air
OA	Ambient Outdoor Air
SV	Soil Vapor
ppm	Parts per millon
VOCs	Volatile Organic Compounds.
SVOCs	Semivolatile Organic Compunds.
PCBs	Polychlorinated Biphenylss
TCL	Target Compound Lists
PFAS	Per - and Polyfluoroylalkyl Substances

Table 1 - Sample Collection Summary
Remedial Investigation Report

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

GZA Sample ID	Tax Lot Location	Date Collected	Sample Depth Interval (ft.)	Boring Completion Depth (ft. bgs)	TCL VOCs	TCL SVOCs	Pesticides	Herbicides	PCBs	PFAS	TAL Metals	1,4 Dioxane
Soil Samples												
SB-28 (1-3')	LOT 10	8/15/2024	1-3	20	X	X	X	X	X	X	X	X
SB-28 (4-6')		8/15/2024	4-6	20	X	X	X	X	X	X	X	X
SB-28 (20')		8/15/2024	20	20	X							
SB-29 (1-3')	LOT 53	8/5/2024	1-3	40	X	X	X	X	X	X	X	X
SB-29 (5-7')		8/5/2024	5-7	40	X	X	X	X	X	X	X	X
SB-29 (20')		8/5/2024	20	40	X							
SB-29 (33')		8/23/2024	33	40	X							
SB-29 (39.5)		8/23/2024	39.5	40	X							
SB-30 (1-3')		8/6/2024	1-3	40	X	X	X	X	X	X	X	X
SB-30 (4-6')		8/6/2024	4-6	40	X	X	X	X	X	X	X	X
SB-30 (20')		8/6/2024	20	40	X							
SB-30 (29')		8/6/2024	29	40	X							
SB-30 (37')		8/23/2024	37	40	X							
SB-30 (40')		8/23/2024	40	40	X							
SB-31 (1-3')		8/6/2024	1-3	35	X	X	X	X	X	X	X	X
SB-31 (4-6')		8/6/2024	4-6	35	X	X	X	X	X	X	X	X
SB-31 (25')		8/6/2024	25	35	X							
SB-31 (35')		8/21/2024	35	35	X							
SB-32 (1-3')		8/7/2024	1-3	40	X	X	X	X	X	X	X	X
SB-32 (5-7')		8/7/2024	5-7	40	X	X	X	X	X	X	X	X
SB-32 (18.5')		8/7/2024	18.5	40	X							
SB-32 (39')		8/22/2024	39	40	X							
SB-33 (1-3')		8/5/2024	1-3	20	X	X	X	X	X	X	X	X
SB-33 (5-7')		8/5/2024	5-7	20	X	X	X	X	X	X	X	X
SB-33 (19')		8/5/2024	19	20	X							
SB-34 (1-3')		8/5/2024	1-3	22	X	X	X	X	X	X	X	X
SB-34 (5-7')		8/5/2024	5-7	22	X	X	X	X	X	X	X	X
SB-34 (21')		8/5/2024	21	22	X							

TABLE NOTES:

ft	feet
bgs	Below ground surface.
SB	Soil boring
IA	Ambient Indoor Air
OA	Ambient Outdoor Air
SV	Soil Vapor
ppm	Parts per millon.
VOCs	Volatile Organic Compounds.
SVOCs	Semivolatile Organic Compunds.
PCBs	Polychlorinated Biphenylss
TCL	Target Compound Lists
PFAS	Per - and Polyfluoroylalkyl Substances

Table 1 - Sample Collection Summary
Remedial Investigation Report

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

GZA Sample ID	Tax Lot Location	Date Collected	Sample Depth Interval (ft.)	Boring Completion Depth (ft. bgs)	TCL VOCs	TCL SVOCs	Pesticides	Herbicides	PCBs	PFAS	TAL Metals	1,4 Dioxane
Soil Samples												
SB-35 (1-3')		8/5/2024	1-3	38	X	X	X	X	X	X	X	X
SB-35 (7-9')		8/5/2024	7-9	38	X	X	X	X	X	X	X	X
SB-35 (17')		8/5/2024	17	38	X							
SB-35 (24')		8/5/2024	24	38	X							
SB-35 (35')		8/22/2024	35	38	X							
SB-35 (38')		8/22/2024	38	38	X							
SB-35-10N (4')		8/21/2024	4	39	X							
SB-35-10N (12')		8/21/2024	12	39	X							
SB-35-10N (26')		8/21/2024	26	39	X							
SB-35-N (32')		8/22/2024	32	39	X							
SB-35-N (38')		8/22/2024	38	39	X							
SB-35-S (14')		8/7/2024	14	20	X							
SB-35-S (17')		8/7/2024	17	20	X							
SB-35-S (20')		8/7/2024	20	20	X							
SB-35-E (13')		8/7/2024	13	20	X							
SB-35-E (18')		8/7/2024	18	20	X							
SB-35-E (20')		8/7/2024	20	20	X							
SB-35-20E (7')		8/19/2024	7	45	X							
SB-35-20E (21')	LOT 53	8/19/2024	21	45	X							
SB-35-20E (39')		8/19/2024	39	45	X							
SB-35-10W (7')		8/21/2024	7	39.5	X							
SB-35-10W (21')		8/21/2024	21	39.5	X							
SB-35-10W (27')		8/21/2024	27	39.5	X							
SB-35-W (33')		8/22/2024	33	39.5	X							
SB-35-W (39')		8/22/2024	39	39.5	X							
SB-35-20W (20')		8/22/2024	20	25	X							
SB-35-20W (25')		8/22/2024	25	25	X							
SB-36 (1-3')		8/6/2024	1-3	19	X	X	X	X	X	X	X	X
SB-36 (5-7')		8/6/2024	5-7	19	X	X	X	X	X	X	X	X
SB-36 (18')		8/6/2024	18	19	X							
SB-37 (1-3')		8/6/2024	1-3	20	X	X	X	X	X	X	X	X
SB-37 (5-7')		8/6/2024	5-7	20	X	X	X	X	X	X	X	X
SB-37 (20')		8/6/2024	20	20	X							
SB-38 (1-3')		8/6/2024	1-3	20	X	X	X	X	X	X	X	X
SB-38 (4-6')		8/6/2024	4-6	20	X	X	X	X	X	X	X	X
SB-38 (20')		8/6/2024	20	20	X							
29Clay-Trench-1		8/20/2024	1.5	1.5	X							

TABLE NOTES:

ft	feet
bgs	Below ground surface.
SB	Soil boring
IA	Ambient Indoor Air
OA	Ambient Outdoor Air
SV	Soil Vapor
ppm	Parts per millon.
VOCs	Volatile Organic Compounds.
SVOCs	Semivolatile Organic Compunds.
PCBs	Polychlorinated Biphenylss
TCL	Target Compound Lists
PFAS	Per - and Polyfluoroylalkyl Substances

Table 1 - Sample Collection Summary
Remedial Investigation Report

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

GZA Sample ID	Tax Lot Location	Date Collected	Approximate well screened Interval (feet below top of casing)	VOCs	SVOCs	Pesticides	Herbicides	PCBs	PFAS	TAL Metals (total / dissolved)	1,4 Dioxane
Groundwater Samples											
MW-01S	LOT 9	9/3/2024	5-15	X	X	X	X	X	X	X	X
MW-01M		9/3/2024	15-25	X	X	X	X	X	X	X	X
MW-01D		9/6/2024	25-35	X							
MW-02S		9/3/2024	6-16	X	X	X	X	X	X	X	X
MW-02M		9/3/2024	15-25	X	X	X	X	X	X	X	X
MW-02D		9/4/2024	25-35	X							
MW-03S		9/4/2024	6-16	X	X	X	X	X	X	X	X
MW-03M		9/3/2024	15-25	X	X	X	X	X	X	X	X
MW-03D		9/6/2024	25-35	X							
MW-04S		9/3/2024	5.5-15.5	X	X	X	X	X	X	X	X
MW-04M		9/3/2024	15-25	X	X	X	X	X	X	X	X
MW-04D		9/4/2024	25-35	X							
MW-05S	LOT 10	9/5/2024	5.5-15.5	X	X	X	X	X	X	X	X
MW-05M		9/5/2024	15-25	X	X	X	X	X	X	X	X
MW-05D		9/5/2024	25-35	X							
MW-06S	LOT 53	9/10/2024	8-18	X	X	X	X	X	X	X	X
MW-06D		9/5/2024	30-40	X							
MW-07S		9/5/2024	6-16	X	X	X	X	X	X	X	X
MW-07M		9/5/2024	15-25	X	X	X	X	X	X	X	X
MW-07D		9/5/2024	30-40	X							
MW-08S		9/6/2024	8-18	X	X	X	X	X	X	X	X
MW-08M		9/6/2024	20-30	X	X	X	X	X	X	X	X
MW-08D		9/4/2024	30-40	X							
MW-09S		9/4/2024	8-18	X	X	X	X	X	X	X	X
MW-09M		9/6/2024	17-27	X	X	X	X	X	X	X	X
MW-09D		9/6/2024	29-39	X							
MW-10S		9/10/2024	5-15	X	X	X	X	X	X	X	X
MW-10M		9/9/2024	15-25								
MW-10D		9/9/2024	32-42	X							
MW-11S		9/10/2024	5-15	X	X	X	X	X	X	X	X
MW-11M		9/9/2024	15-25								
MW-11D		9/9/2024	30-40	X							

TABLE NOTES:

ft	feet
bgs	Below ground surface.
SB	Soil boring
IA	Ambient Indoor Air
OA	Ambient Outdoor Air
SV	Soil Vapor
ppm	Parts per millon.
VOCs	Volatile Organic Compounds.
SVOCs	Semivolatile Organic Compunds.
PCBs	Polychlorinated Biphenylss
TCL	Target Compound Lists
PFAS	Per - and Polyfluoroylalkyl Substances

Table 1 - Sample Collection Summary
Remedial Investigation Report

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

GZA Sample ID	Tax Lot Location	Date Collected	Sample depth (ft below ground surface - soil vapor; ft above grade - ambient air)	VOCs - TO-15	SVOCs	Pesticides	Herbicides	PCBs	PFAS	TAL Metals	1,4 Dioxane
Soil Vapor Samples			**sample depth (ft bgs)**								
SV-12	LOT 9	8/20/2024	4	X							
SV-13		8/20/2024	4	X							
SV-14		8/20/2024	4	X							
SV-15		8/20/2024	4	X							
SV-16		8/28/2024	4	X							
SV-17		8/22/2024	4	X							
SV-18		8/20/2024	4	X							
SV-19	LOT 53	8/12/2024	4	X							
SV-20		8/12/2024	4	X							
SV-21		8/12/2024	4	X							
SV-22		8/12/2024	4	X							
SV-23		8/12/2024	4	X							
Ambient Air Samples			**sample depth (ft above grade)**								
IA-01	LOT 9	8/20/2024	3	X							
IA-02		8/20/2024	3	X							
OA-03	LOT 10	8/16/2024	3	X							
OA-04	LOT 53	8/12/2024	3	X							

TABLE NOTES:

ft	feet
bgs	Below ground surface.
SB	Soil boring
IA	Ambient Indoor Air
OA	Ambient Outdoor Air
SV	Soil Vapor
ppm	Parts per millon.
VOCs - TO-15	Volatile Organic Compounds - EPA Air Method, Toxic Organics - 15
SVOCs	Semivolatile Organic Compunds.
PCBs	Polychlorinated Biphenylss
TCL	Target Compound Lists
PFAS	Per - and Polyfluoroylalkyl Substances

Table 2A - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-1 (0-2)		SB-1 (4-6)		SB-2 (0-2)		SB-2 (4-6)		SB-3 (0-2)		SB-3 (4-6)		SB-4 (0-2)	
LAB SAMPLE ID				23B0662-01		23B0662-02		23B0662-03		23B0662-04		23B0662-13		23B0662-14		23B0662-11	
SAMPLING DATE																	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,1,1-Trichloroethane	0.68	100	0.68	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,1,2,2-Tetrachloroethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,1,2-Trichloroethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,1-Dichloroethane	0.27	26	0.27	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,1-Dichloroethylene	0.33	100	0.33	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,1-Dichloropropylene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,2,3-Trichlorobenzene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,2,3-Trichloropropane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,2,4-Trichlorobenzene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,2-Dibromo-3-chloropropane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,2-Dibromoethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,2-Dichlorobenzene	1.1	100	1.1	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,2-Dichloroethane	0.02	3.1	0.02	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,2-Dichloropropane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,3-Dichlorobenzene	2.4	49	2.4	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,3-Dichloropropane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,4-Dichlorobenzene	1.8	13	1.8	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
1,4-Dioxane	0.1	13	0.1	0.0700	U	0.0470	U	0.0610	U	0.0440	U	0.0450	U	0.0470	U	0.0510	U
2,2-Dichloropropane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
2-Butanone	0.12	100	0.12	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
2-Chloroethylvinyl ether	~	~	~	0.0140	U	0.00940	U	0.0120	U	0.00880	U	0.00900	U	0.00950	U	0.0100	U
2-Chlorotoluene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
2-Hexanone	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
4-Chlorotoluene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
4-Methyl-2-pentanone	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Acetone	0.05	100	0.05	0.00700	U	0.00470	U	0.00610	U	0.00440	U	0.00450	U	0.00470	U	0.00510	U
Acrolein	~	~	~	0.00700	U	0.00470	U	0.00610	U	0.00440	U	0.00450	U	0.00470	U	0.00510	U
Acrylonitrile	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Benzene	0.06	4.8	0.06	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Bromobenzene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Bromochloromethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Bromodichloromethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Bromoform	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Bromomethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Carbon disulfide	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Carbon tetrachloride	0.76	2.4	0.76	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Chlorobenzene	1.1	100	1.1	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Chloroethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Chloroform	0.37	49	0.37	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00270	J
Chloromethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
cis-1,3-Dichloropropylene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Cyclohexane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Dibromochloromethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Dibromomethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Dichlorodifluoromethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Diisopropyl ether (DIPE)	~	~	~	0.00560	U	0.00370	U	0.00490	U	0.00350	U	0.00360	U	0.00380	U	0.00410	U
Ethanol	~	~	~	0.0560	U	0.0370	U	0.0490	U	0.0350	U	0.0360	U	0.0380	U	0.0410	U
Ethyl Benzene	1	41	1	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.00560	U	0.00370	U	0.00490	U	0.00350	U	0.00360	U	0.00380	U	0.00410	U
Hexachlorobutadiene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Iodomethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Isopropylbenzene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Methyl acetate	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Methyl Methacrylate	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Methylcyclohexane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Methylene chloride	0.05	100	0.05	0.00700	U	0.00470	U	0.00610	U	0.00440	U	0.00450	U	0.00470	U	0.00510	U
Naphthalene	12	100	12	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
n-Butylbenzene	12	100	12	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
n-Propylbenzene	3.9	100	3.9	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
o-Xylene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
p- & m- Xylenes	~	~	~	0.00700	U	0.00470	U	0.00610	U	0.00440	U	0.00450	U	0.00470	U	0.00510	U
p-Diethylbenzene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
p-Ethyltoluene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
p-Isopropyltoluene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
sec-Butylbenzene	11	100	11	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Styrene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
tert-Amyl alcohol (TAA)	~	~	~	0.0560	U	0.0370	U	0.0490	U	0.0350	U	0.0360	U	0.0380	U	0.0410	U
tert-Amyl methyl ether (TAME)	~	~	~	0.00560	U	0.00370	U	0.00490	U	0.00350	U	0.00360	U	0.00380	U	0.00410	U
tert-Butyl alcohol (TBA)	~	~	~	0.00880		0.00720		0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
tert-Butylbenzene	5.9	100	5.9	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Tetrachloroethylene	1.3	19	1.3	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.0380	
Tetrahydrofuran	~	~	~	0.00700	U	0.00470	U	0.00610	U	0.00440	U	0.00450	U	0.00470	U	0.00510	U
Toluene	0.7	100	0.7	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
trans-1,3-Dichloropropylene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
trans-1,4-dichloro-2-butene	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Trichloroethylene	0.47	21	0.47	0.420		0.0210		0.0240		0.0110		0.00570		0.00240	U	**10**	D
Trichlorofluoromethane	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Vinyl acetate	~	~	~	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Vinyl Chloride	0.02	0.9	0.02	0.00350	U	0.00230	U	0.00310	U	0.00220	U	0.00230	U	0.00240	U	0.00260	U
Xylenes, Total	0.26	100	1.6	0.0110	U	0.00700	U	0.00920	U	0.00660	U	0.00680	U	0.00710	U	0.00770	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2A - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-4 (4-6)		SB-5 (0-2)		SB-5 (4-6)		SB-6 (0-2)		SB-6 (4-6)		SB-7 (0-2)		SB-7 (4-6)	
LAB SAMPLE ID				23B0662-12		23B0662-09		23B0662-10		23B0662-05		23B0662-06		23B0662-07		23B0662-08	
SAMPLING DATE																	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,1,1-Trichloroethane	0.68	100	0.68	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,1,2,2-Tetrachloroethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,1,2-Trichloroethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,1-Dichloroethane	0.27	26	0.27	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,1-Dichloroethylene	0.33	100	0.33	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,1-Dichloropropylene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,2,3-Trichlorobenzene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,2,3-Trichloropropane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,2,4-Trichlorobenzene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,2-Dibromo-3-chloropropane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,2-Dibromoethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,2-Dichlorobenzene	1.1	100	1.1	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,2-Dichloroethane	0.02	3.1	0.02	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,2-Dichloropropane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,3-Dichlorobenzene	2.4	49	2.4	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,3-Dichloropropane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,4-Dichlorobenzene	1.8	13	1.8	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
1,4-Dioxane	0.1	13	0.1	0.0470	U	0.0600	U	0.0440	U	0.0710	U	0.0520	U	0.0610	U	0.0430	U
2,2-Dichloropropane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
2-Butanone	0.12	100	0.12	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
2-Chloroethylvinyl ether	~	~	~	0.00950	U	0.0120	U	0.00890	U	0.0140	U	0.0100	U	0.0120	U	0.00860	U
2-Chlorotoluene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
2-Hexanone	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
4-Chlorotoluene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
4-Methyl-2-pentanone	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Acetone	0.05	100	0.05	0.00640	J	0.00600	U	0.00440	U	0.00710	U	0.0200		0.0110	J	0.00430	U
Acrolein	~	~	~	0.00470	U	0.00600	U	0.00440	U	0.00710	U	0.00520	U	0.00610	U	0.00430	U
Acrylonitrile	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Benzene	0.06	4.8	0.06	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Bromobenzene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Bromochloromethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Bromodichloromethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Bromoform	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Bromomethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Carbon disulfide	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Carbon tetrachloride	0.76	2.4	0.76	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Chlorobenzene	1.1	100	1.1	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Chloroethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Chloroform	0.37	49	0.37	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Chloromethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
cis-1,3-Dichloropropylene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Cyclohexane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Dibromochloromethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Dibromomethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Dichlorodifluoromethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Diisopropyl ether (DIPE)	~	~	~	0.00380	U	0.00480	U	0.00350	U	0.00570	U	0.00410	U	0.00490	U	0.00340	U
Ethanol	~	~	~	0.0380	U	0.0480	U	0.0350	U	0.0570	U	0.0410	U	0.0490	U	0.0340	U
Ethyl Benzene	1	41	1	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.00380	U	0.00480	U	0.00350	U	0.00570	U	0.00410	U	0.00490	U	0.00340	U
Hexachlorobutadiene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Iodomethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Isopropylbenzene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Methyl acetate	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Methyl Methacrylate	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Methylcyclohexane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Methylene chloride	0.05	100	0.05	0.00470	U	0.00600	U	0.00440	U	0.00710	U	0.00520	U	0.00610	U	0.00430	U
Naphthalene	12	100	12	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
n-Butylbenzene	12	100	12	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
n-Propylbenzene	3.9	100	3.9	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
o-Xylene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
p- & m- Xylenes	~	~	~	0.00470	U	0.00600	U	0.00440	U	0.00710	U	0.00520	U	0.00610	U	0.00430	U
p-Diethylbenzene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
p-Ethyltoluene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
p-Isopropyltoluene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
sec-Butylbenzene	11	100	11	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Styrene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
tert-Amyl alcohol (TAA)	~	~	~	0.0380	U	0.0480	U	0.0350	U	0.0570	U	0.0410	U	0.0490	U	0.0340	U
tert-Amyl methyl ether (TAME)	~	~	~	0.00380	U	0.00480	U	0.00350	U	0.00570	U	0.00410	U	0.00490	U	0.00340	U
tert-Butyl alcohol (TBA)	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
tert-Butylbenzene	5.9	100	5.9	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Tetrachloroethylene	1.3	19	1.3	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Tetrahydrofuran	~	~	~	0.00470	U	0.00600	U	0.00440	U	0.00710	U	0.00520	U	0.00610	U	0.00430	U
Toluene	0.7	100	0.7	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
trans-1,3-Dichloropropylene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
trans-1,4-dichloro-2-butene	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Trichloroethylene	0.47	21	0.47	0.250		0.00750		0.00220	U	**21**	D	0.0940		0.00610		0.00220	U
Trichlorofluoromethane	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Vinyl acetate	~	~	~	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Vinyl Chloride	0.02	0.9	0.02	0.00240	U	0.00300	U	0.00220	U	0.00350	U	0.00260	U	0.00310	U	0.00220	U
Xylenes, Total	0.26	100	1.6	0.00710	U	0.00910	U	0.00660	U	0.0110	U	0.00770	U	0.00920	U	0.00650	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2A - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-8 (0-2')		SB-8 (4-6')		SB-9 (0-2')		SB-9 (4-6')		SB-10 (0-2')		SB-10 (4-6')	
LAB SAMPLE ID				23B0727-05		23B0727-06		23B0727-01		23B0727-02		23B0727-03		23B0727-04	
SAMPLING DATE				2/13/2023 10:10		2/13/2023 10:38		2/13/2023 9:05		2/13/2023 9:15		2/13/2023 9:35		2/13/2023 9:40	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,1,2-Trichloroethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,1-Dichloroethane	0.27	26	0.27	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,1-Dichloroethylene	0.33	100	0.33	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,1-Dichloropropylene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,2,3-Trichlorobenzene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,2,3-Trichloropropane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,2,4-Trichlorobenzene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,2-Dibromoethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,2-Dichloropropane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,3-Dichloropropane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
1,4-Dioxane	0.1	13	0.1	0.093	U	0.16	U	0.06	U	0.053	U	0.069	U	0.063	U
2,2-Dichloropropane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
2-Butanone	0.12	100	0.12	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
2-Chloroethylvinyl ether	~	~	~	0.019	U	0.032	U	0.012	U	0.011	U	0.014	U	0.013	U
2-Chlorotoluene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
2-Hexanone	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
4-Chlorotoluene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
4-Methyl-2-pentanone	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Acetone	0.05	100	0.05	0.0093	J	0.028	J	0.006	U	0.0064	J	0.022		0.0063	U
Acrolein	~	~	~	0.0093	U	0.016	U	0.006	U	0.0053	U	0.0069	U	0.0063	U
Acrylonitrile	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Benzene	0.06	4.8	0.06	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Bromobenzene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Bromochloromethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Bromodichloromethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Bromoform	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Bromomethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Carbon disulfide	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Carbon tetrachloride	0.76	2.4	0.76	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Chlorobenzene	1.1	100	1.1	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Chloroethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Chloroform	0.37	49	0.37	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Chloromethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.032		0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
cis-1,3-Dichloropropylene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Cyclohexane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Dibromochloromethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Dibromomethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Dichlorodifluoromethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Diisopropyl ether (DIPE)	~	~	~	0.0075	U	0.013	U	0.0048	U	0.0042	U	0.0055	U	0.005	U
Ethanol	~	~	~	0.075	U	0.13	U	0.048	U	0.042	U	0.055	U	0.05	U
Ethyl Benzene	1	41	1	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0075	U	0.013	U	0.0048	U	0.0042	U	0.0055	U	0.005	U
Hexachlorobutadiene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Iodomethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Isopropylbenzene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Methyl acetate	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Methyl Methacrylate	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Methylcyclohexane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Methylene chloride	0.05	100	0.05	0.013	J	0.031	J	0.006	U	0.0079	J	0.012	J	0.012	J
Naphthalene	12	100	12	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
n-Butylbenzene	12	100	12	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
n-Propylbenzene	3.9	100	3.9	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
o-Xylene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
p- & m- Xylenes	~	~	~	0.0093	U	0.016	U	0.006	U	0.0053	U	0.0069	U	0.0063	U
p-Diethylbenzene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
p-Ethyltoluene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
p-Isopropyltoluene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
sec-Butylbenzene	11	100	11	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Styrene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
tert-Amyl alcohol (TAA)	~	~	~	0.075	U	0.13	U	0.048	U	0.042	U	0.055	U	0.05	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0075	U	0.013	U	0.0048	U	0.0042	U	0.0055	U	0.005	U
tert-Butyl alcohol (TBA)	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
tert-Butylbenzene	5.9	100	5.9	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Tetrachloroethylene	1.3	19	1.3	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Tetrahydrofuran	~	~	~	0.0093	U	0.016	U	0.006	U	0.0053	U	0.0069	U	0.0063	U
Toluene	0.7	100	0.7	0.01		0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.007	J	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
trans-1,3-Dichloropropylene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
trans-1,4-dichloro-2-butene	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Trichloroethylene	0.47	21	0.47	0.073		0.008	U	0.35		0.0026	U	0.0034	U	0.0031	U
Trichlorofluoromethane	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Vinyl acetate	~	~	~	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Vinyl Chloride	0.02	0.9	0.02	0.0047	U	0.008	U	0.003	U	0.0026	U	0.0034	U	0.0031	U
Xylenes, Total	0.26	100	1.6	0.014	U	0.024	U	0.009	U	0.0079	U	0.01	U	0.0094	U

TABLE NOTES:

	Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use and Protection of Groundwater SCOs.
U :	Not detected at the reported detection limit for the sample.
D:	Result is from an analysis that required a dilution
J:	Analyte detected at or above the method detection limit but below the reporting limit.
mg/kg:	Milligrams per Kilogram.
~ :	No Standards or Guidance Value.
Bold and Italics :	The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-15 (1-3ft)		SB-15 (5-7ft)		SB-15 (21ft)		SB-15 (25ft)		SB-16 (1-3ft)		SB-16 (5-7ft)		SB-16 (20.5ft)	
LAB SAMPLE ID				24H0613-13		24H0613-14		24H0613-15		24H0613-16		24H0613-17		24H0613-18		24H0613-19	
SAMPLING DATE				8/8/2024 8:05:00 AM		8/8/2024 8:25:00 AM		8/8/2024 8:25:00 AM		8/8/2024 8:50:00 AM		8/8/2024 9:25:00 AM		8/8/2024 9:40:00 AM		8/8/2024 10:05:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,1,2-Trichloroethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,1-Dichloroethane	0.27	26	0.27	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,1-Dichloroethylene	0.33	100	0.33	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,1-Dichloropropylene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,2,3-Trichlorobenzene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,2,3-Trichloropropane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,2,4-Trichlorobenzene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,2-Dibromoethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,2-Dichloropropane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,3-Dichloropropane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
1,4-Dioxane	0.1	13	0.1	0.0450	U	0.0480	U	0.0480	U	0.0510	U	0.0510	U	0.0410	U	0.0450	U
2,2-Dichloropropane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
2-Butanone	0.12	100	0.12	0.0023	U	0.0024	U	0.0068		0.0025	U	0.0026	U	0.1000		0.0110	
2-Chloroethylvinyl ether	~	~	~	0.0091	U	0.0096	U	0.0096	U	0.0100	U	0.0100	U	0.0082	U	0.0090	U
2-Chlorotoluene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
2-Hexanone	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
4-Chlorotoluene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
4-Methyl-2-pentanone	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Acetone	0.05	100	0.05	0.0045	U	0.0048	U	0.0048	U	0.0051	U	0.0051	U	**0.0670**		0.0045	U
Acrolein	~	~	~	0.0045	U	0.0048	U	0.0048	U	0.0051	U	0.0051	U	0.0041	U	0.0045	U
Acrylonitrile	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Benzene	0.06	4.8	0.06	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Bromobenzene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Bromochloromethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Bromodichloromethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Bromoform	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Bromomethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Carbon disulfide	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0071	
Carbon tetrachloride	0.76	2.4	0.76	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Chlorobenzene	1.1	100	1.1	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Chloroethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Chloroform	0.37	49	0.37	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Chloromethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0023	U	0.0024	U	0.0780		0.0100		0.0026	U	0.0020	U	0.0022	U
cis-1,3-Dichloropropylene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Cyclohexane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Dibromochloromethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Dibromomethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Dichlorodifluoromethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Diisopropyl ether (DIPE)	~	~	~	0.0036	U	0.0038	U	0.0039	U	0.0041	U	0.0041	U	0.0033	U	0.0036	U
Ethanol	~	~	~	0.0360	U	0.0380	U	0.0390	U	0.0410	U	0.0410	U	0.0330	U	0.0360	U
Ethyl Benzene	1	41	1	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0036	U	0.0038	U	0.0039	U	0.0041	U	0.0041	U	0.0033	U	0.0036	U
Hexachlorobutadiene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Iodomethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Isopropylbenzene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Methyl acetate	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Methyl Methacrylate	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Methylcyclohexane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Methylene chloride	0.05	100	0.05	0.0045	U	0.0048	U	0.0048	U	0.0051	U	0.0160		0.0041	U	0.0045	U
Naphthalene	12	100	12	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
n-Butylbenzene	12	100	12	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
n-Propylbenzene	3.9	100	3.9	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
o-Xylene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
p- & m- Xylenes	~	~	~	0.0045	U	0.0048	U	0.0048	U	0.0051	U	0.0051	U	0.0041	U	0.0045	U
p-Diethylbenzene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
p-Ethyltoluene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
p-Isopropyltoluene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
sec-Butylbenzene	11	100	11	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Styrene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
tert-Amyl alcohol (TAA)	~	~	~	0.0360	U	0.0380	U	0.0390	U	0.0410	U	0.0410	U	0.0330	U	0.0360	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0036	U	0.0038	U	0.0039	U	0.0041	U	0.0041	U	0.0033	U	0.0036	U
tert-Butyl alcohol (TBA)	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
tert-Butylbenzene	5.9	100	5.9	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Tetrachloroethylene	1.3	19	1.3	0.0023	U	0.0024	U	0.0027	J	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Tetrahydrofuran	~	~	~	0.0045	U	0.0048	U	0.0048	U	0.0051	U	0.0051	U	0.0041	U	0.0045	U
Toluene	0.7	100	0.7	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
trans-1,3-Dichloropropylene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
trans-1,4-dichloro-2-butene	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Trichloroethylene	0.47	21	0.47	0.0064		0.0058		**5.10**	D	0.2500		0.0027	J	0.0051		0.0022	U
Trichlorofluoromethane	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Vinyl acetate	~	~	~	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Vinyl Chloride	0.02	0.9	0.02	0.0023	U	0.0024	U	0.0024	U	0.0025	U	0.0026	U	0.0020	U	0.0022	U
Xylenes, Total	0.26	100	1.6	0.0068	U	0.0072	U	0.0072	U	0.0076	U	0.0077	U	0.0061	U	0.0067	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-16 (45ft)		SB-17 (1-3ft)		SB-17 (5-7ft)		SB-17 (17ft)		SB-18 (1-3ft)		SB-18 (5-7ft)		SB-18 (36ft)	
LAB SAMPLE ID				24H0863-01		24H0642-13		24H0642-14		24H0642-15		24H0965-01		24H0965-02		24H0965-03	
SAMPLING DATE				8/13/2024 10:30:00 AM		8/9/2024 9:30:00 AM		8/9/2024 9:45:00 AM		8/9/2024 9:55:00 AM		8/14/2024 12:30:00 PM		8/14/2024 12:40:00 PM		8/14/2024 2:40:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,1,2-Trichloroethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,1-Dichloroethane	0.27	26	0.27	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,1-Dichloroethylene	0.33	100	0.33	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,1-Dichloropropylene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,2,3-Trichlorobenzene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,2,3-Trichloropropane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,2,4-Trichlorobenzene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,2-Dibromoethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,2-Dichloropropane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,3-Dichloropropane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
1,4-Dioxane	0.1	13	0.1	0.0530	U	0.0450	U	0.0570	U	0.0430	U	0.0490	U	0.0440	U	0.0520	U
2,2-Dichloropropane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
2-Butanone	0.12	100	0.12	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
2-Chloroethylvinyl ether	~	~	~	0.0110	U	0.0089	U	0.0110	U	0.0085	U	0.0099	U	0.0087	U	0.0100	U
2-Chlorotoluene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
2-Hexanone	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
4-Chlorotoluene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
4-Methyl-2-pentanone	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Acetone	0.05	100	0.05	0.0053	U	0.0045	U	0.0057	U	0.0043	U	0.0049	U	0.0044	U	0.0052	U
Acrolein	~	~	~	0.0053	U	0.0045	U	0.0057	U	0.0043	U	0.0049	U	0.0044	U	0.0052	U
Acrylonitrile	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Benzene	0.06	4.8	0.06	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Bromobenzene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Bromochloromethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Bromodichloromethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Bromoform	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Bromomethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Carbon disulfide	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Carbon tetrachloride	0.76	2.4	0.76	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Chlorobenzene	1.1	100	1.1	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Chloroethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Chloroform	0.37	49	0.37	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Chloromethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
cis-1,3-Dichloropropylene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Cyclohexane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Dibromochloromethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Dibromomethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Dichlorodifluoromethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Diisopropyl ether (DIPE)	~	~	~	0.0042	U	0.0036	U	0.0046	U	0.0034	U	0.0039	U	0.0035	U	0.0042	U
Ethanol	~	~	~	0.0420	U	0.0360	U	0.0460	U	0.0340	U	0.0390	U	0.0350	U	0.0420	U
Ethyl Benzene	1	41	1	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0042	U	0.0036	U	0.0046	U	0.0034	U	0.0039	U	0.0035	U	0.0042	U
Hexachlorobutadiene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Iodomethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Isopropylbenzene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Methyl acetate	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Methyl Methacrylate	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0037	J
Methylcyclohexane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Methylene chloride	0.05	100	0.05	0.0053	U	0.0045	U	0.0057	U	0.0043	U	0.0049	U	0.0044	U	0.0052	U
Naphthalene	12	100	12	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
n-Butylbenzene	12	100	12	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
n-Propylbenzene	3.9	100	3.9	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
o-Xylene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
p- & m- Xylenes	~	~	~	0.0053	U	0.0045	U	0.0057	U	0.0043	U	0.0049	U	0.0044	U	0.0052	U
p-Diethylbenzene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
p-Ethyltoluene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
p-Isopropyltoluene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
sec-Butylbenzene	11	100	11	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Styrene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
tert-Amyl alcohol (TAA)	~	~	~	0.0420	U	0.0360	U	0.0460	U	0.0340	U	0.0390	U	0.0350	U	0.0420	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0042	U	0.0036	U	0.0046	U	0.0034	U	0.0039	U	0.0035	U	0.0042	U
tert-Butyl alcohol (TBA)	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
tert-Butylbenzene	5.9	100	5.9	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Tetrachloroethylene	1.3	19	1.3	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Tetrahydrofuran	~	~	~	0.0053	U	0.0045	U	0.0057	U	0.0043	U	0.0049	U	0.0044	U	0.0052	U
Toluene	0.7	100	0.7	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
trans-1,3-Dichloropropylene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
trans-1,4-dichloro-2-butene	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Trichloroethylene	0.47	21	0.47	0.0160		0.0022	U	0.0029	U	0.2900		0.0025	U	0.0022	U	0.0026	U
Trichlorofluoromethane	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Vinyl acetate	~	~	~	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Vinyl Chloride	0.02	0.9	0.02	0.0026	U	0.0022	U	0.0029	U	0.0021	U	0.0025	U	0.0022	U	0.0026	U
Xylenes, Total	0.26	100	1.6	0.0079	U	0.0067	U	0.0086	U	0.0064	U	0.0074	U	0.0065	U	0.0078	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use	NYSDEC Part 375 Restricted Use	NYSDEC Part 375 Protection of	SB-19 (1-3 ft)		SB-19 (4-6 ft)		SB-19 (13 ft)		SB-19 (36 ft)		SB-20 (1-3ft)		SB-20 (5-7ft)	
LAB SAMPLE ID	Soil Cleanup	Soil Cleanup	Groundwater Soil	24H1202-01		24H1202-02		24H1202-03		24H1202-04		24H0613-29		24H0613-30	
SAMPLING DATE	Objectives	Objectives-	Cleanup	8/15/2024 8:45:00 AM		8/15/2024 8:55:00 AM		8/15/2024 9:30:00 AM		8/15/2024 11:25:00 AM		8/8/2024 2:00:00 PM		8/8/2024 2:05:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,1,2-Trichloroethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,1-Dichloroethane	0.27	26	0.27	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,1-Dichloroethylene	0.33	100	0.33	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,1-Dichloropropylene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,2,3-Trichlorobenzene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,2,3-Trichloropropane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,2,4-Trichlorobenzene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,2-Dibromoethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,2-Dichloropropane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,3-Dichloropropane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
1,4-Dioxane	0.1	13	0.1	0.0720	U	0.0490	U	0.0480	U	0.0510	U	0.0570	U	0.0450	U
2,2-Dichloropropane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
2-Butanone	0.12	100	0.12	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
2-Chloroethylvinyl ether	~	~	~	0.0140	U	0.0098	U	0.0095	U	0.0100	U	0.0110	U	0.0090	U
2-Chlorotoluene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
2-Hexanone	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
4-Chlorotoluene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
4-Methyl-2-pentanone	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Acetone	0.05	100	0.05	0.0072	U	0.0049	U	0.0060	J	0.0052	J	0.0057	U	0.0046	J
Acrolein	~	~	~	0.0072	U	0.0049	U	0.0048	U	0.0051	U	0.0057	U	0.0045	U
Acrylonitrile	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Benzene	0.06	4.8	0.06	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Bromobenzene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Bromochloromethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Bromodichloromethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Bromoform	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Bromomethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Carbon disulfide	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Carbon tetrachloride	0.76	2.4	0.76	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Chlorobenzene	1.1	100	1.1	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Chloroethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Chloroform	0.37	49	0.37	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Chloromethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
cis-1,3-Dichloropropylene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Cyclohexane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Dibromochloromethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Dibromomethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Dichlorodifluoromethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Diisopropyl ether (DIPE)	~	~	~	0.0057	U	0.0039	U	0.0038	U	0.0041	U	0.0046	U	0.0036	U
Ethanol	~	~	~	0.0570	U	0.0390	U	0.0380	U	0.0410	U	0.0460	U	0.0360	U
Ethyl Benzene	1	41	1	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0057	U	0.0039	U	0.0038	U	0.0041	U	0.0046	U	0.0036	U
Hexachlorobutadiene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Iodomethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Isopropylbenzene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Methyl acetate	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Methyl Methacrylate	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Methylcyclohexane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Methylene chloride	0.05	100	0.05	0.0072	U	0.0059	J	0.0048	U	0.0051	U	0.0057	U	0.0045	U
Naphthalene	12	100	12	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
n-Butylbenzene	12	100	12	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
n-Propylbenzene	3.9	100	3.9	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
o-Xylene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
p- & m- Xylenes	~	~	~	0.0072	U	0.0049	U	0.0048	U	0.0051	U	0.0057	U	0.0045	U
p-Diethylbenzene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
p-Ethyltoluene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
p-Isopropyltoluene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
sec-Butylbenzene	11	100	11	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Styrene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
tert-Amyl alcohol (TAA)	~	~	~	0.0570	U	0.0390	U	0.0380	U	0.0410	U	0.0460	U	0.0360	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0057	U	0.0039	U	0.0038	U	0.0041	U	0.0046	U	0.0036	U
tert-Butyl alcohol (TBA)	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0086		0.0086	
tert-Butylbenzene	5.9	100	5.9	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Tetrachloroethylene	1.3	19	1.3	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Tetrahydrofuran	~	~	~	0.0072	U	0.0049	U	0.0048	U	0.0051	U	0.0057	U	0.0045	U
Toluene	0.7	100	0.7	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
trans-1,3-Dichloropropylene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
trans-1,4-dichloro-2-butene	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Trichloroethylene	0.47	21	0.47	0.0110		0.0025	U	0.0042	J	0.0025	U	0.0350		0.0055	
Trichlorofluoromethane	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Vinyl acetate	~	~	~	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Vinyl Chloride	0.02	0.9	0.02	0.0036	U	0.0025	U	0.0024	U	0.0025	U	0.0029	U	0.0023	U
Xylenes, Total	0.26	100	1.6	0.0110	U	0.0074	U	0.0071	U	0.0076	U	0.0086	U	0.0068	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-20 (19.5ft)		SB-21 (3ft)		SB-22 (3ft)		SB-23 (3ft)		SB-24 (1-3ft)		SB-24 (5-7ft)		SB-24 (17ft)	
LAB SAMPLE ID				24H0613-31		24H0642-07		24H0642-08		24H0642-09		24H0613-26		24H0613-27		24H0613-28	
SAMPLING DATE				8/8/2024 2:25:00 PM		8/9/2024 8:05:00 AM		8/9/2024 8:15:00 AM		8/9/2024 8:25:00 AM		8/8/2024 1:10:00 PM		8/8/2024 1:20:00 PM		8/8/2024 1:35:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,1,2-Trichloroethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,1-Dichloroethane	0.27	26	0.27	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,1-Dichloroethylene	0.33	100	0.33	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,1-Dichloropropylene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,2,3-Trichlorobenzene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,2,3-Trichloropropane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,2,4-Trichlorobenzene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,2-Dibromoethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,2-Dichloropropane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,3-Dichloropropane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
1,4-Dioxane	0.1	13	0.1	0.0490	U	0.0470	U	0.0480	U	0.0480	U	0.0490	U	0.0400	U	0.0680	U
2,2-Dichloropropane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
2-Butanone	0.12	100	0.12	0.0039	J	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
2-Chloroethylvinyl ether	~	~	~	0.0098	U	0.0094	U	0.0096	U	0.0096	U	0.0098	U	0.0079	U	0.0140	U
2-Chlorotoluene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
2-Hexanone	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
4-Chlorotoluene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
4-Methyl-2-pentanone	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Acetone	0.05	100	0.05	0.0067	J	0.0047	U	0.0048	U	0.0048	U	0.0049	U	0.0140		0.0068	U
Acrolein	~	~	~	0.0049	U	0.0047	U	0.0048	U	0.0048	U	0.0049	U	0.0040	U	0.0068	U
Acrylonitrile	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Benzene	0.06	4.8	0.06	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Bromobenzene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Bromochloromethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Bromodichloromethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Bromoform	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Bromomethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Carbon disulfide	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Carbon tetrachloride	0.76	2.4	0.76	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Chlorobenzene	1.1	100	1.1	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Chloroethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Chloroform	0.37	49	0.37	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Chloromethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0380		0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
cis-1,3-Dichloropropylene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Cyclohexane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Dibromochloromethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Dibromomethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Dichlorodifluoromethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Diisopropyl ether (DIPE)	~	~	~	0.0039	U	0.0038	U	0.0038	U	0.0038	U	0.0039	U	0.0032	U	0.0055	U
Ethanol	~	~	~	0.0390	U	0.0380	U	0.0380	U	0.0380	U	0.0390	U	0.0320	U	0.0550	U
Ethyl Benzene	1	41	1	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0039	U	0.0038	U	0.0038	U	0.0038	U	0.0039	U	0.0032	U	0.0055	U
Hexachlorobutadiene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Iodomethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Isopropylbenzene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Methyl acetate	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Methyl Methacrylate	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Methylcyclohexane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Methylene chloride	0.05	100	0.05	0.0049	U	0.0047	U	0.0048	U	0.0048	U	0.0049	U	0.0040	U	0.0068	U
Naphthalene	12	100	12	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
n-Butylbenzene	12	100	12	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
n-Propylbenzene	3.9	100	3.9	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
o-Xylene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
p- & m- Xylenes	~	~	~	0.0049	U	0.0047	U	0.0048	U	0.0048	U	0.0049	U	0.0040	U	0.0068	U
p-Diethylbenzene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
p-Ethyltoluene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
p-Isopropyltoluene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
sec-Butylbenzene	11	100	11	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Styrene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
tert-Amyl alcohol (TAA)	~	~	~	0.0390	U	0.0380	U	0.0380	U	0.0380	U	0.0390	U	0.0320	U	0.0550	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0039	U	0.0038	U	0.0038	U	0.0038	U	0.0039	U	0.0032	U	0.0055	U
tert-Butyl alcohol (TBA)	~	~	~	0.0250		0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0230		0.0034	U
tert-Butylbenzene	5.9	100	5.9	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Tetrachloroethylene	1.3	19	1.3	0.0029	J	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Tetrahydrofuran	~	~	~	0.0049	U	0.0047	U	0.0048	U	0.0048	U	0.0049	U	0.0040	U	0.0068	U
Toluene	0.7	100	0.7	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
trans-1,3-Dichloropropylene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
trans-1,4-dichloro-2-butene	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Trichloroethylene	0.47	21	0.47	**5.10**	D	0.0024	U	0.0042	J	0.0024	U	0.0028	J	0.0020	U	0.0034	U
Trichlorofluoromethane	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Vinyl acetate	~	~	~	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Vinyl Chloride	0.02	0.9	0.02	0.0025	U	0.0024	U	0.0024	U	0.0024	U	0.0025	U	0.0020	U	0.0034	U
Xylenes, Total	0.26	100	1.6	0.0074	U	0.0071	U	0.0072	U	0.0072	U	0.0074	U	0.0059	U	0.0100	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-25 (1-3ft)		SB-25 (6-8ft)		SB-25 (10.5ft)		SB-26 (1-3ft)		SB-26 (5-7ft)		SB-26 (17.5ft)		SB-27 (1-3ft)	
LAB SAMPLE ID				24H0613-20		24H0613-21		24H0613-22		24H0642-16		24H0642-19		24H0642-21		24H0642-11	
SAMPLING DATE				8/8/2024 10:45:00 AM		8/8/2024 10:55:00 AM		8/8/2024 11:05:00 AM		8/9/2024 10:25:00 AM		8/9/2024 10:40:00 AM		8/9/2024 10:45:00 AM		8/9/2024 8:55:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,1,2-Trichloroethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,1-Dichloroethane	0.27	26	0.27	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,1-Dichloroethylene	0.33	100	0.33	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,1-Dichloropropylene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,2,3-Trichlorobenzene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,2,3-Trichloropropane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,2,4-Trichlorobenzene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,2-Dibromoethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,2-Dichloropropane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,3-Dichloropropane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
1,4-Dioxane	0.1	13	0.1	0.0510	U	0.0530	U	0.0460	U	0.0490	U	0.0500	U	0.0550	U	0.0670	U
2,2-Dichloropropane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
2-Butanone	0.12	100	0.12	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
2-Chloroethylvinyl ether	~	~	~	0.0100	U	0.0110	U	0.0091	U	0.0098	U	0.0100	U	0.0110	U	0.0130	U
2-Chlorotoluene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
2-Hexanone	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
4-Chlorotoluene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
4-Methyl-2-pentanone	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Acetone	0.05	100	0.05	0.0051	U	0.0067	J	0.0046	U	0.0120		0.0050	U	0.0055	U	0.0067	U
Acrolein	~	~	~	0.0051	U	0.0053	U	0.0046	U	0.0049	U	0.0050	U	0.0055	U	0.0067	U
Acrylonitrile	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Benzene	0.06	4.8	0.06	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Bromobenzene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Bromochloromethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Bromodichloromethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Bromoform	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Bromomethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Carbon disulfide	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Carbon tetrachloride	0.76	2.4	0.76	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Chlorobenzene	1.1	100	1.1	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Chloroethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Chloroform	0.37	49	0.37	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0042	J
Chloromethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
cis-1,3-Dichloropropylene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Cyclohexane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Dibromochloromethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Dibromomethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Dichlorodifluoromethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Diisopropyl ether (DIPE)	~	~	~	0.0040	U	0.0043	U	0.0037	U	0.0039	U	0.0040	U	0.0044	U	0.0054	U
Ethanol	~	~	~	0.0400	U	0.0430	U	0.0370	U	0.0390	U	0.0400	U	0.0440	U	0.0540	U
Ethyl Benzene	1	41	1	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0040	U	0.0043	U	0.0037	U	0.0039	U	0.0040	U	0.0044	U	0.0054	U
Hexachlorobutadiene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Iodomethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Isopropylbenzene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Methyl acetate	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Methyl Methacrylate	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Methylcyclohexane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Methylene chloride	0.05	100	0.05	0.0051	U	0.0053	U	0.0046	U	0.0049	U	0.0050	U	0.0055	U	0.0067	U
Naphthalene	12	100	12	0.0025	U	0.0027	U	0.0023	U	0.0024	J	0.0025	U	0.0027	U	0.0034	U
n-Butylbenzene	12	100	12	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
n-Propylbenzene	3.9	100	3.9	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
o-Xylene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
p- & m- Xylenes	~	~	~	0.0051	U	0.0053	U	0.0046	U	0.0049	U	0.0050	U	0.0055	U	0.0067	U
p-Diethylbenzene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
p-Ethyltoluene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
p-Isopropyltoluene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
sec-Butylbenzene	11	100	11	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Styrene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
tert-Amyl alcohol (TAA)	~	~	~	0.0400	U	0.0430	U	0.0370	U	0.0390	U	0.0400	U	0.0440	U	0.0540	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0040	U	0.0043	U	0.0037	U	0.0039	U	0.0040	U	0.0044	U	0.0054	U
tert-Butyl alcohol (TBA)	~	~	~	0.0025	U	0.0077		0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
tert-Butylbenzene	5.9	100	5.9	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Tetrachloroethylene	1.3	19	1.3	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0120	
Tetrahydrofuran	~	~	~	0.0051	U	0.0053	U	0.0046	U	0.0049	U	0.0050	U	0.0055	U	0.0067	U
Toluene	0.7	100	0.7	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
trans-1,3-Dichloropropylene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
trans-1,4-dichloro-2-butene	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Trichloroethylene	0.47	21	0.47	0.0025	U	0.0027	U	0.0023	U	0.0030	J	0.0046	J	0.0350		**1,400**	D
Trichlorofluoromethane	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Vinyl acetate	~	~	~	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Vinyl Chloride	0.02	0.9	0.02	0.0025	U	0.0027	U	0.0023	U	0.0024	U	0.0025	U	0.0027	U	0.0034	U
Xylenes, Total	0.26	100	1.6	0.0076	U	0.0080	U	0.0069	U	0.0073	U	0.0075	U	0.0082	U	0.0100	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-27 (6-8ft)		SB-28 (1-3 ft)		SB-28 (4-6 ft)		SB-28 (20 ft)		SB-29 (1ft)		SB-29 (7ft)		SB-29 (20ft)	
LAB SAMPLE ID				24H0642-12		24H1202-05		24H1202-06		24H1202-07		24H0269-13		24H0269-23		24H0269-14	
SAMPLING DATE				8/9/2024 9:15:00 AM		8/15/2024 12:20:00 PM		8/15/2024 12:50:00 PM		8/15/2024 12:55:00 PM		8/5/2024 10:20:00 AM		8/5/2024 2:15:00 PM		8/5/2024 10:40:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,1,2-Trichloroethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,1-Dichloroethane	0.27	26	0.27	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,1-Dichloroethylene	0.33	100	0.33	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0130	
1,1-Dichloropropylene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,2,3-Trichlorobenzene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,2,3-Trichloropropane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,2,4-Trichlorobenzene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,2-Dibromoethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,2-Dichloropropane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,3-Dichloropropane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
1,4-Dioxane	0.1	13	0.1	0.0440	U	0.0610	U	0.0470	U	0.0530	U	0.0540	U	0.0570	U	0.0560	U
2,2-Dichloropropane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
2-Butanone	0.12	100	0.12	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
2-Chloroethylvinyl ether	~	~	~	0.0087	U	0.0120	U	0.0094	U	0.0110	U	0.0110	U	0.0110	U	0.0110	U
2-Chlorotoluene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
2-Hexanone	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
4-Chlorotoluene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
4-Methyl-2-pentanone	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Acetone	0.05	100	0.05	0.0044	U	0.0061	J	0.0047	U	0.0057	J	0.0054	U	0.0057	U	0.0056	U
Acrolein	~	~	~	0.0044	U	0.0061	U	0.0047	U	0.0053	U	0.0054	U	0.0057	U	0.0056	U
Acrylonitrile	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Benzene	0.06	4.8	0.06	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Bromobenzene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Bromochloromethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Bromodichloromethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Bromoform	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Bromomethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Carbon disulfide	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Carbon tetrachloride	0.76	2.4	0.76	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Chlorobenzene	1.1	100	1.1	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Chloroethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Chloroform	0.37	49	0.37	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Chloromethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	**3.60**	D
cis-1,3-Dichloropropylene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Cyclohexane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Dibromochloromethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Dibromomethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Dichlorodifluoromethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Diisopropyl ether (DIPE)	~	~	~	0.0035	U	0.0049	U	0.0038	U	0.0042	U	0.0043	U	0.0045	U	0.0045	U
Ethanol	~	~	~	0.0350	U	0.0490	U	0.0380	U	0.0420	U	0.0430	U	0.0450	U	0.0450	U
Ethyl Benzene	1	41	1	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0035	U	0.0049	U	0.0038	U	0.0042	U	0.0043	U	0.0045	U	0.0045	U
Hexachlorobutadiene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Iodomethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Isopropylbenzene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Methyl acetate	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Methyl Methacrylate	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Methylcyclohexane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Methylene chloride	0.05	100	0.05	0.0044	U	0.0061	U	0.0047	U	0.0053	U	0.0054	U	0.0057	U	0.0056	U
Naphthalene	12	100	12	0.0022	U	0.0480		0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
n-Butylbenzene	12	100	12	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
n-Propylbenzene	3.9	100	3.9	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
o-Xylene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
p- & m- Xylenes	~	~	~	0.0044	U	0.0061	U	0.0047	U	0.0053	U	0.0054	U	0.0057	U	0.0056	U
p-Diethylbenzene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
p-Ethyltoluene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
p-Isopropyltoluene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
sec-Butylbenzene	11	100	11	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Styrene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
tert-Amyl alcohol (TAA)	~	~	~	0.0350	U	0.0490	U	0.0380	U	0.0420	U	0.0430	U	0.0450	U	0.0450	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0035	U	0.0049	U	0.0038	U	0.0042	U	0.0043	U	0.0045	U	0.0045	U
tert-Butyl alcohol (TBA)	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
tert-Butylbenzene	5.9	100	5.9	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Tetrachloroethylene	1.3	19	1.3	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0086	
Tetrahydrofuran	~	~	~	0.0044	U	0.0061	U	0.0047	U	0.0053	U	0.0054	U	0.0057	U	0.0056	U
Toluene	0.7	100	0.7	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0110	
trans-1,3-Dichloropropylene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
trans-1,4-dichloro-2-butene	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Trichloroethylene	0.47	21	0.47	0.0033	J	0.0031	U	0.0024	U	0.0026	U	0.0790		0.0028	U	**23.0**	D
Trichlorofluoromethane	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Vinyl acetate	~	~	~	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	0.0028	U
Vinyl Chloride	0.02	0.9	0.02	0.0022	U	0.0031	U	0.0024	U	0.0026	U	0.0027	U	0.0028	U	**0.0810**	
Xylenes, Total	0.26	100	1.6	0.0065	U	0.0092	U	0.0071	U	0.0079	U	0.0081	U	0.0085	U	0.0084	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-29(33ft)		SB-29(39.5ft)		SB-30 (1-3ft)		SB-30 (4-6ft)		SB-30 (20ft)		SB-30 (29ft)		SB-30(37ft)	
LAB SAMPLE ID				24H1657-05		24H1657-06		24H0372-13		24H0372-14		24H0372-15		24H0372-20		24H1657-01	
SAMPLING DATE				8/23/2024 1:35:00 PM		8/23/2024 1:50:00 PM		8/6/2024 8:10:00 AM		8/6/2024 8:20:00 AM		8/6/2024 9:05:00 AM		8/6/2024 11:05:00 AM		8/23/2024 9:45:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0210		0.0026	U	0.0024	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,1,2-Trichloroethane	~	~	~	0.0026	U	0.0022	U	0.0037	J	0.0028	U	0.0150		0.0026	U	0.0024	U
1,1-Dichloroethane	0.27	26	0.27	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,1-Dichloroethylene	0.33	100	0.33	0.0053		0.0022	U	0.0028	U	0.0028	U	0.0075		0.0026	U	0.0079	
1,1-Dichloropropylene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,2,3-Trichlorobenzene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,2,3-Trichloropropane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,2,4-Trichlorobenzene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0110		0.0022	U	0.0028	U	0.0028	U	0.0200		0.0026	U	0.0024	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,2-Dibromoethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,2-Dichloropropane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0030	J	0.0022	U	0.0028	U	0.0028	U	0.0090		0.0026	U	0.0024	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,3-Dichloropropane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
1,4-Dioxane	0.1	13	0.1	0.0530	U	0.0450	U	0.0570	U	0.0560	U	0.0590	U	0.0510	U	0.0480	U
2,2-Dichloropropane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
2-Butanone	0.12	100	0.12	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0066		0.0026	U	0.0024	U
2-Chloroethylvinyl ether	~	~	~	0.0110	U	0.0089	U	0.0110	U	0.0110	U	0.0120	U	0.0100	U	0.0095	U
2-Chlorotoluene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
2-Hexanone	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
4-Chlorotoluene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
4-Methyl-2-pentanone	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0710		0.0026	U	0.0024	U
Acetone	0.05	100	0.05	0.0180		0.0081	J	0.0092	J	0.0073	J	0.0140		0.0051	U	0.0140	
Acrolein	~	~	~	0.0053	U	0.0045	U	0.0057	U	0.0056	U	0.0059	U	0.0051	U	0.0048	U
Acrylonitrile	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Benzene	0.06	4.8	0.06	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Bromobenzene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Bromochloromethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Bromodichloromethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Bromoform	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Bromomethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Carbon disulfide	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0031	J
Carbon tetrachloride	0.76	2.4	0.76	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Chlorobenzene	1.1	100	1.1	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Chloroethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Chloroform	0.37	49	0.37	0.0026	U	0.0022	U	0.0044	J	0.0028	U	0.0150		0.0026	U	0.0024	U
Chloromethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
cis-1,2-Dichloroethylene	0.25	100	0.25	**3.80**	D	0.1300		0.0028	U	0.0028	U	0.0041	J	0.0150		**1.20**	E
cis-1,3-Dichloropropylene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Cyclohexane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Dibromochloromethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Dibromomethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Dichlorodifluoromethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Diisopropyl ether (DIPE)	~	~	~	0.0042	U	0.0036	U	0.0045	U	0.0045	U	0.0047	U	0.0041	U	0.0038	U
Ethanol	~	~	~	0.0420	U	0.0360	U	0.0450	U	0.0450	U	0.0470	U	0.0410	U	0.0380	U
Ethyl Benzene	1	41	1	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.1300		0.0026	U	0.0024	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0042	U	0.0036	U	0.0045	U	0.0045	U	0.0047	U	0.0041	U	0.0038	U
Hexachlorobutadiene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Iodomethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Isopropylbenzene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Methyl acetate	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Methyl Methacrylate	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Methylcyclohexane	~	~	~	0.0026	U	0.0022	U	0.0067		0.0028	U	0.0029	U	0.0026	U	0.0024	U
Methylene chloride	0.05	100	0.05	0.0053	U	0.0045	U	0.0057	U	0.0056	U	0.0059	U	0.0051	U	0.0048	U
Naphthalene	12	100	12	0.0038	J	0.0022	U	0.0028	U	0.0028	U	0.0096	J	0.0026	U	0.0024	U
n-Butylbenzene	12	100	12	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
n-Propylbenzene	3.9	100	3.9	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0032	J	0.0026	U	0.0024	U
o-Xylene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.1900		0.0026	U	0.0024	U
p- & m- Xylenes	~	~	~	0.0053	U	0.0045	U	0.0057	U	0.0056	U	0.1700		0.0051	U	0.0048	U
p-Diethylbenzene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
p-Ethyltoluene	~	~	~	0.0030	J	0.0022	U	0.0028	U	0.0028	U	0.0110		0.0026	U	0.0024	U
p-Isopropyltoluene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
sec-Butylbenzene	11	100	11	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Styrene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
tert-Amyl alcohol (TAA)	~	~	~	0.0420	U	0.0360	U	0.0450	U	0.0450	U	0.0470	U	0.0410	U	0.0380	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0042	U	0.0036	U	0.0045	U	0.0045	U	0.0047	U	0.0041	U	0.0038	U
tert-Butyl alcohol (TBA)	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0140		0.0026	U	0.0024	U
tert-Butylbenzene	5.9	100	5.9	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Tetrachloroethylene	1.3	19	1.3	0.0087		0.0022	U	**9.40**	D	0.0028	U	0.0670		0.0048	J	0.0024	U
Tetrahydrofuran	~	~	~	0.0053	U	0.0045	U	0.0057	U	0.0056	U	0.0059	U	0.0051	U	0.0048	U
Toluene	0.7	100	0.7	0.0026	U	0.0022	U	0.0055	J	0.0028	U	0.2700		0.0026	U	0.0024	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0080		0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0041	J
trans-1,3-Dichloropropylene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
trans-1,4-dichloro-2-butene	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Trichloroethylene	0.47	21	0.47	**23.0**	D	**1.90**	D	**740.0**	D	0.0140		**29.0**	D	**45.0**	D	**9.50**	D
Trichlorofluoromethane	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Vinyl acetate	~	~	~	0.0026	U	0.0022	U	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Vinyl Chloride	0.02	0.9	0.02	0.0130		0.0025	J	0.0028	U	0.0028	U	0.0029	U	0.0026	U	0.0024	U
Xylenes, Total	0.26	100	1.6	0.0079	U	0.0067	U	0.0085	U	0.0085	U	**0.360**		0.0077	U	0.0071	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-30(40ft)		SB-31 (1-3ft)		SB-31 (4-6ft)		SB-31 (25ft)		SB-31 (35 ft)		SB-32 (1-3ft)		SB-32 (5-7ft)	
LAB SAMPLE ID				24H1657-02		24H0372-21		24H0372-22		24H0372-23		24H1497-04		24H0499-03		24H0499-04	
SAMPLING DATE				8/23/2024 9:50:00 AM		8/6/2024 12:00:00 PM		8/6/2024 12:10:00 PM		8/6/2024 12:30:00 PM		8/21/2024 1:40:00 PM		8/7/2024 7:55:00 AM		8/7/2024 7:55:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,1,2-Trichloroethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,1-Dichloroethane	0.27	26	0.27	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,1-Dichloroethylene	0.33	100	0.33	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,1-Dichloropropylene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,2,3-Trichlorobenzene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,2,3-Trichloropropane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,2,4-Trichlorobenzene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,2-Dibromoethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,2-Dichloropropane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,3-Dichloropropane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
1,4-Dioxane	0.1	13	0.1	0.0360	U	0.0580	U	0.0570	U	0.0630	U	0.0520	U	0.0500	U	0.0420	U
2,2-Dichloropropane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
2-Butanone	0.12	100	0.12	0.0046		0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
2-Chloroethylvinyl ether	~	~	~	0.0073	U	0.0120	U	0.0110	U	0.0130	U	0.0100	U	0.0100	U	0.0083	U
2-Chlorotoluene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
2-Hexanone	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
4-Chlorotoluene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
4-Methyl-2-pentanone	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Acetone	0.05	100	0.05	0.0041	J	0.0058	U	0.0057	U	0.0063	U	0.0052	U	0.0065	J	0.0042	U
Acrolein	~	~	~	0.0036	U	0.0058	U	0.0057	U	0.0063	U	0.0052	U	0.0050	U	0.0042	U
Acrylonitrile	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Benzene	0.06	4.8	0.06	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Bromobenzene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Bromochloromethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Bromodichloromethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Bromoform	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Bromomethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Carbon disulfide	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Carbon tetrachloride	0.76	2.4	0.76	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Chlorobenzene	1.1	100	1.1	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Chloroethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Chloroform	0.37	49	0.37	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Chloromethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0300		0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
cis-1,3-Dichloropropylene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Cyclohexane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Dibromochloromethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Dibromomethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Dichlorodifluoromethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Diisopropyl ether (DIPE)	~	~	~	0.0029	U	0.0047	U	0.0045	U	0.0051	U	0.0042	U	0.0040	U	0.0033	U
Ethanol	~	~	~	0.0290	U	0.0470	U	0.0450	U	0.0510	U	0.0420	U	0.0400	U	0.0330	U
Ethyl Benzene	1	41	1	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0029	U	0.0047	U	0.0045	U	0.0051	U	0.0042	U	0.0040	U	0.0033	U
Hexachlorobutadiene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Iodomethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Isopropylbenzene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Methyl acetate	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Methyl Methacrylate	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Methylcyclohexane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Methylene chloride	0.05	100	0.05	0.0036	U	0.0058	U	0.0057	U	0.0063	U	0.0052	U	0.0050	U	0.0042	U
Naphthalene	12	100	12	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
n-Butylbenzene	12	100	12	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
n-Propylbenzene	3.9	100	3.9	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
o-Xylene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
p- & m- Xylenes	~	~	~	0.0036	U	0.0058	U	0.0057	U	0.0063	U	0.0052	U	0.0050	U	0.0042	U
p-Diethylbenzene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
p-Ethyltoluene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
p-Isopropyltoluene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
sec-Butylbenzene	11	100	11	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Styrene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
tert-Amyl alcohol (TAA)	~	~	~	0.0290	U	0.0470	U	0.0450	U	0.0510	U	0.0420	U	0.0400	U	0.0330	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0029	U	0.0047	U	0.0045	U	0.0051	U	0.0042	U	0.0040	U	0.0033	U
tert-Butyl alcohol (TBA)	~	~	~	0.0026	JB	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
tert-Butylbenzene	5.9	100	5.9	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Tetrachloroethylene	1.3	19	1.3	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Tetrahydrofuran	~	~	~	0.0036	U	0.0058	U	0.0057	U	0.0063	U	0.0052	U	0.0050	U	0.0042	U
Toluene	0.7	100	0.7	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0130		0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
trans-1,3-Dichloropropylene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
trans-1,4-dichloro-2-butene	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Trichloroethylene	0.47	21	0.47	0.2200		0.1800		0.0110		0.0380		0.0040	J	0.0090		0.0021	U
Trichlorofluoromethane	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Vinyl acetate	~	~	~	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Vinyl Chloride	0.02	0.9	0.02	0.0018	U	0.0029	U	0.0028	U	0.0032	U	0.0026	U	0.0025	U	0.0021	U
Xylenes, Total	0.26	100	1.6	0.0055	U	0.0087	U	0.0085	U	0.0095	U	0.0079	U	0.0076	U	0.0062	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-32 (18.5ft)		SB-32 (39 ft)		SB-33 (2ft)		SB-33 (6ft)		SB-33 (19ft)		SB-34 (3ft)		SB-34 (6ft)	
LAB SAMPLE ID				24H0499-05		24H1583-07		24H0269-10		24H0269-21		24H0269-11		24H0269-16		24H0269-18	
SAMPLING DATE				8/7/2024 7:55:00 AM		8/22/2024 12:45:00 PM		8/5/2024 9:10:00 AM		8/5/2024 1:50:00 PM		8/5/2024 10:00:00 AM		8/5/2024 1:10:00 PM		8/5/2024 1:20:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,1,2-Trichloroethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,1-Dichloroethane	0.27	26	0.27	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,1-Dichloroethylene	0.33	100	0.33	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0099		0.0024	U	0.0027	U
1,1-Dichloropropylene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,2,3-Trichlorobenzene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,2,3-Trichloropropane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,2,4-Trichlorobenzene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,2-Dibromoethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,2-Dichloropropane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,3-Dichloropropane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
1,4-Dioxane	0.1	13	0.1	0.0550	U	0.0410	U	0.0580	U	0.0340	U	0.0670	U	0.0480	U	0.0530	U
2,2-Dichloropropane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
2-Butanone	0.12	100	0.12	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
2-Chloroethylvinyl ether	~	~	~	0.0110	U	0.0082	U	0.0120	U	0.0069	U	0.0130	U	0.0097	U	0.0110	U
2-Chlorotoluene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
2-Hexanone	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
4-Chlorotoluene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
4-Methyl-2-pentanone	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Acetone	0.05	100	0.05	0.0055	U	0.0063	J	0.0077	J	0.0034	U	0.0130		0.0048	U	0.0290	
Acrolein	~	~	~	0.0055	U	0.0041	U	0.0058	U	0.0034	U	0.0067	U	0.0048	U	0.0053	U
Acrylonitrile	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Benzene	0.06	4.8	0.06	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Bromobenzene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Bromochloromethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Bromodichloromethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Bromoform	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Bromomethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Carbon disulfide	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Carbon tetrachloride	0.76	2.4	0.76	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Chlorobenzene	1.1	100	1.1	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Chloroethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Chloroform	0.37	49	0.37	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Chloromethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0027	U	0.0021	U	0.0029	U	0.0017	U	**0.280**		0.0024	U	0.0027	U
cis-1,3-Dichloropropylene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Cyclohexane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Dibromochloromethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Dibromomethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Dichlorodifluoromethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Diisopropyl ether (DIPE)	~	~	~	0.0044	U	0.0033	U	0.0046	U	0.0028	U	0.0054	U	0.0039	U	0.0043	U
Ethanol	~	~	~	0.0440	U	0.0330	U	2.3000		0.0280	U	0.0540	U	0.0390	U	0.0430	U
Ethyl Benzene	1	41	1	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0044	U	0.0033	U	0.0046	U	0.0028	U	0.0054	U	0.0039	U	0.0043	U
Hexachlorobutadiene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Iodomethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Isopropylbenzene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Methyl acetate	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0040	J	0.0024	U	0.0027	U
Methyl Methacrylate	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0058		0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Methylcyclohexane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Methylene chloride	0.05	100	0.05	0.0055	U	0.0041	U	0.0058	U	0.0034	U	0.0067	U	0.0048	U	0.0053	U
Naphthalene	12	100	12	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
n-Butylbenzene	12	100	12	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
n-Propylbenzene	3.9	100	3.9	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
o-Xylene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
p- & m- Xylenes	~	~	~	0.0055	U	0.0041	U	0.0058	U	0.0034	U	0.0067	U	0.0048	U	0.0053	U
p-Diethylbenzene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
p-Ethyltoluene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
p-Isopropyltoluene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
sec-Butylbenzene	11	100	11	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Styrene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
tert-Amyl alcohol (TAA)	~	~	~	0.0440	U	0.0330	U	0.0460	U	0.0280	U	0.0540	U	0.0390	U	0.0430	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0044	U	0.0033	U	0.0046	U	0.0028	U	0.0054	U	0.0039	U	0.0043	U
tert-Butyl alcohol (TBA)	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
tert-Butylbenzene	5.9	100	5.9	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Tetrachloroethylene	1.3	19	1.3	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0130		0.0024	U	0.0027	U
Tetrahydrofuran	~	~	~	0.0055	U	0.0041	U	0.0058	U	0.0034	U	0.0067	U	0.0048	U	0.0053	U
Toluene	0.7	100	0.7	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0083		0.0024	U	0.0027	U
trans-1,3-Dichloropropylene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
trans-1,4-dichloro-2-butene	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Trichloroethylene	0.47	21	0.47	0.0027	U	0.0034	J	0.0170		0.0150		**7.90**	D	0.0026	J	0.0043	J
Trichlorofluoromethane	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Vinyl acetate	~	~	~	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0034	U	0.0024	U	0.0027	U
Vinyl Chloride	0.02	0.9	0.02	0.0027	U	0.0021	U	0.0029	U	0.0017	U	0.0080		0.0024	U	0.0027	U
Xylenes, Total	0.26	100	1.6	0.0082	U	0.0062	U	0.0087	U	0.0052	U	0.0100	U	0.0073	U	0.0080	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-34 (21ft)		SB-35 (3ft)		SB-35 (7ft)		SB-35 (17ft)		SB-35 (24ft)		SB-35 (35 ft)		SB-35 (38 ft)	
LAB SAMPLE ID				24H0269-19		24H0269-25		24H0269-27		24H0269-29		24H0269-30		24H1583-02		24H1583-01	
SAMPLING DATE				8/5/2024 1:25:00 PM		8/5/2024 3:05:00 PM		8/5/2024 3:20:00 PM		8/5/2024 3:30:00 PM		8/5/2024 3:35:00 PM		8/22/2024 9:15:00 AM		8/22/2024 9:00:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0029	U	0.450	U	0.0024	U	**2.9**	D	0.240	U	0.0031	U	0.0020	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,1,2-Trichloroethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,1-Dichloroethane	0.27	26	0.27	0.0029	U	***0.450***	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,1-Dichloroethylene	0.33	100	0.33	0.0063		***0.450***	U	0.0024	U	0.280	JD	0.240	U	0.0031	J	0.0020	U
1,1-Dichloropropylene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,2,3-Trichlorobenzene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,2,3-Trichloropropane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0029	U	0.450	U	0.0130		5.800	D	0.240	U	0.0031	U	0.0020	U
1,2,4-Trichlorobenzene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0029	U	0.450	U	0.0190		**130**	D	0.240	U	0.0031	U	0.0020	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,2-Dibromoethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0029	U	***0.450***	U	0.0024	U	***0.260***	U	***0.240***	U	0.0031	U	0.0020	U
1,2-Dichloropropane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0029	U	0.450	U	0.0780		**39.0**	D	0.240	U	0.0031	U	0.0020	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,3-Dichloropropane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
1,4-Dioxane	0.1	13	0.1	0.0590	U	***9.000***	U	0.0480	U	***5.100***	U	***4.800***	U	0.0610	U	0.0400	U
2,2-Dichloropropane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
2-Butanone	0.12	100	0.12	0.0029	U	***0.450***	U	0.0024	U	***0.260***	U	***0.240***	U	0.0031	U	0.0020	U
2-Chloroethylvinyl ether	~	~	~	0.0120	U	1.800	U	0.0096	U	1.000	U	0.960	U	0.0120	U	0.0080	U
2-Chlorotoluene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
2-Hexanone	~	~	~	0.0029	U	0.450	U	0.0220		0.260	U	0.240	U	0.0031	U	0.0020	U
4-Chlorotoluene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
4-Methyl-2-pentanone	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Acetone	0.05	100	0.05	0.0059	U	***0.900***	U	0.0087	J	***0.510***	U	***0.480***	U	0.0062	J	0.0040	U
Acrolein	~	~	~	0.0059	U	0.900	U	0.0048	U	0.510	U	0.480	U	0.0061	U	0.0040	U
Acrylonitrile	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Benzene	0.06	4.8	0.06	0.0029	U	***0.450***	U	0.0024	U	***0.260***	U	***0.240***	U	0.0031	U	0.0020	U
Bromobenzene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Bromochloromethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Bromodichloromethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Bromoform	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Bromomethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Carbon disulfide	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Carbon tetrachloride	0.76	2.4	0.76	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Chlorobenzene	1.1	100	1.1	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Chloroethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Chloroform	0.37	49	0.37	0.0029	U	***0.450***	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Chloromethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
cis-1,2-Dichloroethylene	0.25	100	0.25	**0.430**		***0.450***	U	0.0024	U	***0.260***	U	0.240	U	0.0530		0.0350	
cis-1,3-Dichloropropylene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Cyclohexane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Dibromochloromethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Dibromomethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Dichlorodifluoromethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Diisopropyl ether (DIPE)	~	~	~	0.0047	U	0.720	U	0.0038	U	0.410	U	0.390	U	0.0049	U	0.0032	U
Ethanol	~	~	~	0.0470	U	7.200	U	0.0380	U	4.100	U	3.900	U	0.0490	U	0.0320	U
Ethyl Benzene	1	41	1	0.0029	U	0.450	U	0.0067		**10.0**	D	0.240	U	0.0031	U	0.0020	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0047	U	0.720	U	0.0038	U	0.410	U	0.390	U	0.0049	U	0.0032	U
Hexachlorobutadiene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Iodomethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Isopropylbenzene	~	~	~	0.0029	U	0.450	U	0.0027	J	2.400	D	0.240	U	0.0031	U	0.0020	U
Methyl acetate	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0039	J	0.0020	U
Methyl Methacrylate	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Methylcyclohexane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Methylene chloride	0.05	100	0.05	0.0059	U	**3.1**	D	0.0048	U	**2.0**	D	**1.9**	D	0.0061	U	0.0040	U
Naphthalene	12	100	12	0.0029	U	0.450	U	0.0046	J	5.600	D	0.240	U	0.0031	U	0.0020	U
n-Butylbenzene	12	100	12	0.0029	U	0.450	U	0.0230		5.700	D	0.240	U	0.0031	U	0.0020	U
n-Propylbenzene	3.9	100	3.9	0.0029	U	0.450	U	0.0076		**7.4**	D	0.240	U	0.0031	U	0.0020	U
o-Xylene	~	~	~	0.0029	U	0.450	U	0.0160		20.0	D	0.240	U	0.0031	U	0.0020	U
p- & m- Xylenes	~	~	~	0.0059	U	0.900	U	0.0110		69.0	D	0.480	U	0.0061	U	0.0040	U
p-Diethylbenzene	~	~	~	0.0029	U	0.450	U	0.0560		27.0	D	0.240	U	0.0031	U	0.0020	U
p-Ethyltoluene	~	~	~	0.0029	U	0.450	U	0.0024	U	39.0	D	0.240	U	0.0031	U	0.0020	U
p-Isopropyltoluene	~	~	~	0.0029	U	0.450	U	0.0240		7.200	D	0.240	U	0.0031	U	0.0020	U
sec-Butylbenzene	11	100	11	0.0029	U	0.450	U	0.0170		5.100	D	0.240	U	0.0031	U	0.0020	U
Styrene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
tert-Amyl alcohol (TAA)	~	~	~	0.0470	U	7.200	U	0.0380	U	4.100	U	3.900	U	0.0490	U	0.0320	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0047	U	0.720	U	0.0038	U	0.410	U	0.390	U	0.0049	U	0.0032	U
tert-Butyl alcohol (TBA)	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
tert-Butylbenzene	5.9	100	5.9	0.0029	U	0.450	U	0.0029	J	0.690	D	0.240	U	0.0031	U	0.0020	U
Tetrachloroethylene	1.3	19	1.3	0.0029	U	**21.0**	D	0.0610		**29.0**	D	0.240	U	0.0031	U	0.0020	U
Tetrahydrofuran	~	~	~	0.0059	U	0.900	U	0.0048	U	0.510	U	0.480	U	0.0061	U	0.0040	U
Toluene	0.7	100	0.7	0.0029	U	0.450	JD	0.0039	J	**35.0**	D	0.370	JD	0.0031	U	0.0020	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0029	U	***0.450***	U	0.0024	U	***0.260***	U	***0.240***	U	0.0038	J	0.0020	U
trans-1,3-Dichloropropylene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
trans-1,4-dichloro-2-butene	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Trichloroethylene	0.47	21	0.47	**33.0**	D	**3,100.0**	DE	**9.30**	D	**12,000.0**	DE	**160.0**	D	**4.50**	D	**3.20**	D
Trichlorofluoromethane	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Vinyl acetate	~	~	~	0.0029	U	0.450	U	0.0024	U	0.260	U	0.240	U	0.0031	U	0.0020	U
Vinyl Chloride	0.02	0.9	0.02	0.0110		***0.450***	U	0.0024	U	***0.260***	U	***0.240***	U	0.0031	U	0.0020	U
Xylenes, Total	0.26	100	1.6	0.0088	U	***1.400***	U	0.0270		**88.0**	D	***0.720***	U	0.0092	U	0.0060	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-35_S (14ft)		SB-35_S (17ft)		SB-35_S (20ft)		SB-35_E (13ft)		SB-35_E (18ft)		SB-35_E (20ft)		SB-35-20E (7 ft)	
LAB SAMPLE ID				24H0499-06		24H0499-07		24H0499-08		24H0499-11		24H0499-12		24H0499-13		24H1261-01	
SAMPLING DATE				8/7/2024 10:10:00 AM		8/7/2024 10:15:00 AM		8/7/2024 10:20:00 AM		8/7/2024 11:45:00 AM		8/7/2024 11:50:00 AM		8/7/2024 11:55:00 AM		8/19/2024 9:45:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0037	J	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,1,1-Trichloroethane	0.68	100	0.68	0.3000		0.1100		0.0038	J	0.0420		**7.20**	D	0.0021	U	0.0022	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0027	U	0.0083		0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,1,2-Trichloroethane	~	~	~	0.0250		0.0150		0.0024	U	0.0068		0.0023	U	0.0021	U	0.0022	U
1,1-Dichloroethane	0.27	26	0.27	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,1-Dichloroethylene	0.33	100	0.33	0.0410		0.0270		0.0024	U	0.0074		**1.10**	E	0.0038	J	0.0022	U
1,1-Dichloropropylene	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,2,3-Trichlorobenzene	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,2,3-Trichloropropane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0990		0.0034	U	0.0024	U	0.0028	U	0.1200		0.0059		0.0022	U
1,2,4-Trichlorobenzene	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,2,4-Trimethylbenzene	3.6	52	3.6	**14.0**	D	0.0550		0.0024	U	0.1200		**320.0**	D	0.0190		0.0022	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,2-Dibromoethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,2-Dichloropropane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,3,5-Trimethylbenzene	8.4	52	8.4	5.2000	D	0.0190		0.0024	U	0.0460		**120.0**	D	0.0076		0.0022	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,3-Dichloropropane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
1,4-Dioxane	0.1	13	0.1	0.0540	U	0.0670	U	0.0480	U	0.0560	U	0.0460	U	0.0420	U	0.0450	U
2,2-Dichloropropane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
2-Butanone	0.12	100	0.12	0.0120		0.0180		0.0024	U	0.0052	J	0.0023	U	0.0021	U	0.0022	U
2-Chloroethylvinyl ether	~	~	~	0.0110	U	0.0130	U	0.0097	U	0.0110	U	0.0092	U	0.0085	U	0.0089	U
2-Chlorotoluene	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
2-Hexanone	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
4-Chlorotoluene	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
4-Methyl-2-pentanone	~	~	~	0.0360		0.0640		0.0024	U	0.0042	J	0.0023	U	0.0021	U	0.0022	U
Acetone	0.05	100	0.05	0.0290		0.0330		0.0048	U	0.0140		0.0046	U	0.0042	U	0.0045	U
Acrolein	~	~	~	0.0054	U	0.0067	U	0.0048	U	0.0056	U	0.0046	U	0.0042	U	0.0045	U
Acrylonitrile	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Benzene	0.06	4.8	0.06	0.0045	J	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Bromobenzene	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Bromochloromethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Bromodichloromethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Bromoform	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Bromomethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Carbon disulfide	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Carbon tetrachloride	0.76	2.4	0.76	0.0051	J	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Chlorobenzene	1.1	100	1.1	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Chloroethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Chloroform	0.37	49	0.37	0.0360		0.0220		0.0024	J	0.0067		0.1400		0.0021	U	0.0022	U
Chloromethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0052		0.0021	U	0.0022	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0078		0.0064	J	0.0024	U	0.0028	U	0.0810		0.0140		0.0022	U
cis-1,3-Dichloropropylene	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Cyclohexane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Dibromochloromethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Dibromomethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Dichlorodifluoromethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Diisopropyl ether (DIPE)	~	~	~	0.0043	U	0.0054	U	0.0039	U	0.0045	U	0.0037	U	0.0034	U	0.0036	U
Ethanol	~	~	~	0.0430	U	0.0540	U	0.0390	U	0.0450	U	0.0370	U	0.0340	U	0.0360	U
Ethyl Benzene	1	41	1	**19.0**	D	0.4800		0.0032	J	0.0480		**23.0**	D	0.0024	J	0.0022	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0043	U	0.0054	U	0.0039	U	0.0045	U	0.0037	U	0.0034	U	0.0036	U
Hexachlorobutadiene	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Iodomethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Isopropylbenzene	~	~	~	0.0910		0.0038	J	0.0024	U	0.0048	J	9.5000	D	0.0021	U	0.0022	U
Methyl acetate	~	~	~	0.0029	J	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Methyl Methacrylate	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Methylcyclohexane	~	~	~	0.0200		0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Methylene chloride	0.05	100	0.05	0.0054	U	0.0067	U	0.0048	U	0.0056	U	0.0074	J	0.0042	U	0.0045	U
Naphthalene	12	100	12	0.1900		0.0120	J	0.0024	U	0.0300		0.2400		0.0210		0.0022	U
n-Butylbenzene	12	100	12	0.1000		0.0034	U	0.0024	U	0.0050	J	**21.0**	D	0.0023	J	0.0022	U
n-Propylbenzene	3.9	100	3.9	0.1700		0.0053	J	0.0024	U	0.0120		**30.0**	D	0.0021	U	0.0022	U
o-Xylene	~	~	~	21.0	D	0.85	D	0.0450		0.0920		44.0	D	0.0045		0.0022	U
p- & m- Xylenes	~	~	~	88.0	D	3.30	D	0.0150		0.2300		120.0	D	0.0130		0.0045	U
p-Diethylbenzene	~	~	~	0.3800		0.0039	J	0.0024	U	0.0110		83.0	D	0.0078		0.0022	U
p-Ethyltoluene	~	~	~	5.2000	D	0.0074		0.0024	U	0.0160		64.0	D	0.0037	J	0.0022	U
p-Isopropyltoluene	~	~	~	0.1500		0.0034	U	0.0024	U	0.0040	J	24.0	D	0.0023	J	0.0022	U
sec-Butylbenzene	11	100	11	0.1100		0.0034	U	0.0024	U	0.0050	J	**17.0**	D	0.0021	U	0.0022	U
Styrene	~	~	~	0.1900		0.0034	U	0.0024	U	0.0028	U	0.1400		0.0021	U	0.0022	U
tert-Amyl alcohol (TAA)	~	~	~	0.0430	U	0.0540	U	0.0390	U	0.0450	U	0.0370	U	0.0340	U	0.0360	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0043	U	0.0054	U	0.0039	U	0.0045	U	0.0037	U	0.0034	U	0.0036	U
tert-Butyl alcohol (TBA)	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0038	J	0.0023	U	0.0021	U	0.0022	U
tert-Butylbenzene	5.9	100	5.9	0.0150		0.0034	U	0.0024	U	0.0028	U	0.0650		0.0021	U	0.0022	U
Tetrachloroethylene	1.3	19	1.3	0.4200		0.0640		0.0160		0.1600		**72.0**	D	0.0110		0.0022	U
Tetrahydrofuran	~	~	~	0.0054	U	0.0067	U	0.0048	U	0.0056	U	0.0046	U	0.0042	U	0.0045	U
Toluene	0.7	100	0.7	**36.0**	D	**6.40**	D	0.0140		**1.10**	D	**68.0**	D	0.0052		0.0022	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0053		0.0021	U	0.0022	U
trans-1,3-Dichloropropylene	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
trans-1,4-dichloro-2-butene	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Trichloroethylene	0.47	21	0.47	**310.0**	D	**140.0**	D	**9.70**	D	**250.0**	D	**19,000.0**	DE	**62.0**	D	0.2900	
Trichlorofluoromethane	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Vinyl acetate	~	~	~	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Vinyl Chloride	0.02	0.9	0.02	0.0027	U	0.0034	U	0.0024	U	0.0028	U	0.0023	U	0.0021	U	0.0022	U
Xylenes, Total	0.26	100	1.6	**110.0**	D	**4.10**	D	0.0600		**0.320**		**160.0**	D	0.0180		0.0067	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-35-20E (21 ft)		SB-35-20E (39 ft)		SB-35-10W (7 ft)		SB-35-10W (21 ft)		SB-35-10W (27 ft)		SB-35 W (33 ft)		SB-35 W (39 ft)	
LAB SAMPLE ID				24H1261-02		24H1261-03		24H1497-01		24H1497-02		24H1497-03		24H1583-05		24H1583-06	
SAMPLING DATE				8/19/2024 10:00:00 AM		8/19/2024 11:30:00 AM		8/21/2024 12:00:00 PM		8/21/2024 12:20:00 PM		8/21/2024 12:25:00 PM		8/22/2024 12:30:00 PM		8/22/2024 12:40:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.400	U	0.0023	U	0.0026	U	0.0019	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0024	U	0.0024	U	0.0025	U	**36.0**	D	0.1100		0.0026	U	0.0019	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,1,2-Trichloroethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0100		0.0026	U	0.0019	U
1,1-Dichloroethane	0.27	26	0.27	0.0024	U	0.0024	U	0.0025	U	***1.40***	U	0.0023	U	0.0026	U	0.0019	U
1,1-Dichloroethylene	0.33	100	0.33	0.0035	J	0.0024	U	0.0025	U	***1.40***	U	0.0170		0.0074		0.0056	
1,1-Dichloropropylene	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,2,3-Trichlorobenzene	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,2,3-Trichloropropane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0024	U	0.0024	U	0.0025	U	16.00	D	0.0024	J	0.0026	U	0.0019	U
1,2,4-Trichlorobenzene	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0024	U	0.0024	U	0.0025	U	**410.0**	D	0.0350		0.0026	U	0.0019	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,2-Dibromoethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0024	U	0.0024	U	0.0025	U	***1.40***	U	0.0023	U	0.0026	U	0.0019	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0024	U	0.0024	U	0.0025	U	***1.40***	U	0.0028	J	0.0026	U	0.0019	U
1,2-Dichloropropane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.4000	U	0.0023	U	0.0026	U	0.0019	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0024	U	0.0024	U	0.0025	U	**120.0**	D	0.0120		0.0026	U	0.0019	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,3-Dichloropropane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
1,4-Dioxane	0.1	13	0.1	0.0480	U	0.0490	U	0.0490	U	***28.00***	U	0.0460	U	0.0510	U	0.0380	U
2,2-Dichloropropane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
2-Butanone	0.12	100	0.12	0.0024	U	0.0024	U	0.0025	U	***1.40***	U	0.0220		0.0026	U	0.0058	
2-Chloroethylvinyl ether	~	~	~	0.0096	U	0.0097	U	0.0099	U	5.60	U	0.0091	U	0.0100	U	0.0075	U
2-Chlorotoluene	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
2-Hexanone	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0047		0.0026	U	0.0019	U
4-Chlorotoluene	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
4-Methyl-2-pentanone	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.1400		0.0097		0.0120	
Acetone	0.05	100	0.05	0.0048	U	0.0049	U	0.0049	U	***2.80***	U	0.0430		0.0054	J	0.0084	
Acrolein	~	~	~	0.0048	U	0.0049	U	0.0049	U	2.80	U	0.0046	U	0.0051	U	0.0038	U
Acrylonitrile	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Benzene	0.06	4.8	0.06	0.0024	U	0.0024	U	0.0025	U	***1.40***	U	0.0023	U	0.0026	U	0.0019	U
Bromobenzene	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Bromochloromethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Bromodichloromethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Bromoform	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Bromomethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Carbon disulfide	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Carbon tetrachloride	0.76	2.4	0.76	0.0024	U	0.0024	U	0.0025	U	***1.40***	U	0.0023	U	0.0026	U	0.0019	U
Chlorobenzene	1.1	100	1.1	0.0024	U	0.0024	U	0.0025	U	***1.40***	U	0.0023	U	0.0026	U	0.0019	U
Chloroethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Chloroform	0.37	49	0.37	0.0024	U	0.0024	U	0.0025	U	***1.40***	U	0.0110		0.0026	U	0.0019	U
Chloromethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0140		0.0350		0.0025	U	***1.40***	U	0.0086		0.2400		**0.290**	
cis-1,3-Dichloropropylene	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Cyclohexane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Dibromochloromethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Dibromomethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Dichlorodifluoromethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Diisopropyl ether (DIPE)	~	~	~	0.0038	U	0.0039	U	0.0040	U	2.20	U	0.0037	U	0.0041	U	0.0030	U
Ethanol	~	~	~	0.0380	U	0.0390	U	0.0400	U	22.00	U	0.0370	U	0.0410	U	0.0300	U
Ethyl Benzene	1	41	1	0.0024	U	0.0024	U	0.0025	U	**410.0**	D	0.1400		0.0026	U	0.0019	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0038	U	0.0039	U	0.0040	U	2.20	U	0.0037	U	0.0041	U	0.0030	U
Hexachlorobutadiene	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Iodomethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Isopropylbenzene	~	~	~	0.0024	U	0.0024	U	0.0025	U	11.00	D	0.0023	U	0.0026	U	0.0019	U
Methyl acetate	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Methyl Methacrylate	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0024	U	0.0024	U	0.0025	U	***1.40***	U	0.0023	U	0.0026	U	0.0019	U
Methylcyclohexane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.4000	U	0.0023	U	0.0026	U	0.0019	U
Methylene chloride	0.05	100	0.05	0.0048	U	0.0049	U	0.0049	U	**2.80**	JD	0.0046	U	0.0051	U	0.0038	U
Naphthalene	12	100	12	0.0024	U	0.0024	U	0.0025	U	**21.0**	D	0.0320		0.0026	U	0.0019	U
n-Butylbenzene	12	100	12	0.0024	U	0.0024	U	0.0025	U	**15.0**	D	0.0023	U	0.0026	U	0.0019	U
n-Propylbenzene	3.9	100	3.9	0.0024	U	0.0024	U	0.0025	U	**28.0**	D	0.0031	J	0.0026	U	0.0019	U
o-Xylene	~	~	~	0.0024	U	0.0024	U	0.0025	U	480.0	D	0.1700		0.0026	U	0.0019	U
p- & m- Xylenes	~	~	~	0.0048	U	0.0049	U	0.0049	U	2,200.0	D	0.6100		0.0051	U	0.0038	U
p-Diethylbenzene	~	~	~	0.0024	U	0.0024	U	0.0025	U	73.0	D	0.0039	J	0.0026	U	0.0019	U
p-Ethyltoluene	~	~	~	0.0024	U	0.0024	U	0.0025	U	120.0	D	0.0160		0.0026	U	0.0019	U
p-Isopropyltoluene	~	~	~	0.0024	U	0.0024	U	0.0025	U	24.0	D	0.0023	U	0.0026	U	0.0019	U
sec-Butylbenzene	11	100	11	0.0024	U	0.0024	U	0.0025	U	**17.0**	D	0.0023	U	0.0026	U	0.0019	U
Styrene	~	~	~	0.0024	U	0.0024	U	0.0025	U	15.00	D	0.0053		0.0026	U	0.0019	U
tert-Amyl alcohol (TAA)	~	~	~	0.0380	U	0.0390	U	0.0400	U	22.00	U	0.0370	U	0.0410	U	0.0300	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0038	U	0.0039	U	0.0040	U	2.20	U	0.0037	U	0.0041	U	0.0030	U
tert-Butyl alcohol (TBA)	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
tert-Butylbenzene	5.9	100	5.9	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Tetrachloroethylene	1.3	19	1.3	0.0035	J	0.0024	U	0.0025	U	**120.0**	D	0.0490		0.0026	U	0.0019	U
Tetrahydrofuran	~	~	~	0.0048	U	0.0049	U	0.0049	U	2.8000	U	0.0046	U	0.0051	U	0.0038	U
Toluene	0.7	100	0.7	0.0042	J	0.0024	U	0.0025	U	**1,100.0**	D	**1.1**	E	0.0033	J	0.0019	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0024	U	0.0029	J	0.0025	U	***1.40***	U	0.0023	U	0.0026	U	0.0025	J
trans-1,3-Dichloropropylene	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.4000	U	0.0023	U	0.0026	U	0.0019	U
trans-1,4-dichloro-2-butene	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.4000	U	0.0023	U	0.0026	U	0.0019	U
Trichloroethylene	0.47	21	0.47	**24.0**	D	0.1400		0.0420		**57,000.0**	DE	**15.0**	D	**9.30**	D	**14.0**	D
Trichlorofluoromethane	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Vinyl acetate	~	~	~	0.0024	U	0.0024	U	0.0025	U	1.40	U	0.0023	U	0.0026	U	0.0019	U
Vinyl Chloride	0.02	0.9	0.02	0.0024	U	0.0024	U	0.0025	U	***1.40***	U	0.0023	U	0.0042	J	0.0047	
Xylenes, Total	0.26	100	1.6	0.0072	U	0.0073	U	0.0074	U	**2,700.0**	D	**0.780**		0.0077	U	0.0057	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-35-20W (20 ft)		SB-35-20W (25 ft)		SB-35-10N (4 ft)		SB-35-10N (12 ft)		SB-35-10N (26 ft)		SB-35 N (32 ft)		SB-35 N (38 ft)	
LAB SAMPLE ID				24H1583-09		24H1583-10		24H1497-06		24H1497-07		24H1497-08		24H1583-04		24H1583-03	
SAMPLING DATE				8/22/2024 3:40:00 PM		8/22/2024 3:45:00 PM		8/21/2024 3:15:00 PM		8/21/2024 3:25:00 PM		8/21/2024 3:35:00 PM		8/22/2024 10:40:00 AM		8/22/2024 10:30:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0240		0.0027	U	0.0027	U	0.0025	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0350		0.0025	U	0.0021	U	0.2900		0.0027	U	0.0027	U	0.0025	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,1,2-Trichloroethane	~	~	~	0.0042	J	0.0025	U	0.0024	J	0.0890		0.0027	U	0.0027	U	0.0025	U
1,1-Dichloroethane	0.27	26	0.27	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,1-Dichloroethylene	0.33	100	0.33	0.0029	J	0.0025	U	0.0021	U	0.0400		0.0027	U	0.0053	J	0.0025	U
1,1-Dichloropropylene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,2,3-Trichlorobenzene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,2,3-Trichloropropane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0690		0.0088		0.0027	U	0.0025	U
1,2,4-Trichlorobenzene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0094		0.0025	U	0.0022	J	**19.0**	D	0.0390		0.0027	U	0.0025	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,2-Dibromoethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,2-Dichloropropane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0035	J	0.0025	U	0.0021	U	8.2000	D	0.0150		0.0027	U	0.0025	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,3-Dichloropropane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
1,4-Dioxane	0.1	13	0.1	0.0480	U	0.0490	U	0.0420	U	0.0490	U	0.0540	U	0.0540	U	0.0500	U
2,2-Dichloropropane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
2-Butanone	0.12	100	0.12	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0043	J	0.0025	U
2-Chloroethylvinyl ether	~	~	~	0.0095	U	0.0099	U	0.0085	U	0.0097	U	0.0110	U	0.0110	U	0.0100	U
2-Chlorotoluene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
2-Hexanone	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
4-Chlorotoluene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
4-Methyl-2-pentanone	~	~	~	0.0240		0.0025	U	0.0021	U	0.0960		0.0027	U	0.0150		0.0025	U
Acetone	0.05	100	0.05	0.0048	U	0.0049	U	0.0290		0.0250		0.0360		0.0100	J	0.0050	U
Acrolein	~	~	~	0.0048	U	0.0049	U	0.0042	U	0.0049	U	0.0054	U	0.0054	U	0.0050	U
Acrylonitrile	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Benzene	0.06	4.8	0.06	0.0024	U	0.0025	U	0.0021	U	0.0056		0.0027	U	0.0027	U	0.0025	U
Bromobenzene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Bromochloromethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Bromodichloromethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Bromoform	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Bromomethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Carbon disulfide	~	~	~	0.0024	U	0.0025	U	0.0032	J	0.0035	J	0.0027	U	0.0027	U	0.0025	U
Carbon tetrachloride	0.76	2.4	0.76	0.0024	U	0.0025	U	0.0021	U	0.0100		0.0027	U	0.0027	U	0.0025	U
Chlorobenzene	1.1	100	1.1	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Chloroethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Chloroform	0.37	49	0.37	0.0035	J	0.0025	U	0.0038	J	0.0360		0.0027	U	0.0027	U	0.0025	U
Chloromethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0024	U	0.0025	U	0.0065		0.0650		0.0340		0.0480		0.0025	U
cis-1,3-Dichloropropylene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Cyclohexane	~	~	~	0.0024	U	0.0025	U	0.0040	J	0.0083		0.0027	U	0.0027	U	0.0025	U
Dibromochloromethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Dibromomethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Dichlorodifluoromethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Diisopropyl ether (DIPE)	~	~	~	0.0038	U	0.0040	U	0.0034	U	0.0039	U	0.0043	U	0.0044	U	0.0040	U
Ethanol	~	~	~	0.0380	U	0.0400	U	0.0340	U	0.0390	U	0.0430	U	0.0440	U	0.0400	U
Ethyl Benzene	1	41	1	0.0380		0.0025	U	0.0021	U	**3.20**	D	0.0110		0.0027	U	0.0025	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0038	U	0.0040	U	0.0034	U	0.0039	U	0.0043	U	0.0044	U	0.0040	U
Hexachlorobutadiene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Iodomethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Isopropylbenzene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.3900		0.0027	U	0.0027	U	0.0025	U
Methyl acetate	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Methyl Methacrylate	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Methylcyclohexane	~	~	~	0.0024	U	0.0025	U	0.0053		0.0520		0.0027	U	0.0027	U	0.0025	U
Methylene chloride	0.05	100	0.05	0.0048	U	0.0049	U	0.0042	U	0.0049	U	0.0054	U	0.0054	U	0.0050	U
Naphthalene	12	100	12	0.0024	U	0.0025	U	0.0035	J	0.0530		0.0480		0.0027	U	0.0025	U
n-Butylbenzene	12	100	12	0.0024	U	0.0025	U	0.0021	U	0.3100		0.0027	U	0.0027	U	0.0025	U
n-Propylbenzene	3.9	100	3.9	0.0024	U	0.0025	U	0.0021	U	1.7000	D	0.0033	J	0.0027	U	0.0025	U
o-Xylene	~	~	~	0.0560		0.0027	J	0.0021	U	5.3000	D	0.0180		0.0027	U	0.0025	U
p- & m- Xylenes	~	~	~	0.1700		0.0049	U	0.0044	J	15.0000	D	0.0370		0.0054	U	0.0050	U
p-Diethylbenzene	~	~	~	0.0024	U	0.0025	U	0.0021	U	5.3000	D	0.0140		0.0027	U	0.0025	U
p-Ethyltoluene	~	~	~	0.0046	J	0.0025	U	0.0021	U	8.2000	D	0.0130		0.0027	U	0.0025	U
p-Isopropyltoluene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.3500		0.0032	J	0.0027	U	0.0025	U
sec-Butylbenzene	11	100	11	0.0024	U	0.0025	U	0.0021	U	1.2000	D	0.0027	U	0.0027	U	0.0025	U
Styrene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0990		0.0027	U	0.0027	U	0.0025	U
tert-Amyl alcohol (TAA)	~	~	~	0.0380	U	0.0400	U	0.0340	U	0.0390	U	0.0430	U	0.0440	U	0.0400	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0038	U	0.0040	U	0.0034	U	0.0039	U	0.0043	U	0.0044	U	0.0040	U
tert-Butyl alcohol (TBA)	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
tert-Butylbenzene	5.9	100	5.9	0.0024	U	0.0025	U	0.0021	U	0.0780		0.0027	U	0.0027	U	0.0025	U
Tetrachloroethylene	1.3	19	1.3	0.0210		0.0026	J	0.1200		**19.0**	D	0.0290		0.0027	U	0.0025	U
Tetrahydrofuran	~	~	~	0.0048	U	0.0049	U	0.0042	U	0.0049	U	0.0054	U	0.0054	U	0.0050	U
Toluene	0.7	100	0.7	0.4200	E	0.0025	U	0.0062		**7.50**	D	0.0780		0.0210		0.0025	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
trans-1,3-Dichloropropylene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
trans-1,4-dichloro-2-butene	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Trichloroethylene	0.47	21	0.47	**17.0**	D	**1.10**	D	**360.0**	D	**1,400.0**	D	**70.0**	D	**13.0**	D	0.0370	
Trichlorofluoromethane	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Vinyl acetate	~	~	~	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Vinyl Chloride	0.02	0.9	0.02	0.0024	U	0.0025	U	0.0021	U	0.0024	U	0.0027	U	0.0027	U	0.0025	U
Xylenes, Total	0.26	100	1.6	0.2300		0.0074	U	0.0063	U	**20.0**	D	0.0560		0.0082	U	0.0075	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use	NYSDEC Part 375 Restricted Use	NYSDEC Part 375 Protection of	SB-36 (1-3ft)		SB-36 (5-7ft)		SB-36 (18ft)		SB-37 (1-3ft)		SB-37 (5-7ft)	
LAB SAMPLE ID	Soil Cleanup	Soil Cleanup	Groundwater Soil	24H0372-17		24H0372-18		24H0372-19		24H0372-28		24H0372-29	
SAMPLING DATE	Objectives	Objectives-	Cleanup	8/6/2024 10:20:00 AM		8/6/2024 10:45:00 AM		8/6/2024 10:50:00 AM		8/6/2024 2:05:00 PM		8/6/2024 2:15:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,1,2-Trichloroethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,1-Dichloroethane	0.27	26	0.27	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,1-Dichloroethylene	0.33	100	0.33	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,1-Dichloropropylene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,2,3-Trichlorobenzene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,2,3-Trichloropropane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,2,4-Trichlorobenzene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,2-Dibromoethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,2-Dichloropropane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,3-Dichloropropane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
1,4-Dioxane	0.1	13	0.1	0.0560	U	0.0560	U	0.0550	U	0.0570	U	0.0480	U
2,2-Dichloropropane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
2-Butanone	0.12	100	0.12	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
2-Chloroethylvinyl ether	~	~	~	0.0110	U	0.0110	U	0.0110	U	0.0110	U	0.0095	U
2-Chlorotoluene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
2-Hexanone	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
4-Chlorotoluene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
4-Methyl-2-pentanone	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Acetone	0.05	100	0.05	0.0120		0.0056	U	0.0055	U	0.0057	U	0.0048	U
Acrolein	~	~	~	0.0056	U	0.0056	U	0.0055	U	0.0057	U	0.0048	U
Acrylonitrile	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Benzene	0.06	4.8	0.06	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Bromobenzene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Bromochloromethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Bromodichloromethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Bromoform	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Bromomethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Carbon disulfide	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Carbon tetrachloride	0.76	2.4	0.76	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Chlorobenzene	1.1	100	1.1	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Chloroethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Chloroform	0.37	49	0.37	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Chloromethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
cis-1,3-Dichloropropylene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Cyclohexane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Dibromochloromethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Dibromomethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Dichlorodifluoromethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Diisopropyl ether (DIPE)	~	~	~	0.0045	U	0.0045	U	0.0044	U	0.0046	U	0.0038	U
Ethanol	~	~	~	0.0450	U	0.0450	U	0.0440	U	0.0460	U	0.0380	U
Ethyl Benzene	1	41	1	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0045	U	0.0045	U	0.0044	U	0.0046	U	0.0038	U
Hexachlorobutadiene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Iodomethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Isopropylbenzene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Methyl acetate	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Methyl Methacrylate	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Methylcyclohexane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Methylene chloride	0.05	100	0.05	0.0056	U	0.0056	U	0.0055	U	0.0057	U	0.0048	U
Naphthalene	12	100	12	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
n-Butylbenzene	12	100	12	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
n-Propylbenzene	3.9	100	3.9	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
o-Xylene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
p- & m- Xylenes	~	~	~	0.0056	U	0.0056	U	0.0055	U	0.0057	U	0.0048	U
p-Diethylbenzene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
p-Ethyltoluene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
p-Isopropyltoluene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
sec-Butylbenzene	11	100	11	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Styrene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
tert-Amyl alcohol (TAA)	~	~	~	0.0450	U	0.0450	U	0.0440	U	0.0460	U	0.0380	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0045	U	0.0045	U	0.0044	U	0.0046	U	0.0038	U
tert-Butyl alcohol (TBA)	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
tert-Butylbenzene	5.9	100	5.9	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Tetrachloroethylene	1.3	19	1.3	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Tetrahydrofuran	~	~	~	0.0056	U	0.0056	U	0.0055	U	0.0057	U	0.0048	U
Toluene	0.7	100	0.7	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
trans-1,3-Dichloropropylene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
trans-1,4-dichloro-2-butene	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Trichloroethylene	0.47	21	0.47	NT		0.0730		0.0072		0.0099		0.0110	
Trichlorofluoromethane	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Vinyl acetate	~	~	~	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Vinyl Chloride	0.02	0.9	0.02	0.0028	U	0.0028	U	0.0028	U	0.0029	U	0.0024	U
Xylenes, Total	0.26	100	1.6	0.0084	U	0.0084	U	0.0083	U	0.0086	U	0.0071	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	SB-37 (20ft)		SB-38 (1-3ft)		SB-38 (4-6ft)		SB-38 (20ft)		29 Clay-Trench-1	
LAB SAMPLE ID				24H0372-30		24H0372-25		24H0372-26		24H0372-27		24H1360-01	
SAMPLING DATE				8/6/2024 2:25:00 PM		8/6/2024 1:05:00 PM		8/6/2024 1:15:00 PM		8/6/2024 1:40:00 PM		8/20/2024 10:00:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
1,1,1,2-Tetrachloroethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,1,1-Trichloroethane	0.68	100	0.68	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,1,2-Trichloroethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,1-Dichloroethane	0.27	26	0.27	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,1-Dichloroethylene	0.33	100	0.33	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,1-Dichloropropylene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,2,3-Trichlorobenzene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,2,3-Trichloropropane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,2,4-Trichlorobenzene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,2-Dibromo-3-chloropropane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,2-Dibromoethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,2-Dichloroethane	0.02	3.1	0.02	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,2-Dichloropropane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,3-Dichloropropane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
1,4-Dioxane	0.1	13	0.1	0.0510	U	0.0580	U	0.0580	U	0.0440	U	0.060	U
2,2-Dichloropropane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
2-Butanone	0.12	100	0.12	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
2-Chloroethylvinyl ether	~	~	~	0.0100	U	0.0120	U	0.0120	U	0.0088	U	0.012	U
2-Chlorotoluene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
2-Hexanone	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
4-Chlorotoluene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
4-Methyl-2-pentanone	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Acetone	0.05	100	0.05	0.0082	J	0.0058	U	0.0058	U	0.0044	U	0.010	J
Acrolein	~	~	~	0.0051	U	0.0058	U	0.0058	U	0.0044	U	0.006	U
Acrylonitrile	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Benzene	0.06	4.8	0.06	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Bromobenzene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Bromochloromethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Bromodichloromethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Bromoform	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Bromomethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Carbon disulfide	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Carbon tetrachloride	0.76	2.4	0.76	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Chlorobenzene	1.1	100	1.1	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Chloroethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Chloroform	0.37	49	0.37	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Chloromethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
cis-1,3-Dichloropropylene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Cyclohexane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Dibromochloromethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Dibromomethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Dichlorodifluoromethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Diisopropyl ether (DIPE)	~	~	~	0.0041	U	0.0046	U	0.0047	U	0.0035	U	0.005	U
Ethanol	~	~	~	0.0410	U	0.0460	U	0.0470	U	0.0350	U	0.048	U
Ethyl Benzene	1	41	1	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.0041	U	0.0046	U	0.0047	U	0.0035	U	0.005	U
Hexachlorobutadiene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Iodomethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Isopropylbenzene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Methyl acetate	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Methyl Methacrylate	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Methylcyclohexane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Methylene chloride	0.05	100	0.05	0.0051	U	0.0058	U	0.0058	U	0.0044	U	0.006	U
Naphthalene	12	100	12	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
n-Butylbenzene	12	100	12	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
n-Propylbenzene	3.9	100	3.9	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
o-Xylene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
p- & m- Xylenes	~	~	~	0.0051	U	0.0058	U	0.0058	U	0.0044	U	0.006	U
p-Diethylbenzene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
p-Ethyltoluene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
p-Isopropyltoluene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
sec-Butylbenzene	11	100	11	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Styrene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
tert-Amyl alcohol (TAA)	~	~	~	0.0410	U	0.0460	U	0.0470	U	0.0350	U	0.048	U
tert-Amyl methyl ether (TAME)	~	~	~	0.0041	U	0.0046	U	0.0047	U	0.0035	U	0.005	U
tert-Butyl alcohol (TBA)	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
tert-Butylbenzene	5.9	100	5.9	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Tetrachloroethylene	1.3	19	1.3	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.017	
Tetrahydrofuran	~	~	~	0.0051	U	0.0058	U	0.0058	U	0.0044	U	0.006	U
Toluene	0.7	100	0.7	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
trans-1,3-Dichloropropylene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
trans-1,4-dichloro-2-butene	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Trichloroethylene	0.47	21	0.47	0.0330		0.1100		0.0049	J	0.0120		**400**	D
Trichlorofluoromethane	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Vinyl acetate	~	~	~	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Vinyl Chloride	0.02	0.9	0.02	0.0025	U	0.0029	U	0.0029	U	0.0022	U	0.003	U
Xylenes, Total	0.26	100	1.6	0.0076	U	0.0087	U	0.0087	U	0.0066	U	0.0091	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 2B - Volatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C224408

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-	NYSDEC Part 375 Protection of Groundwater Soil Cleanup	8.6.2024_Duplicate		8.7.2024_Duplicate		8.8.2024-Duplicate		8.9.2024-Duplicate		8.15.24- Duplicate		DUPE-8.19.24		8.23.24-DUP	
LAB SAMPLE ID				24H0372-16		24H0499-14		24H0613-23		24H0642-20		24H1202-08		24H1261-04		24H1657-07	
SAMPLING DATE				8/6/2024 9:05:00 AM		8/7/2024 11:55:00 AM		8/8/2024 3:00:00 PM		8/9/2024 12:00:00 PM		8/15/2024 3:00:00 PM		8/19/2024 3:00:00 PM		8/23/2024 1:50:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Volatile Organics by EPA 8260 (mg/kg)				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
				*SB-30 (1-3') Dup		*SB-35-E (20') Dup		*SB-25 (3') Dup		*SB-26 (6') Dup		*SB-28 (2') Dup		*SB-35-20E (39') Dup		*SB-29 (39.5') Dup	
1,1,1,2-Tetrachloroethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,1,1-Trichloroethane	0.68	100	0.68	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,1,2,2-Tetrachloroethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,1,2-Trichloroethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,1-Dichloroethane	0.27	26	0.27	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,1-Dichloroethylene	0.33	100	0.33	0.003	U	0.012		0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,1-Dichloropropylene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,2,3-Trichlorobenzene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,2,3-Trichloropropane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,2,4,5-Tetramethylbenzene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,2,4-Trichlorobenzene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,2,4-Trimethylbenzene	3.6	52	3.6	0.003	U	0.013		0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,2-Dibromo-3-chloropropane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,2-Dibromoethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,2-Dichlorobenzene	1.1	100	1.1	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,2-Dichloroethane	0.02	3.1	0.02	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,2-Dichloropropane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,3,5-Trimethylbenzene	8.4	52	8.4	0.003	U	0.007		0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,3-Dichlorobenzene	2.4	49	2.4	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,3-Dichloropropane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,4-Dichlorobenzene	1.8	13	1.8	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
1,4-Dioxane	0.1	13	0.1	0.059	U	0.040	U	0.050	U	0.050	U	0.067	U	0.050	U	0.043	U
2,2-Dichloropropane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
2-Butanone	0.12	100	0.12	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
2-Chloroethylvinyl ether	~	~	~	0.012	U	0.008	U	0.010	U	0.010	U	0.013	U	0.010	U	0.009	U
2-Chlorotoluene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
2-Hexanone	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
4-Chlorotoluene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
4-Methyl-2-pentanone	~	~	~	0.003	U	0.006		0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Acetone	0.05	100	0.05	0.008	J	0.004	U	0.005	U	0.005	U	0.007	U	0.005	U	0.004	U
Acrolein	~	~	~	0.006	U	0.004	U	0.005	U	0.005	U	0.007	U	0.005	U	0.004	U
Acrylonitrile	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Benzene	0.06	4.8	0.06	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Bromobenzene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Bromochloromethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Bromodichloromethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Bromoform	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Bromomethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Carbon disulfide	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Carbon tetrachloride	0.76	2.4	0.76	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Chlorobenzene	1.1	100	1.1	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Chloroethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Chloroform	0.37	49	0.37	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Chloromethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
cis-1,2-Dichloroethylene	0.25	100	0.25	0.003	U	0.044		0.003	U	0.003	U	0.003	U	0.033		0.031	
cis-1,3-Dichloropropylene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Cyclohexane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Dibromochloromethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Dibromomethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Dichlorodifluoromethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Diisopropyl ether (DIPE)	~	~	~	0.005	U	0.003	U	0.004	U	0.004	U	0.005	U	0.004	U	0.004	U
Ethanol	~	~	~	0.047	U	0.032	U	0.040	U	0.040	U	0.054	U	0.040	U	0.035	U
Ethyl Benzene	1	41	1	0.003	U	0.003	J	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Ethyl tert-butyl ether (ETBE)	~	~	~	0.005	U	0.003	U	0.004	U	0.004	U	0.005	U	0.004	U	0.004	U
Hexachlorobutadiene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Iodomethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Isopropylbenzene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Methyl acetate	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Methyl Methacrylate	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Methyl tert-butyl ether (MTBE)	0.93	100	0.93	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Methylcyclohexane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Methylene chloride	0.05	100	0.05	0.006	U	0.004	U	0.005	U	0.005	U	0.007	U	0.005	U	0.004	U
Naphthalene	12	100	12	0.003	U	0.003	J	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
n-Butylbenzene	12	100	12	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
n-Propylbenzene	3.9	100	3.9	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
o-Xylene	~	~	~	0.003	U	0.006		0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
p- & m- Xylenes	~	~	~	0.006	U	0.017		0.005	U	0.005	U	0.007	U	0.005	U	0.004	U
p-Diethylbenzene	~	~	~	0.003	U	0.003	J	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
p-Ethyltoluene	~	~	~	0.003	U	0.003	J	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
p-Isopropyltoluene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
sec-Butylbenzene	11	100	11	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Styrene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
tert-Amyl alcohol (TAA)	~	~	~	0.047	U	0.032	U	0.040	U	0.040	U	0.054	U	0.040	U	0.035	U
tert-Amyl methyl ether (TAME)	~	~	~	0.005	U	0.003	U	0.004	U	0.004	U	0.005	U	0.004	U	0.004	U
tert-Butyl alcohol (TBA)	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
tert-Butylbenzene	5.9	100	5.9	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Tetrachloroethylene	1.3	19	1.3	0.003	U	0.023		0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Tetrahydrofuran	~	~	~	0.006	U	0.004	U	0.005	U	0.005	U	0.007	U	0.005	U	0.004	U
Toluene	0.7	100	0.7	0.003	U	0.010		0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
trans-1,2-Dichloroethylene	0.19	100	0.19	0.003	U	0.003	J	0.003	U	0.003	U	0.003	U	0.003	J	0.002	U
trans-1,3-Dichloropropylene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
trans-1,4-dichloro-2-butene	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Trichloroethylene	0.47	21	0.47	NT		**31**	D	0.01		0.00	J	0.00	U	0.13		0.17	
Trichlorofluoromethane	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Vinyl acetate	~	~	~	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Vinyl Chloride	0.02	0.9	0.02	0.003	U	0.002	U	0.003	U	0.003	U	0.003	U	0.003	U	0.002	U
Xylenes, Total	0.26	100	1.6	0.0088	U	0.0230		0.0076	U	0.0076	U	0.0100	U	0.0075	U	0.0065	U

TABLE NOTES:

	Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.
U :	Not detected at the reported detection limit for the sample.
D:	Result is from an analysis that required a dilution
J:	Analyte detected at or above the method detection limit but below the reporting limit.
B:	Analyte found in the analysis batch blank
E:	Result is estimated and cannot be accurately reported due to levels encountered or interferences
mg/kg:	Milligrams per Kilogram.
~ :	No Standards or Guidance Value.
Bold and Italics :	The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 3A - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-1 (0-2)		SB-1 (4-6)		SB-2 (0-2)		SB-2 (4-6)		SB-3 (0-2)	
LAB SAMPLE ID				23B0662-01		23B0662-02		23B0662-03		23B0662-04		23B0662-13	
SAMPLING DATE				Soil		Soil		Soil		Soil		Soil	
SAMPLE TYPE				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)													
1,1-Biphenyl	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0937	U	0.0952	U	0.101	U	0.0967	U	0.0914	U
1,2,4-Trichlorobenzene	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
1,4-Dichlorobenzene	1.8	13.0	1.8	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0937	U	0.0952	U	0.101	U	0.0967	U	0.0914	U
2,4,5-Trichlorophenol	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2,4,6-Trichlorophenol	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2,4-Dichlorophenol	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2,4-Dimethylphenol	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2,4-Dinitrophenol	~	~	~	0.0937	U	0.0952	U	0.101	U	0.0967	U	0.0914	U
2,4-Dinitrotoluene	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2,6-Dinitrotoluene	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2-Chloronaphthalene	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2-Chlorophenol	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2-Methylnaphthalene	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2-Methylphenol	0.33	100	0.33	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
2-Nitroaniline	~	~	~	0.0937	U	0.0952	U	0.101	U	0.0967	U	0.0914	U
2-Nitrophenol	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
3- & 4-Methylphenols	0.33	100	0.33	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
3,3-Dichlorobenzidine	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
3-Nitroaniline	~	~	~	0.0937	U	0.0952	U	0.101	U	0.0967	U	0.0914	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0937	U	0.0952	U	0.101	U	0.0967	U	0.0914	U
4-Bromophenyl phenyl ether	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
4-Chloro-3-methylphenol	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
4-Chloroaniline	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
4-Chlorophenyl phenyl ether	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
4-Nitroaniline	~	~	~	0.0937	U	0.0952	U	0.101	U	0.0967	U	0.0914	U
4-Nitrophenol	~	~	~	0.0937	U	0.0952	U	0.101	U	0.0967	U	0.0914	U
Acenaphthene	20	100	98	0.0470	U	0.0477	U	0.0518	JD	0.0485	U	0.0458	U
Acenaphthylene	100	100	107	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Acetophenone	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Aniline	~	~	~	0.188	U	0.191	U	0.203	U	0.194	U	0.183	U
Anthracene	100	100	1000	0.0470	U	0.0477	U	0.113	D	0.0485	U	0.0458	U
Atrazine	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Benzaldehyde	~	~	~	0.0470	U	0.0477	U	0.0558	JD	0.0485	U	0.0458	U
Benzidine	~	~	~	0.188	U	0.191	U	0.203	U	0.194	U	0.183	U
Benzo(a)anthracene	1	1	1	0.0794	JD	0.0477	U	0.411	D	0.0485	U	0.0458	U
Benzo(a)pyrene	1	1	22	0.0554	JD	0.0477	U	0.263	D	0.0485	U	0.0458	U
Benzo(b)fluoranthene	1	1	1.7	0.0622	JD	0.0477	U	0.306	D	0.0485	U	0.0458	U
Benzo(g,h,i)perylene	100	100	1000	0.0470	U	0.0477	U	0.226	D	0.0485	U	0.0458	U
Benzo(k)fluoranthene	0.8	3.9	1.7	0.0487	JD	0.0477	U	0.220	D	0.0485	U	0.0458	U
Benzoic acid	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Benzyl alcohol	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Benzyl butyl phthalate	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Bis(2-chloroethoxy)methane	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Bis(2-chloroethyl)ether	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Caprolactam	~	~	~	0.0937	U	0.0952	U	0.101	U	0.0967	U	0.0914	U
Carbazole	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Chrysene	1	3.9	1	0.0914	JD	0.0477	U	0.432	D	0.0485	U	0.0458	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0470	U	0.0477	U	0.0753	JD	0.0485	U	0.0458	U
Dibenzofuran	7	59	210	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Diethyl phthalate	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Dimethyl phthalate	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Di-n-butyl phthalate	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Di-n-octyl phthalate	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Fluoranthene	100	100	1000	0.115	D	0.0477	U	0.804	D	0.0485	U	0.0458	U
Fluorene	30	100	386	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Hexachlorobenzene	0.33	1.200	3.2	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Hexachlorobutadiene	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Hexachlorocyclopentadiene	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Hexachloroethane	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.0470	U	0.0477	U	0.225	D	0.0485	U	0.0458	U
Isophorone	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Naphthalene	12	100	12	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Nitrobenzene	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
N-Nitrosodimethylamine	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
N-nitroso-di-n-propylamine	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
N-Nitrosodiphenylamine	~	~	~	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Pentachlorophenol	0.8	6.7	0.8	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Phenanthrene	100	100	1000	0.148	D	0.0477	U	0.689	D	0.0485	U	0.0458	U
Phenol	0.33	100	0.33	0.0470	U	0.0477	U	0.0507	U	0.0485	U	0.0458	U
Pyrene	100	100	1000	0.162	D	0.0477	U	0.860	D	0.0485	U	0.0458	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)													
1,4-Dioxane	0.1	13	0.1	NT		NT		NT		NT		NT	

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

NT: NT=this indicates the analyte was not a target for this sample

D: Result is from an analysis that required a dilution

Table 3A - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-3 (4-6)		SB-4 (0-2)		SB-4 (4-6)		SB-5 (0-2)		SB-5 (4-6)	
LAB SAMPLE ID				23B0662-14		23B0662-11		23B0662-12		23B0662-09		23B0662-10	
SAMPLING DATE													
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)													
1,1-Biphenyl	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.121	D	0.0485	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0914	U	0.0999	U	0.0930	U	0.0967	U	0.0967	U
1,2,4-Trichlorobenzene	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
1,4-Dichlorobenzene	1.8	13.0	1.8	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0914	U	0.0999	U	0.0930	U	0.0967	U	0.0967	U
2,4,5-Trichlorophenol	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
2,4,6-Trichlorophenol	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
2,4-Dichlorophenol	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
2,4-Dimethylphenol	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
2,4-Dinitrophenol	~	~	~	0.0914	U	0.0999	U	0.0930	U	0.0967	U	0.0967	U
2,4-Dinitrotoluene	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
2,6-Dinitrotoluene	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
2-Chloronaphthalene	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
2-Chlorophenol	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
2-Methylnaphthalene	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.526	D	0.0485	U
2-Methylphenol	0.33	100	0.33	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
2-Nitroaniline	~	~	~	0.0914	U	0.0999	U	0.0930	U	0.0967	U	0.0967	U
2-Nitrophenol	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
3- & 4-Methylphenols	0.33	100	0.33	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
3,3-Dichlorobenzidine	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
3-Nitroaniline	~	~	~	0.0914	U	0.0999	U	0.0930	U	0.0967	U	0.0967	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0914	U	0.0999	U	0.0930	U	0.0967	U	0.0967	U
4-Bromophenyl phenyl ether	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
4-Chloro-3-methylphenol	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
4-Chloroaniline	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
4-Chlorophenyl phenyl ether	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
4-Nitroaniline	~	~	~	0.0914	U	0.0999	U	0.0930	U	0.0967	U	0.0967	U
4-Nitrophenol	~	~	~	0.0914	U	0.0999	U	0.0930	U	0.0967	U	0.0967	U
Acenaphthene	20	100	98	0.0458	U	0.0501	U	0.0466	U	1.020	D	0.0485	U
Acenaphthylene	100	100	107	0.0458	U	0.0501	U	0.0466	U	0.209	D	0.0485	U
Acetophenone	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Aniline	~	~	~	0.183	U	0.200	U	0.186	U	0.194	U	0.194	U
Anthracene	100	100	1000	0.0458	U	0.0501	U	0.0466	U	1.800	D	0.0485	U
Atrazine	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Benzaldehyde	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Benzidine	~	~	~	0.183	U	0.200	U	0.186	U	0.194	U	0.194	U
Benzo(a)anthracene	1	1	1	0.0458	U	0.0501	U	0.0466	U	**4**	D	0.0485	U
Benzo(a)pyrene	1	1	22	0.0458	U	0.0719	JD	0.0466	U	**3.020**	D	0.0485	U
Benzo(b)fluoranthene	1	1	1.7	0.0458	U	0.0607	JD	0.0466	U	**2.670**	D	0.0485	U
Benzo(g,h,i)perylene	100	100	1000	0.0458	U	0.0727	JD	0.0466	U	1.690	D	0.0485	U
Benzo(k)fluoranthene	0.8	3.9	1.7	0.0458	U	0.0607	JD	0.0466	U	**2.800**	D	0.0485	U
Benzoic acid	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Benzyl alcohol	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Benzyl butyl phthalate	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Bis(2-chloroethoxy)methane	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Bis(2-chloroethyl)ether	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Caprolactam	~	~	~	0.0914	U	0.0999	U	0.0930	U	0.0967	U	0.0967	U
Carbazole	~	~	~	0.0458	U	0.0501	U	0.0466	U	1.100	D	0.0485	U
Chrysene	1	3.9	1	0.0458	U	0.0607	JD	0.0466	U	**3.900**	D	0.0485	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0458	U	0.0501	U	0.0466	U	**0.672**	D	0.0485	U
Dibenzofuran	7	59	210	0.0458	U	0.0501	U	0.0466	U	1.040	D	0.0485	U
Diethyl phthalate	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Dimethyl phthalate	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Di-n-butyl phthalate	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Di-n-octyl phthalate	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Fluoranthene	100	100	1000	0.0458	U	0.0519	JD	0.0466	U	10.100	D	0.0485	U
Fluorene	30	100	386	0.0458	U	0.0501	U	0.0466	U	0.736	D	0.0485	U
Hexachlorobenzene	0.33	1.200	3.2	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Hexachlorobutadiene	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Hexachlorocyclopentadiene	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Hexachloroethane	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.0458	U	0.0575	JD	0.0466	U	**1.660**	D	0.0485	U
Isophorone	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Naphthalene	12	100	12	0.0458	U	0.0501	U	0.0466	U	1.150	D	0.0485	U
Nitrobenzene	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
N-Nitrosodimethylamine	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
N-nitroso-di-n-propylamine	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
N-Nitrosodiphenylamine	~	~	~	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Pentachlorophenol	0.8	6.7	0.8	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Phenanthrene	100	100	1000	0.0458	U	0.0501	U	0.0466	U	11.600	D	0.0485	U
Phenol	0.33	100	0.33	0.0458	U	0.0501	U	0.0466	U	0.0485	U	0.0485	U
Pyrene	100	100	1000	0.0458	U	0.0501	U	0.0466	U	7.740	D	0.0485	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)													
1,4-Dioxane	0.1	13	0.1	NT		0.0194	U	NT		NT		NT	

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

NT: NT=this indicates the analyte was not a target for this sample

D: Result is from an analysis that required a dilution

Table 3A - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-6 (0-2)		SB-6 (4-6)		SB-7 (0-2)		SB-7 (4-6)		SB-8 (0-2')		SB-8 (4-6')	
LAB SAMPLE ID				23B0662-05		23B0662-06		23B0662-07		23B0662-08		23B0727-05		23B0727-06	
SAMPLING DATE												2/13/2023 10:10:00 AM		2/13/2023 10:38:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)															
1,1-Biphenyl	~	~	~	0.0470	U	0.0726	U	0.0681	JD	0.0512	U	0.344	D	0.0502	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0937	U	0.145	U	0.104	U	0.102	U	0.128	U	0.100	U
1,2,4-Trichlorobenzene	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
1,4-Dichlorobenzene	1.8	13.0	1.8	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0937	U	0.145	U	0.104	U	0.102	U	0.128	U	0.100	U
2,4,5-Trichlorophenol	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
2,4,6-Trichlorophenol	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
2,4-Dichlorophenol	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
2,4-Dimethylphenol	~	~	~	0.0470	U	0.0726	U	0.103	JD	0.0512	U	0.0641	U	0.0502	U
2,4-Dinitrophenol	~	~	~	0.0937	U	0.145	U	0.104	U	0.102	U	0.128	U	0.100	U
2,4-Dinitrotoluene	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
2,6-Dinitrotoluene	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
2-Chloronaphthalene	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
2-Chlorophenol	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
2-Methylnaphthalene	~	~	~	0.0470	U	0.0726	U	0.245	D	0.0512	U	1.490	D	0.0502	U
2-Methylphenol	0.33	100	0.33	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
2-Nitroaniline	~	~	~	0.0937	U	0.145	U	0.104	U	0.102	U	0.128	U	0.100	U
2-Nitrophenol	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
3- & 4-Methylphenols	0.33	100	0.33	0.0470	U	0.0726	U	0.186	D	0.0512	U	0.0992	JD	0.0502	U
3,3-Dichlorobenzidine	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
3-Nitroaniline	~	~	~	0.0937	U	0.145	U	0.104	U	0.102	U	0.128	U	0.100	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0937	U	0.145	U	0.104	U	0.102	U	0.128	U	0.100	U
4-Bromophenyl phenyl ether	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
4-Chloro-3-methylphenol	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
4-Chloroaniline	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
4-Chlorophenyl phenyl ether	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
4-Nitroaniline	~	~	~	0.0937	U	0.145	U	0.104	U	0.102	U	0.128	U	0.100	U
4-Nitrophenol	~	~	~	0.0937	U	0.145	U	0.104	U	0.102	U	0.128	U	0.100	U
Acenaphthene	20	100	98	0.0532	JD	0.0726	U	0.774	D	0.0512	U	2.020	D	0.0502	U
Acenaphthylene	100	100	107	0.0472	JD	0.0726	U	2.600	D	0.0512	U	0.573	D	0.0502	U
Acetophenone	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Aniline	~	~	~	0.188	U	0.290	U	0.208	U	0.205	U	0.256	U	0.201	U
Anthracene	100	100	1000	0.158	D	0.0726	U	4.040	D	0.0512	U	5.900	D	0.0502	U
Atrazine	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Benzaldehyde	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.469	D	0.0502	U
Benzidine	~	~	~	0.188	U	0.290	U	0.208	U	0.205	U	0.256	U	0.201	U
Benzo(a)anthracene	1	1	1	0.611	D	0.191	D	**15**	D	0.0512	U	**9.690**	D	0.0502	U
Benzo(a)pyrene	1	1	22	0.565	D	0.158	D	**13.100**	D	0.0512	U	**8.110**	D	0.0502	U
Benzo(b)fluoranthene	1	1	1.7	0.597	D	0.136	JD	**12**	D	0.0512	U	**6.130**	D	0.0502	U
Benzo(g,h,i)perylene	100	100	1000	0.377	D	0.0834	JD	8.070	D	0.0512	U	4.150	D	0.0502	U
Benzo(k)fluoranthene	0.8	3.9	1.7	0.385	D	0.130	JD	**10.900**	D	0.0512	U	**7.640**	D	0.0502	U
Benzoic acid	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.135	D	0.0502	U
Benzyl alcohol	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Benzyl butyl phthalate	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Bis(2-chloroethoxy)methane	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Bis(2-chloroethyl)ether	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.259	D	0.0502	U
Caprolactam	~	~	~	0.0937	U	0.145	U	0.104	U	0.102	U	0.128	U	0.100	U
Carbazole	~	~	~	0.0786	JD	0.0726	U	1.340	D	0.0512	U	2.290	D	0.0502	U
Chrysene	1	3.9	1	0.602	D	0.181	D	**13.900**	D	0.0512	U	**9.060**	D	0.0502	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.106	D	0.0726	U	**1.590**	D	0.0512	U	**3.270**	D	0.0502	U
Dibenzofuran	7	59	210	0.0470	U	0.0726	U	0.575	D	0.0512	U	3.070	D	0.0502	U
Diethyl phthalate	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Dimethyl phthalate	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Di-n-butyl phthalate	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Di-n-octyl phthalate	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Fluoranthene	100	100	1000	1.030	D	0.307	D	30.700	D	0.0512	U	20.500	D	0.0502	U
Fluorene	30	100	386	0.0547	JD	0.0726	U	0.874	D	0.0512	U	2.190	D	0.0502	U
Hexachlorobenzene	0.33	1.200	3.2	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Hexachlorobutadiene	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Hexachlorocyclopentadiene	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Hexachloroethane	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.352	D	0.0834	JD	**8.730**	D	0.0512	U	**3.480**	D	0.0502	U
Isophorone	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Naphthalene	12	100	12	0.0470	U	0.0726	U	0.406	D	0.0512	U	2.830	D	0.0502	U
Nitrobenzene	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
N-Nitrosodimethylamine	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
N-nitroso-di-n-propylamine	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
N-Nitrosodiphenylamine	~	~	~	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Pentachlorophenol	0.8	6.7	0.8	0.0470	U	0.0726	U	0.0521	U	0.0512	U	0.0641	U	0.0502	U
Phenanthrene	100	100	1000	0.841	D	0.353	D	15.800	D	0.0512	U	21.200	D	0.0502	U
Phenol	0.33	100	0.33	0.0470	U	0.0726	U	0.0521	U	0.0512	U	**0.459**	D	0.0502	U
Pyrene	100	100	1000	1.240	D	0.346	D	27	D	0.0512	U	17.600	D	0.0502	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)															
1,4-Dioxane	0.1	13	0.1	NT		0.0194	U	NT		NT		NT		NT	

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

NT: NT=this indicates the analyte was not a target for this sample

D: Result is from an analysis that required a dilution

Table 3A - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-9 (0-2')		SB-9 (4-6')		SB-10 (0-2')		SB-10 (4-6')	
LAB SAMPLE ID				23B0727-01		23B0727-02		23B0727-03		23B0727-04	
SAMPLING DATE				2/13/2023 9:05:00 AM		2/13/2023 9:15:00 AM		2/13/2023 9:35:00 AM		2/13/2023 9:40:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)											
1,1-Biphenyl	~	~	~	0.0891	JD	0.0488	U	0.0484	U	0.0527	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0953	U	0.0974	U	0.0966	U	0.105	U
1,2,4-Trichlorobenzene	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0477	U	0.0488	U	0.0484	U	0.0527	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0477	U	0.0488	U	0.0484	U	0.0527	U
1,4-Dichlorobenzene	1.8	13.0	1.8	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0953	U	0.0974	U	0.0966	U	0.105	U
2,4,5-Trichlorophenol	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,4,6-Trichlorophenol	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,4-Dichlorophenol	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,4-Dimethylphenol	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,4-Dinitrophenol	~	~	~	0.0953	U	0.0974	U	0.0966	U	0.105	U
2,4-Dinitrotoluene	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2,6-Dinitrotoluene	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2-Chloronaphthalene	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2-Chlorophenol	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2-Methylnaphthalene	~	~	~	0.570	D	0.0488	U	0.0484	U	0.0527	U
2-Methylphenol	0.33	100	0.33	0.0477	U	0.0488	U	0.0484	U	0.0527	U
2-Nitroaniline	~	~	~	0.0953	U	0.0974	U	0.0966	U	0.105	U
2-Nitrophenol	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
3- & 4-Methylphenols	0.33	100	0.33	0.0477	U	0.0488	U	0.0484	U	0.0527	U
3,3-Dichlorobenzidine	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
3-Nitroaniline	~	~	~	0.0953	U	0.0974	U	0.0966	U	0.105	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0953	U	0.0974	U	0.0966	U	0.105	U
4-Bromophenyl phenyl ether	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
4-Chloro-3-methylphenol	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
4-Chloroaniline	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
4-Chlorophenyl phenyl ether	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
4-Nitroaniline	~	~	~	0.0953	U	0.0974	U	0.0966	U	0.105	U
4-Nitrophenol	~	~	~	0.0953	U	0.0974	U	0.0966	U	0.105	U
Acenaphthene	20	100	98	0.0480	JD	0.0488	U	0.0484	U	0.0527	U
Acenaphthylene	100	100	107	0.0716	JD	0.0488	U	0.0484	U	0.0527	U
Acetophenone	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Aniline	~	~	~	0.191	U	0.195	U	0.193	U	0.211	U
Anthracene	100	100	1000	0.150	D	0.0488	U	0.0484	U	0.0527	U
Atrazine	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Benzaldehyde	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Benzidine	~	~	~	0.191	U	0.195	U	0.193	U	0.211	U
Benzo(a)anthracene	1	1	1	0.454	D	0.0488	U	0.0726	JD	0.0527	U
Benzo(a)pyrene	1	1	22	0.436	D	0.0488	U	0.0484	U	0.0527	U
Benzo(b)fluoranthene	1	1	1.7	0.441	D	0.0488	U	0.0484	U	0.0527	U
Benzo(g,h,i)perylene	100	100	1000	0.251	D	0.0488	U	0.0484	U	0.0527	U
Benzo(k)fluoranthene	0.8	3.9	1.7	0.381	D	0.0488	U	0.0484	U	0.0527	U
Benzoic acid	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Benzyl alcohol	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Benzyl butyl phthalate	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Bis(2-chloroethoxy)methane	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Bis(2-chloroethyl)ether	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0477	U	0.0488	U	0.119	D	0.0527	U
Caprolactam	~	~	~	0.0953	U	0.0974	U	0.0966	U	0.105	U
Carbazole	~	~	~	0.0716	JD	0.0488	U	0.0484	U	0.0527	U
Chrysene	1	3.9	1	0.483	D	0.0488	U	0.0788	JD	0.0527	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0944	JD	0.0488	U	0.0484	U	0.0527	U
Dibenzofuran	7	59	210	0.0525	JD	0.0488	U	0.0484	U	0.0527	U
Diethyl phthalate	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Dimethyl phthalate	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Di-n-butyl phthalate	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Di-n-octyl phthalate	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Fluoranthene	100	100	1000	0.898	D	0.0488	U	0.119	D	0.0527	U
Fluorene	30	100	386	0.0480	JD	0.0488	U	0.0484	U	0.0527	U
Hexachlorobenzene	0.33	1.200	3.2	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Hexachlorobutadiene	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Hexachlorocyclopentadiene	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Hexachloroethane	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.293	D	0.0488	U	0.0484	U	0.0527	U
Isophorone	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Naphthalene	12	100	12	0.495	D	0.0488	U	0.0484	U	0.0527	U
Nitrobenzene	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
N-Nitrosodimethylamine	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
N-nitroso-di-n-propylamine	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
N-Nitrosodiphenylamine	~	~	~	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Pentachlorophenol	0.8	6.7	0.8	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Phenanthrene	100	100	1000	0.756	D	0.0488	U	0.0842	JD	0.0527	U
Phenol	0.33	100	0.33	0.0477	U	0.0488	U	0.0484	U	0.0527	U
Pyrene	100	100	1000	0.860	D	0.0488	U	0.150	D	0.0527	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)											
1,4-Dioxane	0.1	13	0.1	NT		NT		NT		0.019	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

NT: NT=this indicates the analyte was not a target for this sample

D: Result is from an analysis that required a dilution

Table 3B - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-15 (1-3ft)		SB-15 (5-7ft)		SB-16 (1-3ft)		SB-16 (5-7ft)		SB-17 (1-3ft)	
LAB SAMPLE ID				24H0613-13		24H0613-14		24H0613-17		24H0613-18		24H0642-13	
SAMPLING DATE				8/8/2024 8:05:00 AM		8/8/2024 8:25:00 AM		8/8/2024 9:25:00 AM		8/8/2024 9:40:00 AM		8/9/2024 9:30:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)													
1,1-Biphenyl	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0888	U	0.0885	U	0.0947	U	0.0972	U	0.0939	U
1,2,4-Trichlorobenzene	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0888	U	0.0885	U	0.0947	U	0.0972	U	0.0939	U
2,4,5-Trichlorophenol	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
2,4,6-Trichlorophenol	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
2,4-Dichlorophenol	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
2,4-Dimethylphenol	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
2,4-Dinitrophenol	~	~	~	0.0888	U	0.0885	U	0.0947	U	0.0972	U	0.0939	U
2,4-Dinitrotoluene	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
2,6-Dinitrotoluene	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
2-Chloronaphthalene	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
2-Chlorophenol	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
2-Methylnaphthalene	~	~	~	0.0445	U	0.0443	U	0.0712	JD	0.0487	U	0.0623	JD
2-Methylphenol	0.33	100	0.33	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
2-Nitroaniline	~	~	~	0.0888	U	0.0885	U	0.0947	U	0.0972	U	0.0939	U
2-Nitrophenol	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
3- & 4-Methylphenols	0.33	100	0.33	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
3,3-Dichlorobenzidine	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
3-Nitroaniline	~	~	~	0.0888	U	0.0885	U	0.0947	U	0.0972	U	0.0939	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0888	U	0.0885	U	0.0947	U	0.0972	U	0.0939	U
4-Bromophenyl phenyl ether	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
4-Chloro-3-methylphenol	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
4-Chloroaniline	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
4-Chlorophenyl phenyl ether	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
4-Nitroaniline	~	~	~	0.0888	U	0.0885	U	0.0947	U	0.0972	U	0.0939	U
4-Nitrophenol	~	~	~	0.0888	U	0.0885	U	0.0947	U	0.0972	U	0.0939	U
Acenaphthene	20	100	98	0.0445	U	0.0443	U	0.169	D	0.0487	U	0.0471	U
Acenaphthylene	100	100	107	0.0445	U	0.0443	U	0.0863	JD	0.0487	U	0.0471	U
Acetophenone	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Aniline	~	~	~	0.178	U	0.177	U	0.190	U	0.195	U	0.188	U
Anthracene	100	100	1000	0.0445	U	0.0443	U	0.449	D	0.0653	JD	0.0471	U
Atrazine	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Benzaldehyde	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Benzidine	~	~	~	0.178	U	0.177	U	0.190	U	0.195	U	0.188	U
Benzo(a)anthracene	1	1	1	0.0445	U	0.0443	U	**1.170**	D	0.297	D	0.125	D
Benzo(a)pyrene	1	1	22	0.0445	U	0.0443	U	**1.180**	D	0.305	D	0.139	D
Benzo(b)fluoranthene	1	1	1.7	0.0454	JD	0.0443	U	**1.420**	D	0.344	D	0.134	D
Benzo(g,h,i)perylene	100	100	1000	0.0445	U	0.0443	U	0.702	D	0.134	D	0.147	D
Benzo(k)fluoranthene	0.8	3.9	1.7	0.0445	U	0.0443	U	0.480	D	0.119	D	0.104	D
Benzoic acid	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Benzyl alcohol	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Benzyl butyl phthalate	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Bis(2-chloroethoxy)methane	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Bis(2-chloroethyl)ether	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Caprolactam	~	~	~	0.0888	U	0.0885	U	0.0947	U	0.0972	U	0.0939	U
Carbazole	~	~	~	0.0445	U	0.0443	U	0.203	D	0.0487	U	0.0471	U
Chrysene	1	3.9	1	0.0445	U	0.0443	U	**1.130**	D	0.252	D	0.187	D
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0445	U	0.0443	U	0.169	D	0.0487	U	0.0471	U
Dibenzofuran	7	59	210	0.0445	U	0.0443	U	0.134	D	0.0487	U	0.0471	U
Diethyl phthalate	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Dimethyl phthalate	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Di-n-butyl phthalate	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Di-n-octyl phthalate	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Fluoranthene	100	100	1000	0.0445	U	0.0443	U	2.350	D	0.371	D	0.211	D
Fluorene	30	100	386	0.0445	U	0.0443	U	0.154	D	0.0487	U	0.0471	U
Hexachlorobenzene	0.33	1.2	3.2	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Hexachlorobutadiene	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Hexachlorocyclopentadiene	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Hexachloroethane	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.0445	U	0.0443	U	**0.782**	D	0.162	D	0.119	D
Isophorone	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Naphthalene	12	100	12	0.0445	U	0.0443	U	0.109	D	0.0487	U	0.0471	U
Nitrobenzene	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
N-Nitrosodimethylamine	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
N-nitroso-di-n-propylamine	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
N-Nitrosodiphenylamine	~	~	~	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Pentachlorophenol	0.8	6.7	0.8	0.0445	U	0.0443	U	0.0475	U	0.0487	U	0.0471	U
Phenanthrene	100	100	1000	0.0445	U	0.0443	U	2.620	D	0.0971	JD	0.274	D
Phenol	0.33	100	0.33	0.0445	U	0.0443	U	0.0772	JD	0.0487	U	0.0471	U
Pyrene	100	100	1000	0.0445	U	0.0443	U	2.230	D	0.393	D	0.187	D
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)													
1,4-Dioxane	0.1	13	0.1	0.0192	U	0.0192	U	0.0192	U	0.0192	U	0.0194	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 3B - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-17 (5-7ft)		SB-18 (1-3ft)		SB-18 (5-7ft)		SB-19 (1-3 ft)		SB-19 (4-6 ft)	
LAB SAMPLE ID				24H0642-14		24H0965-01		24H0965-02		24H1202-01		24H1202-02	
SAMPLING DATE				8/9/2024 9:45:00 AM		8/14/2024 12:30:00 PM		8/14/2024 12:40:00 PM		8/15/2024 8:45:00 AM		8/15/2024 8:55:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)													
1,1-Biphenyl	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0959	U	0.494	U	0.0908	U	0.0973	U	0.101	U
1,2,4-Trichlorobenzene	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0959	U	0.494	U	0.0908	U	0.0973	U	0.101	U
2,4,5-Trichlorophenol	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
2,4,6-Trichlorophenol	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
2,4-Dichlorophenol	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
2,4-Dimethylphenol	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
2,4-Dinitrophenol	~	~	~	0.0959	U	0.494	U	0.0908	U	0.0973	U	0.101	U
2,4-Dinitrotoluene	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
2,6-Dinitrotoluene	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
2-Chloronaphthalene	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
2-Chlorophenol	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
2-Methylnaphthalene	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0918	JD	0.0504	U
2-Methylphenol	0.33	100	0.33	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
2-Nitroaniline	~	~	~	0.0959	U	0.494	U	0.0908	U	0.0973	U	0.101	U
2-Nitrophenol	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
3- & 4-Methylphenols	0.33	100	0.33	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
3,3-Dichlorobenzidine	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
3-Nitroaniline	~	~	~	0.0959	U	0.494	U	0.0908	U	0.0973	U	0.101	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0959	U	0.494	U	0.0908	U	0.0973	U	0.101	U
4-Bromophenyl phenyl ether	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
4-Chloro-3-methylphenol	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
4-Chloroaniline	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
4-Chlorophenyl phenyl ether	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
4-Nitroaniline	~	~	~	0.0959	U	0.494	U	0.0908	U	0.0973	U	0.101	U
4-Nitrophenol	~	~	~	0.0959	U	0.494	U	0.0908	U	0.0973	U	0.101	U
Acenaphthene	20	100	98	0.0481	U	0.248	U	0.0455	U	0.167	D	0.0504	U
Acenaphthylene	100	100	107	0.0481	U	0.304	JD	0.0455	U	0.0488	U	0.0504	U
Acetophenone	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Aniline	~	~	~	0.192	U	0.989	U	0.182	U	0.195	U	0.201	U
Anthracene	100	100	1000	0.0481	U	0.746	D	0.0455	U	0.457	D	0.0504	U
Atrazine	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Benzaldehyde	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Benzidine	~	~	~	0.192	U	0.989	U	0.182	U	0.195	U	0.201	U
Benzo(a)anthracene	1	1	1	0.0481	U	**3.210**	D	0.0455	U	**1.080**	D	0.0504	U
Benzo(a)pyrene	1	1	22	0.0481	U	**2.830**	D	0.0455	U	0.896	D	0.0504	U
Benzo(b)fluoranthene	1	1	1.7	0.0481	U	**3.900**	D	0.0455	U	**1.280**	D	0.0504	U
Benzo(g,h,i)perylene	100	100	1000	0.0481	U	1.800	D	0.0455	U	0.558	D	0.0504	U
Benzo(k)fluoranthene	0.8	3.9	1.7	0.0481	U	**1.200**	D	0.0455	U	0.383	D	0.0504	U
Benzoic acid	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Benzyl alcohol	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Benzyl butyl phthalate	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Bis(2-chloroethoxy)methane	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Bis(2-chloroethyl)ether	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Caprolactam	~	~	~	0.0959	U	0.494	U	0.0908	U	0.0973	U	0.101	U
Carbazole	~	~	~	0.0481	U	0.248	U	0.0455	U	0.210	D	0.0504	U
Chrysene	1	3.9	1	0.0481	U	**2.950**	D	0.0455	U	**1.060**	D	0.0504	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0481	U	**0.422**	JD	0.0455	U	0.164	D	0.0504	U
Dibenzofuran	7	59	210	0.0481	U	0.248	U	0.0455	U	0.136	D	0.0504	U
Diethyl phthalate	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Dimethyl phthalate	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Di-n-butyl phthalate	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Di-n-octyl phthalate	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Fluoranthene	100	100	1000	0.0481	U	6.200	D	0.0455	U	2.500	D	0.0504	U
Fluorene	30	100	386	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Hexachlorobenzene	0.33	1.2	3.2	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Hexachlorobutadiene	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Hexachlorocyclopentadiene	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Hexachloroethane	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.0481	U	**2.020**	D	0.0455	U	**0.639**	D	0.0504	U
Isophorone	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Naphthalene	12	100	12	0.0481	U	0.248	U	0.0455	U	0.0886	JD	0.0504	U
Nitrobenzene	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
N-Nitrosodimethylamine	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
N-nitroso-di-n-propylamine	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
N-Nitrosodiphenylamine	~	~	~	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Pentachlorophenol	0.8	6.7	0.8	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Phenanthrene	100	100	1000	0.0481	U	3.140	D	0.0455	U	2.690	D	0.0504	U
Phenol	0.33	100	0.33	0.0481	U	0.248	U	0.0455	U	0.0488	U	0.0504	U
Pyrene	100	100	1000	0.0481	U	5.130	D	0.0455	U	1.850	D	0.0504	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)													
1,4-Dioxane	0.1	13	0.1	0.0194	U	0.0194	U	0.0194	U	0.0190	U	0.0189	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 3B - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-20 (1-3ft)		SB-20 (5-7ft)		SB-24 (1-3ft)		SB-24 (5-7ft)		SB-25 (1-3ft)	
LAB SAMPLE ID				24H0613-29		24H0613-30		24H0613-26		24H0613-27		24H0613-20	
SAMPLING DATE				8/8/2024 2:00:00 PM		8/8/2024 2:05:00 PM		8/8/2024 1:10:00 PM		8/8/2024 1:20:00 PM		8/8/2024 10:45:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)													
1,1-Biphenyl	~	~	~	0.151	D	0.0475	U	0.0469	U	0.0429	U	0.0486	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0949	U	0.0948	U	0.0936	U	0.0857	U	0.0970	U
1,2,4-Trichlorobenzene	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0949	U	0.0948	U	0.0936	U	0.0857	U	0.0970	U
2,4,5-Trichlorophenol	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
2,4,6-Trichlorophenol	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
2,4-Dichlorophenol	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
2,4-Dimethylphenol	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
2,4-Dinitrophenol	~	~	~	0.0949	U	0.0948	U	0.0936	U	0.0857	U	0.0970	U
2,4-Dinitrotoluene	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
2,6-Dinitrotoluene	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
2-Chloronaphthalene	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
2-Chlorophenol	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
2-Methylnaphthalene	~	~	~	0.810	D	0.0475	U	0.0469	U	0.0429	U	0.0744	JD
2-Methylphenol	0.33	100	0.33	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
2-Nitroaniline	~	~	~	0.0949	U	0.0948	U	0.0936	U	0.0857	U	0.0970	U
2-Nitrophenol	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
3- & 4-Methylphenols	0.33	100	0.33	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
3,3-Dichlorobenzidine	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
3-Nitroaniline	~	~	~	0.0949	U	0.0948	U	0.0936	U	0.0857	U	0.0970	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0949	U	0.0948	U	0.0936	U	0.0857	U	0.0970	U
4-Bromophenyl phenyl ether	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
4-Chloro-3-methylphenol	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
4-Chloroaniline	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
4-Chlorophenyl phenyl ether	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
4-Nitroaniline	~	~	~	0.0949	U	0.0948	U	0.0936	U	0.0857	U	0.0970	U
4-Nitrophenol	~	~	~	0.0949	U	0.0948	U	0.0936	U	0.0857	U	0.0970	U
Acenaphthene	20	100	98	0.0501	JD	0.0475	U	0.0643	JD	0.0429	U	0.143	D
Acenaphthylene	100	100	107	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0582	JD
Acetophenone	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Aniline	~	~	~	0.190	U	0.190	U	0.187	U	0.172	U	0.194	U
Anthracene	100	100	1000	0.115	D	0.0475	U	0.107	D	0.0429	U	0.331	D
Atrazine	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Benzaldehyde	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Benzidine	~	~	~	0.190	U	0.190	U	0.187	U	0.172	U	0.194	U
Benzo(a)anthracene	1	1	1	0.215	D	0.0475	U	0.395	D	0.0429	U	0.844	D
Benzo(a)pyrene	1	1	22	0.170	D	0.0475	U	0.544	D	0.0429	U	0.889	D
Benzo(b)fluoranthene	1	1	1.7	0.319	D	0.0475	U	0.694	D	0.0429	U	**1.080**	D
Benzo(g,h,i)perylene	100	100	1000	0.155	D	0.0475	U	0.727	D	0.0429	U	0.654	D
Benzo(k)fluoranthene	0.8	3.9	1.7	0.0910	JD	0.0475	U	0.197	D	0.0429	U	0.364	D
Benzoic acid	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Benzyl alcohol	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Benzyl butyl phthalate	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Bis(2-chloroethoxy)methane	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Bis(2-chloroethyl)ether	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Caprolactam	~	~	~	0.0949	U	0.0948	U	0.0936	U	0.0857	U	0.0970	U
Carbazole	~	~	~	0.0475	U	0.0475	U	0.0546	JD	0.0429	U	0.130	D
Chrysene	1	3.9	1	0.287	D	0.0475	U	0.423	D	0.0429	U	0.813	D
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0475	U	0.0475	U	0.180	D	0.0429	U	0.184	D
Dibenzofuran	7	59	210	0.350	D	0.0475	U	0.0539	JD	0.0429	U	0.0938	JD
Diethyl phthalate	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Dimethyl phthalate	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Di-n-butyl phthalate	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Di-n-octyl phthalate	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Fluoranthene	100	100	1000	0.403	D	0.0475	U	0.721	D	0.0429	U	1.680	D
Fluorene	30	100	386	0.0475	U	0.0475	U	0.0501	JD	0.0429	U	0.116	D
Hexachlorobenzene	0.33	1.2	3.2	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Hexachlorobutadiene	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Hexachlorocyclopentadiene	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Hexachloroethane	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.154	D	0.0475	U	**0.548**	D	0.0429	U	**0.644**	D
Isophorone	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Naphthalene	12	100	12	0.893	D	0.0475	U	0.0501	JD	0.0429	U	0.0605	JD
Nitrobenzene	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
N-Nitrosodimethylamine	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
N-nitroso-di-n-propylamine	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
N-Nitrosodiphenylamine	~	~	~	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Pentachlorophenol	0.8	6.7	0.8	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Phenanthrene	100	100	1000	0.670	D	0.0475	U	0.755	D	0.0429	U	1.700	D
Phenol	0.33	100	0.33	0.0475	U	0.0475	U	0.0469	U	0.0429	U	0.0486	U
Pyrene	100	100	1000	0.461	D	0.0475	U	0.663	D	0.0429	U	1.570	D
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)													
1,4-Dioxane	0.1	13	0.1	0.0196	U	0.0196	U	0.0196	U	0.0196	U	0.0192	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 3B - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-25 (6-8ft)		SB-26 (1-3ft)		SB-26 (5-7ft)		SB-27 (1-3ft)		SB-27 (6-8ft)	
LAB SAMPLE ID				24H0613-21		24H0642-16		24H0642-19		24H0642-11		24H0642-12	
SAMPLING DATE				8/8/2024 10:55:00 AM		8/9/2024 10:25:00 AM		8/9/2024 10:40:00 AM		8/9/2024 8:55:00 AM		8/9/2024 9:15:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)													
1,1-Biphenyl	~	~	~	0.0461	U	0.0771	JD	0.0476	U	0.0471	U	0.0455	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0920	U	0.0910	U	0.0949	U	0.0940	U	0.0908	U
1,2,4-Trichlorobenzene	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0920	U	0.0910	U	0.0949	U	0.0940	U	0.0908	U
2,4,5-Trichlorophenol	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
2,4,6-Trichlorophenol	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
2,4-Dichlorophenol	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
2,4-Dimethylphenol	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
2,4-Dinitrophenol	~	~	~	0.0920	U	0.0910	U	0.0949	U	0.0940	U	0.0908	U
2,4-Dinitrotoluene	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
2,6-Dinitrotoluene	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
2-Chloronaphthalene	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
2-Chlorophenol	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
2-Methylnaphthalene	~	~	~	0.0461	U	0.253	D	0.0476	U	0.0684	JD	0.0455	U
2-Methylphenol	0.33	100	0.33	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
2-Nitroaniline	~	~	~	0.0920	U	0.0910	U	0.0949	U	0.0940	U	0.0908	U
2-Nitrophenol	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
3- & 4-Methylphenols	0.33	100	0.33	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
3,3-Dichlorobenzidine	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
3-Nitroaniline	~	~	~	0.0920	U	0.0910	U	0.0949	U	0.0940	U	0.0908	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0920	U	0.0910	U	0.0949	U	0.0940	U	0.0908	U
4-Bromophenyl phenyl ether	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
4-Chloro-3-methylphenol	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
4-Chloroaniline	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
4-Chlorophenyl phenyl ether	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
4-Nitroaniline	~	~	~	0.0920	U	0.0910	U	0.0949	U	0.0940	U	0.0908	U
4-Nitrophenol	~	~	~	0.0920	U	0.0910	U	0.0949	U	0.0940	U	0.0908	U
Acenaphthene	20	100	98	0.0461	U	0.547	D	0.0476	U	0.0842	JD	0.0455	U
Acenaphthylene	100	100	107	0.0461	U	0.202	D	0.0476	U	0.0471	U	0.0455	U
Acetophenone	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Aniline	~	~	~	0.184	U	0.182	U	0.190	U	0.188	U	0.182	U
Anthracene	100	100	1000	0.0461	U	1.210	D	0.0476	U	0.181	D	0.0455	U
Atrazine	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Benzaldehyde	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Benzidine	~	~	~	0.184	U	0.182	U	0.190	U	0.188	U	0.182	U
Benzo(a)anthracene	1	1	1	0.0461	U	**2.040**	D	0.0476	U	0.454	D	0.0455	U
Benzo(a)pyrene	1	1	22	0.0461	U	**1.820**	D	0.0476	U	0.428	D	0.0455	U
Benzo(b)fluoranthene	1	1	1.7	0.0461	U	**1.410**	D	0.0476	U	0.334	D	0.0455	U
Benzo(g,h,i)perylene	100	100	1000	0.0461	U	0.973	D	0.0476	U	0.277	D	0.0455	U
Benzo(k)fluoranthene	0.8	3.9	1.7	0.0461	U	**1.560**	D	0.0476	U	0.349	D	0.0455	U
Benzoic acid	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Benzyl alcohol	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Benzyl butyl phthalate	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Bis(2-chloroethoxy)methane	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Bis(2-chloroethyl)ether	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Caprolactam	~	~	~	0.0920	U	0.0910	U	0.0949	U	0.0940	U	0.0908	U
Carbazole	~	~	~	0.0461	U	0.573	D	0.0476	U	0.0827	JD	0.0455	U
Chrysene	1	3.9	1	0.0461	U	**1.870**	D	0.0476	U	0.452	D	0.0455	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0461	U	**0.357**	D	0.0476	U	0.0736	JD	0.0455	U
Dibenzofuran	7	59	210	0.0461	U	0.476	D	0.0476	U	0.0534	JD	0.0455	U
Diethyl phthalate	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Dimethyl phthalate	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Di-n-butyl phthalate	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Di-n-octyl phthalate	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Fluoranthene	100	100	1000	0.0461	U	5.670	D	0.0476	U	0.904	D	0.0455	U
Fluorene	30	100	386	0.0461	U	0.525	D	0.0476	U	0.0471	U	0.0455	U
Hexachlorobenzene	0.33	1.2	3.2	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Hexachlorobutadiene	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Hexachlorocyclopentadiene	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Hexachloroethane	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.0461	U	**1.030**	D	0.0476	U	0.258	D	0.0455	U
Isophorone	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Naphthalene	12	100	12	0.0461	U	0.359	D	0.0476	U	0.0699	JD	0.0455	U
Nitrobenzene	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
N-Nitrosodimethylamine	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
N-nitroso-di-n-propylamine	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
N-Nitrosodiphenylamine	~	~	~	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Pentachlorophenol	0.8	6.7	0.8	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Phenanthrene	100	100	1000	0.0461	U	6.260	D	0.0476	U	0.833	D	0.0455	U
Phenol	0.33	100	0.33	0.0461	U	0.0456	U	0.0476	U	0.0471	U	0.0455	U
Pyrene	100	100	1000	0.0461	U	5.020	D	0.0476	U	0.854	D	0.0455	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)													
1,4-Dioxane	0.1	13	0.1	0.0192	U	0.0194	U	0.0194	U	0.0196	U	0.0196	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 3B - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-28 (1-3 ft)		SB-28 (4-6 ft)		SB-29 (1-3ft)		SB-29 (5-7ft)		SB-30 (1-3ft)	
LAB SAMPLE ID				24H1202-05		24H1202-06		24H0269-12		24H0269-22		24H0372-13	
SAMPLING DATE				8/15/2024 12:20:00 PM		8/15/2024 12:50:00 PM		8/5/2024 10:20:00 AM		8/5/2024 2:15:00 PM		8/6/2024 8:10:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)													
1,1-Biphenyl	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.102	U	0.0949	U	0.0908	U	0.0891	U	0.0943	U
1,2,4-Trichlorobenzene	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.102	U	0.0949	U	0.0908	U	0.0891	U	0.0943	U
2,4,5-Trichlorophenol	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2,4,6-Trichlorophenol	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2,4-Dichlorophenol	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2,4-Dimethylphenol	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2,4-Dinitrophenol	~	~	~	0.102	U	0.0949	U	0.0908	U	0.0891	U	0.0943	U
2,4-Dinitrotoluene	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2,6-Dinitrotoluene	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2-Chloronaphthalene	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2-Chlorophenol	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2-Methylnaphthalene	~	~	~	0.0617	JD	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2-Methylphenol	0.33	100	0.33	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
2-Nitroaniline	~	~	~	0.102	U	0.0949	U	0.0908	U	0.0891	U	0.0943	U
2-Nitrophenol	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
3- & 4-Methylphenols	0.33	100	0.33	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
3,3-Dichlorobenzidine	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
3-Nitroaniline	~	~	~	0.102	U	0.0949	U	0.0908	U	0.0891	U	0.0943	U
4,6-Dinitro-2-methylphenol	~	~	~	0.102	U	0.0949	U	0.0908	U	0.0891	U	0.0943	U
4-Bromophenyl phenyl ether	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
4-Chloro-3-methylphenol	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
4-Chloroaniline	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
4-Chlorophenyl phenyl ether	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
4-Nitroaniline	~	~	~	0.102	U	0.0949	U	0.0908	U	0.0891	U	0.0943	U
4-Nitrophenol	~	~	~	0.102	U	0.0949	U	0.0908	U	0.0891	U	0.0943	U
Acenaphthene	20	100	98	0.0528	JD	0.0475	U	0.0798	JD	0.0447	U	0.0490	JD
Acenaphthylene	100	100	107	0.0609	JD	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Acetophenone	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Aniline	~	~	~	0.203	U	0.190	U	0.182	U	0.178	U	0.189	U
Anthracene	100	100	1000	0.146	D	0.0475	U	0.112	D	0.0447	U	0.0942	JD
Atrazine	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Benzaldehyde	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Benzidine	~	~	~	0.203	U	0.190	U	0.182	U	0.178	U	0.189	U
Benzo(a)anthracene	1	1	1	0.659	D	0.0475	U	0.259	D	0.0447	U	0.394	D
Benzo(a)pyrene	1	1	22	0.721	D	0.0475	U	0.225	D	0.0447	U	0.381	D
Benzo(b)fluoranthene	1	1	1.7	0.905	D	0.0475	U	0.196	D	0.0447	U	0.326	D
Benzo(g,h,i)perylene	100	100	1000	0.537	D	0.0475	U	0.144	D	0.0447	U	0.210	D
Benzo(k)fluoranthene	0.8	3.9	1.7	0.274	D	0.0475	U	0.200	D	0.0447	U	0.348	D
Benzoic acid	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Benzyl alcohol	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Benzyl butyl phthalate	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Bis(2-chloroethoxy)methane	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Bis(2-chloroethyl)ether	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Caprolactam	~	~	~	0.102	U	0.0949	U	0.0908	U	0.0891	U	0.0943	U
Carbazole	~	~	~	0.0666	JD	0.0475	U	0.0530	JD	0.0447	U	0.0473	U
Chrysene	1	3.9	1	0.660	D	0.0475	U	0.256	D	0.0447	U	0.404	D
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.146	D	0.0475	U	0.0455	U	0.0447	U	0.0550	JD
Dibenzofuran	7	59	210	0.0509	U	0.0475	U	0.0537	JD	0.0447	U	0.0473	U
Diethyl phthalate	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Dimethyl phthalate	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Di-n-butyl phthalate	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Di-n-octyl phthalate	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Fluoranthene	100	100	1000	1.230	D	0.0475	U	0.641	D	0.0447	U	0.846	D
Fluorene	30	100	386	0.0509	U	0.0475	U	0.0508	JD	0.0447	U	0.0473	U
Hexachlorobenzene	0.33	1.2	3.2	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Hexachlorobutadiene	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Hexachlorocyclopentadiene	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Hexachloroethane	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	**0.542**	D	0.0475	U	0.148	D	0.0447	U	0.261	D
Isophorone	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Naphthalene	12	100	12	0.0722	JD	0.0475	U	0.0675	JD	0.0447	U	0.0473	U
Nitrobenzene	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
N-Nitrosodimethylamine	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
N-nitroso-di-n-propylamine	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
N-Nitrosodiphenylamine	~	~	~	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Pentachlorophenol	0.8	6.7	0.8	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Phenanthrene	100	100	1000	0.798	D	0.0475	U	0.671	D	0.0447	U	0.632	D
Phenol	0.33	100	0.33	0.0509	U	0.0475	U	0.0455	U	0.0447	U	0.0473	U
Pyrene	100	100	1000	0.984	D	0.0475	U	0.587	D	0.0447	U	0.672	D
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)													
1,4-Dioxane	0.1	13	0.1	0.0190	U	0.0189	U	0.0198	U	0.0185	U	0.0189	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 3B - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-30 (4-6ft)		SB-31 (1-3ft)		SB-31 (4-6ft)		SB-32 (1-3ft)		SB-32 (5-7ft)	
LAB SAMPLE ID				24H0372-14		24H0372-21		24H0372-22		24H0499-03		24H0499-04	
SAMPLING DATE				8/6/2024 8:20:00 AM		8/6/2024 12:00:00 PM		8/6/2024 12:10:00 PM		8/7/2024 7:55:00 AM		8/7/2024 7:55:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)													
1,1-Biphenyl	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0937	U	0.0969	U	0.0940	U	0.0960	U	0.0936	U
1,2,4-Trichlorobenzene	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0937	U	0.0969	U	0.0940	U	0.0960	U	0.0936	U
2,4,5-Trichlorophenol	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
2,4,6-Trichlorophenol	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
2,4-Dichlorophenol	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
2,4-Dimethylphenol	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
2,4-Dinitrophenol	~	~	~	0.0937	U	0.0969	U	0.0940	U	0.0960	U	0.0936	U
2,4-Dinitrotoluene	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
2,6-Dinitrotoluene	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
2-Chloronaphthalene	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
2-Chlorophenol	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
2-Methylnaphthalene	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0990	D	0.0469	U
2-Methylphenol	0.33	100	0.33	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
2-Nitroaniline	~	~	~	0.0937	U	0.0969	U	0.0940	U	0.0960	U	0.0936	U
2-Nitrophenol	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
3- & 4-Methylphenols	0.33	100	0.33	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
3,3-Dichlorobenzidine	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
3-Nitroaniline	~	~	~	0.0937	U	0.0969	U	0.0940	U	0.0960	U	0.0936	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0937	U	0.0969	U	0.0940	U	0.0960	U	0.0936	U
4-Bromophenyl phenyl ether	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
4-Chloro-3-methylphenol	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
4-Chloroaniline	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
4-Chlorophenyl phenyl ether	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
4-Nitroaniline	~	~	~	0.0937	U	0.0969	U	0.0940	U	0.0960	U	0.0936	U
4-Nitrophenol	~	~	~	0.0937	U	0.0969	U	0.0940	U	0.0960	U	0.0936	U
Acenaphthene	20	100	98	0.0470	U	0.105	D	0.0471	U	0.585	D	0.0469	U
Acenaphthylene	100	100	107	0.0470	U	0.0485	U	0.0471	U	0.127	D	0.0469	U
Acetophenone	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Aniline	~	~	~	0.188	U	0.194	U	0.188	U	0.192	U	0.187	U
Anthracene	100	100	1000	0.0470	U	0.225	D	0.0471	U	1.470	D	0.0469	U
Atrazine	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Benzaldehyde	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Benzidine	~	~	~	0.188	U	0.194	U	0.188	U	0.192	U	0.187	U
Benzo(a)anthracene	1	1	1	0.0470	U	0.629	D	0.0471	U	**4.200**	D	0.0469	U
Benzo(a)pyrene	1	1	22	0.0470	U	0.663	D	0.0471	U	**2.980**	D	0.0469	U
Benzo(b)fluoranthene	1	1	1.7	0.0470	U	0.551	D	0.0471	U	**2.610**	D	0.0469	U
Benzo(g,h,i)perylene	100	100	1000	0.0470	U	0.416	D	0.0471	U	1.820	D	0.0469	U
Benzo(k)fluoranthene	0.8	3.9	1.7	0.0470	U	0.555	D	0.0471	U	**2.560**	D	0.0469	U
Benzoic acid	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Benzyl alcohol	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Benzyl butyl phthalate	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Bis(2-chloroethoxy)methane	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Bis(2-chloroethyl)ether	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Caprolactam	~	~	~	0.0937	U	0.0969	U	0.0940	U	0.0960	U	0.0936	U
Carbazole	~	~	~	0.0470	U	0.120	D	0.0471	U	0.470	D	0.0469	U
Chrysene	1	3.9	1	0.0470	U	0.649	D	0.0471	U	**4**	D	0.0469	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0470	U	0.145	D	0.0471	U	**0.685**	D	0.0469	U
Dibenzofuran	7	59	210	0.0470	U	0.0705	JD	0.0471	U	0.310	D	0.0469	U
Diethyl phthalate	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Dimethyl phthalate	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Di-n-butyl phthalate	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Di-n-octyl phthalate	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Fluoranthene	100	100	1000	0.0470	U	1.460	D	0.0766	JD	10.400	D	0.0469	U
Fluorene	30	100	386	0.0470	U	0.0859	JD	0.0471	U	0.476	D	0.0469	U
Hexachlorobenzene	0.33	1.2	3.2	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Hexachlorobutadiene	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Hexachlorocyclopentadiene	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Hexachloroethane	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.0470	U	0.424	D	0.0471	U	**1.900**	D	0.0469	U
Isophorone	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Naphthalene	12	100	12	0.0470	U	0.0485	U	0.0471	U	0.110	D	0.0469	U
Nitrobenzene	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
N-Nitrosodimethylamine	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
N-nitroso-di-n-propylamine	~	~	~	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
N-Nitrosodiphenylamine	~	~	~	0.0470	U	0.0728	JD	0.0471	U	0.0481	U	0.0469	U
Pentachlorophenol	0.8	6.7	0.8	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Phenanthrene	100	100	1000	0.0470	U	1.260	D	0.0916	JD	8.800	D	0.0469	U
Phenol	0.33	100	0.33	0.0470	U	0.0485	U	0.0471	U	0.0481	U	0.0469	U
Pyrene	100	100	1000	0.0470	U	1.160	D	0.0744	JD	9	D	0.0469	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)													
1,4-Dioxane	0.1	13	0.1	0.0198	U	0.0198	U	0.0194	U	0.0198	U	0.0198	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 3B - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-33 (1-3ft)		SB-33 (5-7ft)		SB-34 (1-3ft)		SB-34 (5-7ft)		SB-35 (1-3ft)	
LAB SAMPLE ID				24H0269-09		24H0269-20		24H0269-15		24H0269-17		24H0269-24	
SAMPLING DATE				8/5/2024 9:10:00 AM		8/5/2024 1:50:00 PM		8/5/2024 1:10:00 PM		8/5/2024 1:20:00 PM		8/5/2024 3:05:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)													
1,1-Biphenyl	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0954	U	0.101	U	0.0945	U	0.109	U	0.0963	U
1,2,4-Trichlorobenzene	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0954	U	0.101	U	0.0945	U	0.109	U	0.0963	U
2,4,5-Trichlorophenol	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2,4,6-Trichlorophenol	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2,4-Dichlorophenol	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2,4-Dimethylphenol	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2,4-Dinitrophenol	~	~	~	0.0954	U	0.101	U	0.0945	U	0.109	U	0.0963	U
2,4-Dinitrotoluene	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2,6-Dinitrotoluene	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2-Chloronaphthalene	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2-Chlorophenol	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2-Methylnaphthalene	~	~	~	0.133	D	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2-Methylphenol	0.33	100	0.33	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
2-Nitroaniline	~	~	~	0.0954	U	0.101	U	0.0945	U	0.109	U	0.0963	U
2-Nitrophenol	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
3- & 4-Methylphenols	0.33	100	0.33	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
3,3-Dichlorobenzidine	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
3-Nitroaniline	~	~	~	0.0954	U	0.101	U	0.0945	U	0.109	U	0.0963	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0954	U	0.101	U	0.0945	U	0.109	U	0.0963	U
4-Bromophenyl phenyl ether	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
4-Chloro-3-methylphenol	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
4-Chloroaniline	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
4-Chlorophenyl phenyl ether	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
4-Nitroaniline	~	~	~	0.0954	U	0.101	U	0.0945	U	0.109	U	0.0963	U
4-Nitrophenol	~	~	~	0.0954	U	0.101	U	0.0945	U	0.109	U	0.0963	U
Acenaphthene	20	100	98	0.612	D	0.0646	JD	0.0967	D	0.0544	U	0.0483	U
Acenaphthylene	100	100	107	0.517	D	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Acetophenone	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Aniline	~	~	~	0.191	U	0.202	U	0.189	U	0.217	U	0.193	U
Anthracene	100	100	1000	2.430	D	0.170	D	0.247	D	0.0544	U	0.0483	U
Atrazine	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Benzaldehyde	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Benzidine	~	~	~	0.191	U	0.202	U	0.189	U	0.217	U	0.193	U
Benzo(a)anthracene	1	1	1	**6.630**	D	0.341	D	0.413	D	0.0544	U	0.0483	U
Benzo(a)pyrene	1	1	22	**7.360**	D	0.322	D	0.336	D	0.0544	U	0.0483	U
Benzo(b)fluoranthene	1	1	1.7	**5.700**	D	0.266	D	0.323	D	0.0544	U	0.0483	U
Benzo(g,h,i)perylene	100	100	1000	4.170	D	0.206	D	0.188	D	0.0544	U	0.0483	U
Benzo(k)fluoranthene	0.8	3.9	1.7	**6.290**	D	0.239	D	0.288	D	0.0544	U	0.0483	U
Benzoic acid	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Benzyl alcohol	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Benzyl butyl phthalate	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Bis(2-chloroethoxy)methane	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Bis(2-chloroethyl)ether	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0939	JD
Caprolactam	~	~	~	0.0954	U	0.101	U	0.0945	U	0.109	U	0.0963	U
Carbazole	~	~	~	0.998	D	0.0702	JD	0.0877	JD	0.0544	U	0.0483	U
Chrysene	1	3.9	1	**6.830**	D	0.347	D	0.382	D	0.0544	U	0.0483	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	**0.880**	D	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Dibenzofuran	7	59	210	0.413	D	0.0506	U	0.0521	JD	0.0544	U	0.0483	U
Diethyl phthalate	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Dimethyl phthalate	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Di-n-butyl phthalate	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0654	JD
Di-n-octyl phthalate	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Fluoranthene	100	100	1000	16.400	D	0.828	D	0.909	D	0.0544	U	0.0483	U
Fluorene	30	100	386	0.564	D	0.0533	JD	0.0846	JD	0.0544	U	0.0483	U
Hexachlorobenzene	0.33	1.2	3.2	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Hexachlorobutadiene	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Hexachlorocyclopentadiene	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Hexachloroethane	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	**4.480**	D	0.208	D	0.196	D	0.0544	U	0.0483	U
Isophorone	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Naphthalene	12	100	12	0.231	D	0.0509	JD	0.0474	U	0.0544	U	0.0793	JD
Nitrobenzene	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
N-Nitrosodimethylamine	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
N-nitroso-di-n-propylamine	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
N-Nitrosodiphenylamine	~	~	~	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Pentachlorophenol	0.8	6.7	0.8	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Phenanthrene	100	100	1000	10.100	D	0.761	D	0.865	D	0.0544	U	0.0483	U
Phenol	0.33	100	0.33	0.0478	U	0.0506	U	0.0474	U	0.0544	U	0.0483	U
Pyrene	100	100	1000	13.600	D	0.797	D	0.873	D	0.0544	U	0.0483	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)													
1,4-Dioxane	0.1	13	0.1	0.0192	U	0.0194	U	0.0198	U	0.0196	U	0.0190	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 3B - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-35 (7-9ft)		SB-36 (1-3ft)		SB-36 (5-7ft)		SB-37 (1-3ft)	
LAB SAMPLE ID				24H0269-26		24H0372-17		24H0372-18		24H0372-28	
SAMPLING DATE				8/5/2024 3:20:00 PM		8/6/2024 10:20:00 AM		8/6/2024 10:45:00 AM		8/6/2024 2:05:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)											
1,1-Biphenyl	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0959	U	0.0925	U	0.0928	U	0.0942	U
1,2,4-Trichlorobenzene	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0481	U	0.0464	U	0.0465	U	0.0472	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0481	U	0.0464	U	0.0465	U	0.0472	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0959	U	0.0925	U	0.0928	U	0.0942	U
2,4,5-Trichlorophenol	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2,4,6-Trichlorophenol	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2,4-Dichlorophenol	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2,4-Dimethylphenol	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2,4-Dinitrophenol	~	~	~	0.0959	U	0.0925	U	0.0928	U	0.0942	U
2,4-Dinitrotoluene	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2,6-Dinitrotoluene	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2-Chloronaphthalene	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2-Chlorophenol	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2-Methylnaphthalene	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2-Methylphenol	0.33	100	0.33	0.0481	U	0.0464	U	0.0465	U	0.0472	U
2-Nitroaniline	~	~	~	0.0959	U	0.0925	U	0.0928	U	0.0942	U
2-Nitrophenol	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
3- & 4-Methylphenols	0.33	100	0.33	0.0481	U	0.0464	U	0.0465	U	0.0472	U
3,3-Dichlorobenzidine	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
3-Nitroaniline	~	~	~	0.0959	U	0.0925	U	0.0928	U	0.0942	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0959	U	0.0925	U	0.0928	U	0.0942	U
4-Bromophenyl phenyl ether	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
4-Chloro-3-methylphenol	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
4-Chloroaniline	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
4-Chlorophenyl phenyl ether	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
4-Nitroaniline	~	~	~	0.0959	U	0.0925	U	0.0928	U	0.0942	U
4-Nitrophenol	~	~	~	0.0959	U	0.0925	U	0.0928	U	0.0942	U
Acenaphthene	20	100	98	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Acenaphthylene	100	100	107	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Acetophenone	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Aniline	~	~	~	0.192	U	0.185	U	0.186	U	0.189	U
Anthracene	100	100	1000	0.0481	U	0.0464	U	0.0465	U	0.141	D
Atrazine	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Benzaldehyde	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Benzidine	~	~	~	0.192	U	0.185	U	0.186	U	0.189	U
Benzo(a)anthracene	1	1	1	0.0481	U	0.0503	JD	0.0465	U	0.0912	JD
Benzo(a)pyrene	1	1	22	0.0481	U	0.0464	U	0.0465	U	0.0896	JD
Benzo(b)fluoranthene	1	1	1.7	0.0481	U	0.0464	U	0.0465	U	0.0663	JD
Benzo(g,h,i)perylene	100	100	1000	0.0481	U	0.0464	U	0.0465	U	0.0482	JD
Benzo(k)fluoranthene	0.8	3.9	1.7	0.0481	U	0.0464	U	0.0465	U	0.0708	JD
Benzoic acid	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Benzyl alcohol	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Benzyl butyl phthalate	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Bis(2-chloroethoxy)methane	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Bis(2-chloroethyl)ether	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Caprolactam	~	~	~	0.0959	U	0.0925	U	0.0928	U	0.0942	U
Carbazole	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Chrysene	1	3.9	1	0.0481	U	0.0464	U	0.0465	U	0.0904	JD
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Dibenzofuran	7	59	210	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Diethyl phthalate	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Dimethyl phthalate	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Di-n-butyl phthalate	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Di-n-octyl phthalate	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Fluoranthene	100	100	1000	0.0481	U	0.112	D	0.0465	U	0.191	D
Fluorene	30	100	386	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Hexachlorobenzene	0.33	1.2	3.2	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Hexachlorobutadiene	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Hexachlorocyclopentadiene	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Hexachloroethane	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.0481	U	0.0464	U	0.0465	U	0.0520	JD
Isophorone	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Naphthalene	12	100	12	0.0812	JD	0.0464	U	0.0465	U	0.0472	U
Nitrobenzene	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
N-Nitrosodimethylamine	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
N-nitroso-di-n-propylamine	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
N-Nitrosodiphenylamine	~	~	~	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Pentachlorophenol	0.8	6.7	0.8	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Phenanthrene	100	100	1000	0.0481	U	0.104	D	0.0465	U	0.144	D
Phenol	0.33	100	0.33	0.0481	U	0.0464	U	0.0465	U	0.0472	U
Pyrene	100	100	1000	0.0481	U	0.104	D	0.0465	U	0.169	D
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)											
1,4-Dioxane	0.1	13	0.1	0.0196	U	0.0192	U	0.0198	U	0.0190	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 3B - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-37 (5-7ft)		SB-38 (1-3ft)		SB-38 (4-6ft)	
LAB SAMPLE ID				24H0372-29		24H0372-25		24H0372-26	
SAMPLING DATE				8/6/2024 2:15:00 PM		8/6/2024 1:05:00 PM		8/6/2024 1:15:00 PM	
SAMPLE TYPE				Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)									
1,1-Biphenyl	~	~	~	0.0469	U	0.0482	U	0.0472	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0936	U	0.0961	U	0.0942	U
1,2,4-Trichlorobenzene	~	~	~	0.0469	U	0.0482	U	0.0472	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0469	U	0.0482	U	0.0472	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0469	U	0.0482	U	0.0472	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0469	U	0.0482	U	0.0472	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0469	U	0.0482	U	0.0472	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0936	U	0.0961	U	0.0942	U
2,4,5-Trichlorophenol	~	~	~	0.0469	U	0.0482	U	0.0472	U
2,4,6-Trichlorophenol	~	~	~	0.0469	U	0.0482	U	0.0472	U
2,4-Dichlorophenol	~	~	~	0.0469	U	0.0482	U	0.0472	U
2,4-Dimethylphenol	~	~	~	0.0469	U	0.0482	U	0.0472	U
2,4-Dinitrophenol	~	~	~	0.0936	U	0.0961	U	0.0942	U
2,4-Dinitrotoluene	~	~	~	0.0469	U	0.0482	U	0.0472	U
2,6-Dinitrotoluene	~	~	~	0.0469	U	0.0482	U	0.0472	U
2-Chloronaphthalene	~	~	~	0.0469	U	0.0482	U	0.0472	U
2-Chlorophenol	~	~	~	0.0469	U	0.0482	U	0.0472	U
2-Methylnaphthalene	~	~	~	0.0469	U	0.0482	U	0.0472	U
2-Methylphenol	0.33	100	0.33	0.0469	U	0.0482	U	0.0472	U
2-Nitroaniline	~	~	~	0.0936	U	0.0961	U	0.0942	U
2-Nitrophenol	~	~	~	0.0469	U	0.0482	U	0.0472	U
3- & 4-Methylphenols	0.33	100	0.33	0.0469	U	0.0482	U	0.0472	U
3,3-Dichlorobenzidine	~	~	~	0.0469	U	0.0482	U	0.0472	U
3-Nitroaniline	~	~	~	0.0936	U	0.0961	U	0.0942	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0936	U	0.0961	U	0.0942	U
4-Bromophenyl phenyl ether	~	~	~	0.0469	U	0.0482	U	0.0472	U
4-Chloro-3-methylphenol	~	~	~	0.0469	U	0.0482	U	0.0472	U
4-Chloroaniline	~	~	~	0.0469	U	0.0482	U	0.0472	U
4-Chlorophenyl phenyl ether	~	~	~	0.0469	U	0.0482	U	0.0472	U
4-Nitroaniline	~	~	~	0.0936	U	0.0961	U	0.0942	U
4-Nitrophenol	~	~	~	0.0936	U	0.0961	U	0.0942	U
Acenaphthene	20	100	98	0.0469	U	0.0482	U	0.0472	U
Acenaphthylene	100	100	107	0.0469	U	0.0482	U	0.0472	U
Acetophenone	~	~	~	0.0469	U	0.0482	U	0.0472	U
Aniline	~	~	~	0.188	U	0.192	U	0.189	U
Anthracene	100	100	1000	0.0469	U	0.0853	JD	0.0472	U
Atrazine	~	~	~	0.0469	U	0.0482	U	0.0472	U
Benzaldehyde	~	~	~	0.0469	U	0.0482	U	0.0472	U
Benzidine	~	~	~	0.188	U	0.192	U	0.189	U
Benzo(a)anthracene	1	1	1	0.0469	U	0.151	D	0.0472	U
Benzo(a)pyrene	1	1	22	0.0469	U	0.179	D	0.0472	U
Benzo(b)fluoranthene	1	1	1.7	0.0469	U	0.132	D	0.0472	U
Benzo(g,h,i)perylene	100	100	1000	0.0469	U	0.109	D	0.0472	U
Benzo(k)fluoranthene	0.8	3.9	1.7	0.0469	U	0.141	D	0.0472	U
Benzoic acid	~	~	~	0.0469	U	0.0482	U	0.0472	U
Benzyl alcohol	~	~	~	0.0469	U	0.0482	U	0.0472	U
Benzyl butyl phthalate	~	~	~	0.0469	U	0.0482	U	0.0472	U
Bis(2-chloroethoxy)methane	~	~	~	0.0469	U	0.0482	U	0.0472	U
Bis(2-chloroethyl)ether	~	~	~	0.0469	U	0.0482	U	0.0472	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0469	U	0.0482	U	0.0472	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0469	U	0.0482	U	0.0472	U
Caprolactam	~	~	~	0.0936	U	0.0961	U	0.0942	U
Carbazole	~	~	~	0.0469	U	0.0492	JD	0.0472	U
Chrysene	1	3.9	1	0.0469	U	0.155	D	0.0472	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0469	U	0.0482	U	0.0472	U
Dibenzofuran	7	59	210	0.0469	U	0.0482	U	0.0472	U
Diethyl phthalate	~	~	~	0.0469	U	0.0482	U	0.0472	U
Dimethyl phthalate	~	~	~	0.0469	U	0.0482	U	0.0472	U
Di-n-butyl phthalate	~	~	~	0.0469	U	0.0482	U	0.0472	U
Di-n-octyl phthalate	~	~	~	0.0469	U	0.0482	U	0.0472	U
Fluoranthene	100	100	1000	0.0469	U	0.397	D	0.0472	U
Fluorene	30	100	386	0.0469	U	0.0482	U	0.0472	U
Hexachlorobenzene	0.33	1.2	3.2	0.0469	U	0.0482	U	0.0472	U
Hexachlorobutadiene	~	~	~	0.0469	U	0.0482	U	0.0472	U
Hexachlorocyclopentadiene	~	~	~	0.0469	U	0.0482	U	0.0472	U
Hexachloroethane	~	~	~	0.0469	U	0.0482	U	0.0472	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.0469	U	0.113	D	0.0472	U
Isophorone	~	~	~	0.0469	U	0.0482	U	0.0472	U
Naphthalene	12	100	12	0.0469	U	0.0482	U	0.0472	U
Nitrobenzene	~	~	~	0.0469	U	0.0482	U	0.0472	U
N-Nitrosodimethylamine	~	~	~	0.0469	U	0.0482	U	0.0472	U
N-nitroso-di-n-propylamine	~	~	~	0.0469	U	0.0482	U	0.0472	U
N-Nitrosodiphenylamine	~	~	~	0.0469	U	0.0482	U	0.0472	U
Pentachlorophenol	0.8	6.7	0.8	0.0469	U	0.0482	U	0.0472	U
Phenanthrene	100	100	1000	0.0469	U	0.438	D	0.0472	U
Phenol	0.33	100	0.33	0.0469	U	0.0482	U	0.0472	U
Pyrene	100	100	1000	0.0469	U	0.348	D	0.0472	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)									
1,4-Dioxane	0.1	13	0.1	0.0187	U	0.0192	U	0.0194	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 3B - Semivolatile Organic Compounds in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	8.6.2024_Duplicate		8.8.2024-Duplicate		8.15.24- Duplicate	
LAB SAMPLE ID				24H0372-16		24H0613-23		24H1202-08	
SAMPLING DATE				8/6/2024 9:05:00 AM		8/8/2024 3:00:00 PM		8/15/2024 3:00:00 PM	
SAMPLE TYPE				Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q
Semivolatile Organics, 8270 - Comprehensive (mg/kg)				*SB-30 (1-3') Dup		*SB-25 (1-3') Dup		*SB-28 (1-3') Dup	
1,1-Biphenyl	~	~	~	0.0483	U	0.0476	U	0.0482	U
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0964	U	0.0949	U	0.0961	U
1,2,4-Trichlorobenzene	~	~	~	0.0483	U	0.0476	U	0.0482	U
1,2-Dichlorobenzene	1.1	100	1.1	0.0483	U	0.0476	U	0.0482	U
1,2-Diphenylhydrazine (as Azobenzene)	~	~	~	0.0483	U	0.0476	U	0.0482	U
1,3-Dichlorobenzene	2.4	49	2.4	0.0483	U	0.0476	U	0.0482	U
1,4-Dichlorobenzene	1.8	13	1.8	0.0483	U	0.0476	U	0.0482	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0964	U	0.0949	U	0.0961	U
2,4,5-Trichlorophenol	~	~	~	0.0483	U	0.0476	U	0.0482	U
2,4,6-Trichlorophenol	~	~	~	0.0483	U	0.0476	U	0.0482	U
2,4-Dichlorophenol	~	~	~	0.0483	U	0.0476	U	0.0482	U
2,4-Dimethylphenol	~	~	~	0.0483	U	0.0476	U	0.0482	U
2,4-Dinitrophenol	~	~	~	0.0964	U	0.0949	U	0.0961	U
2,4-Dinitrotoluene	~	~	~	0.0483	U	0.0476	U	0.0482	U
2,6-Dinitrotoluene	~	~	~	0.0483	U	0.0476	U	0.0482	U
2-Chloronaphthalene	~	~	~	0.0483	U	0.0476	U	0.0482	U
2-Chlorophenol	~	~	~	0.0483	U	0.0476	U	0.0482	U
2-Methylnaphthalene	~	~	~	0.0483	U	0.0476	U	0.0630	JD
2-Methylphenol	0.33	100	0.33	0.0483	U	0.0476	U	0.0482	U
2-Nitroaniline	~	~	~	0.0964	U	0.0949	U	0.0961	U
2-Nitrophenol	~	~	~	0.0483	U	0.0476	U	0.0482	U
3- & 4-Methylphenols	0.33	100	0.33	0.0483	U	0.0476	U	0.0482	U
3,3-Dichlorobenzidine	~	~	~	0.0483	U	0.0476	U	0.0482	U
3-Nitroaniline	~	~	~	0.0964	U	0.0949	U	0.0961	U
4,6-Dinitro-2-methylphenol	~	~	~	0.0964	U	0.0949	U	0.0961	U
4-Bromophenyl phenyl ether	~	~	~	0.0483	U	0.0476	U	0.0482	U
4-Chloro-3-methylphenol	~	~	~	0.0483	U	0.0476	U	0.0482	U
4-Chloroaniline	~	~	~	0.0483	U	0.0476	U	0.0482	U
4-Chlorophenyl phenyl ether	~	~	~	0.0483	U	0.0476	U	0.0482	U
4-Nitroaniline	~	~	~	0.0964	U	0.0949	U	0.0961	U
4-Nitrophenol	~	~	~	0.0964	U	0.0949	U	0.0961	U
Acenaphthene	20	100	98	0.0483	U	0.0736	JD	0.126	D
Acenaphthylene	100	100	107	0.0483	U	0.0476	U	0.0760	JD
Acetophenone	~	~	~	0.0483	U	0.0476	U	0.0482	U
Aniline	~	~	~	0.193	U	0.190	U	0.192	U
Anthracene	100	100	1000	0.0483	U	0.186	D	0.351	D
Atrazine	~	~	~	0.0483	U	0.0476	U	0.0482	U
Benzaldehyde	~	~	~	0.0483	U	0.0476	U	0.0482	U
Benzidine	~	~	~	0.193	U	0.190	U	0.192	U
Benzo(a)anthracene	1	1	1	0.0483	U	0.394	D	0.886	D
Benzo(a)pyrene	1	1	22	0.0483	U	0.370	D	0.839	D
Benzo(b)fluoranthene	1	1	1.7	0.0483	U	0.452	D	**1.060**	D
Benzo(g,h,i)perylene	100	100	1000	0.0483	U	0.225	D	0.532	D
Benzo(k)fluoranthene	0.8	3.9	1.7	0.0483	U	0.147	D	0.349	D
Benzoic acid	~	~	~	0.0483	U	0.0476	U	0.0482	U
Benzyl alcohol	~	~	~	0.0483	U	0.0476	U	0.0482	U
Benzyl butyl phthalate	~	~	~	0.0483	U	0.0476	U	0.0482	U
Bis(2-chloroethoxy)methane	~	~	~	0.0483	U	0.0476	U	0.0482	U
Bis(2-chloroethyl)ether	~	~	~	0.0483	U	0.0476	U	0.0482	U
Bis(2-chloroisopropyl)ether	~	~	~	0.0483	U	0.0476	U	0.0482	U
Bis(2-ethylhexyl)phthalate	~	~	~	0.0483	U	0.0476	U	0.0482	U
Caprolactam	~	~	~	0.0964	U	0.0949	U	0.0961	U
Carbazole	~	~	~	0.0483	U	0.0774	JD	0.141	D
Chrysene	1	3.9	1	0.0483	U	0.353	D	0.813	D
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.0483	U	0.0569	JD	0.114	D
Dibenzofuran	7	59	210	0.0483	U	0.0653	JD	0.0968	D
Diethyl phthalate	~	~	~	0.0483	U	0.0476	U	0.0482	U
Dimethyl phthalate	~	~	~	0.0483	U	0.0476	U	0.0482	U
Di-n-butyl phthalate	~	~	~	0.0483	U	0.0476	U	0.0482	U
Di-n-octyl phthalate	~	~	~	0.0483	U	0.0476	U	0.0482	U
Fluoranthene	100	100	1000	0.0483	U	0.807	D	1.930	D
Fluorene	30	100	386	0.0483	U	0.0476	U	0.121	D
Hexachlorobenzene	0.33	1.2	3.2	0.0483	U	0.0476	U	0.0482	U
Hexachlorobutadiene	~	~	~	0.0483	U	0.0476	U	0.0482	U
Hexachlorocyclopentadiene	~	~	~	0.0483	U	0.0476	U	0.0482	U
Hexachloroethane	~	~	~	0.0483	U	0.0476	U	0.0482	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.0483	U	0.241	D	**0.588**	D
Isophorone	~	~	~	0.0483	U	0.0476	U	0.0482	U
Naphthalene	12	100	12	0.0483	U	0.0933	JD	0.0653	JD
Nitrobenzene	~	~	~	0.0483	U	0.0476	U	0.0482	U
N-Nitrosodimethylamine	~	~	~	0.0483	U	0.0476	U	0.0482	U
N-nitroso-di-n-propylamine	~	~	~	0.0483	U	0.0476	U	0.0482	U
N-Nitrosodiphenylamine	~	~	~	0.0483	U	0.0476	U	0.0482	U
Pentachlorophenol	0.8	6.7	0.8	0.0483	U	0.0476	U	0.0482	U
Phenanthrene	100	100	1000	0.0483	U	0.885	D	1.560	D
Phenol	0.33	100	0.33	0.0483	U	0.0476	U	0.0482	U
Pyrene	100	100	1000	0.0483	U	0.747	D	1.470	D
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil (mg/kg)									
1,4-Dioxane	0.1	13	0.1	0.0198	U	0.0196	U	0.0198	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 4A - Total Metals in Soil
Remedial Investigation Report - NYCOER 2023 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-1 (0-2)		SB-1 (4-6)		SB-2 (0-2)		SB-2 (4-6)		SB-3 (0-2)		SB-3 (4-6)		SB-4 (0-2)		SB-4 (4-6)		SB-5 (0-2)	
LAB SAMPLE ID				23B0662-01		23B0662-02		23B0662-03		23B0662-04		23B0662-13		23B0662-14		23B0662-11		23B0662-12		23B0662-09	
SAMPLING DATE																					
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)																					
Aluminum	~	~	~	6,090		9,460		7,200		13,300		7,990		8,600		13100		6,220		4,270	
Antimony	~	~	~	4.470		2.390	U	2.570	U	2.420	U	2.290	U	2.310	U	13.40		2.360	U	7.930	
Arsenic	13	16	16	7.060		4.270		7.500		3.460		8.050		3.970		**15.30**		3.980		**15.1**	
Barium	350	400	820	70.800		47.600		72.400		85.100		25.900		64.800		325		25.300		271	
Beryllium	7.2	72	47	0.790		0.919		0.896		1.640		0.719		1.110		3.380		0.635		0.614	
Cadmium	2.5	4.3	7.5	0.306		0.308		0.596		0.291	U	0.275	U	0.423		0.797		0.283	U	1.100	
Calcium	~	~	~	1,440	B	1,100	B	3,450	B	2,000	B	1,270	B	1,800	B	32,600	B	1,590	B	11,500	B
Chromium	~	~	~	12.500		23.600		18.700		33.900		12.600		25.500		12		14.200		18.500	
Cobalt	~	~	~	18.600		11.100		9.600		16.300		7.740		13.200		19.600		4.950		8.190	
Copper	50	270	1720	**62**		21.300		**115**		27.500		13.400		19.800		**128**		17.100		**311**	
Iron	~	~	~	33,300		25,100		21,200		30,000		19,400		29,200		45,100		17,800		35,700	
Lead	63	400	450	**359**		15.900		**327**		17.800		26.900		16.100		**1,720**		18.200		**1,980**	
Magnesium	~	~	~	2,030		3,270		2,640		5,510		2,210		3,870		1,160		2,180		1,940	
Manganese	1600	2000	2000	552		692		402		377		136		363		418		137		309	
Nickel	30	310	130	**36.8**		25.100		16		27		10.800		19.700		29.200		10.400		20.100	
Potassium	~	~	~	1,050		1,310		1,480		3,150		990	B	2,190	B	1,440	B	984	B	780	B
Selenium	3.9	180	4	2.350	U	2.390	U	2.570	U	2.420	U	2.290	U	2.310	U	2.500	U	2.360	U	2.430	U
Silver	2	180	8.3	0.473	U	0.481	U	0.518	U	0.489	U	0.462	U	0.465	U	0.505	U	0.476	U	0.490	U
Sodium	~	~	~	165		108		376		294		111		96		595		85.200		205	
Thallium	~	~	~	2.350	U	2.390	U	2.570	U	2.420	U	2.290	U	2.310	U	2.500	U	2.360	U	2.430	U
Vanadium	~	~	~	22.400		32.100		33.300		45.100		19.900		38.800		22.700		20.200		16	
Zinc	109	10,000	2,480	81.500		39.500		**497**		85.200		39		68.300		67.900		36.400		**404**	
Mercury by 7473 (mg/kg)																					
Mercury	0.18	0.81	0.73	0.0372	U	0.0378	U	0.0407	U	0.0384	U	0.0363	U	0.0365	U	0.0960		0.0374	U	**0.193**	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 4A - Total Metals in Soil
Remedial Investigation Report - NYCOER 2023 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION LAB SAMPLE ID SAMPLING DATE SAMPLE TYPE	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-5 (4-6) 23B0662-10 Soil		SB-6 (0-2) 23B0662-05 Soil		SB-6 (4-6) 23B0662-06 Soil		SB-7 (0-2) 23B0662-07 Soil		SB-7 (4-6) 23B0662-08 Soil		SB-8 (0-2') 23B0727-05 2/13/2023 10:10:00 AM Soil		SB-8 (4-6') 23B0727-06 2/13/2023 10:38:00 AM Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)																	
Aluminum	~	~	~	16,800		6,020		8,160		9,670		6,240		2,620		788	
Antimony	~	~	~	2.460	U	2.370	U	2.470	U	2.650		3.310		8.800		2.690	
Arsenic	13	16	16	3.660		4.680		5.880		11.500		1.540	U	7.160		3.280	
Barium	350	400	820	125		22.200		137		**513**		41.200		136		29.600	
Beryllium	7.2	72	47	1.810		0.543		0.583		1.160		1.300		0.304		0.0900	
Cadmium	2.5	4.3	7.5	0.519		0.285	U	0.297	U	**6.14**		0.497		2.070		0.301	U
Calcium	~	~	~	3,480	B	1,940	B	822	B	16,700	B	717	B	4,630	B	172	B
Chromium	~	~	~	35		10.700		27.4		39		47.400		33.200		1.670	
Cobalt	~	~	~	19.800		4.050		5.320		12.300		11.300		4.540		0.568	
Copper	50	270	1720	36.700		15.700		**50.3**		**303**		39.300		**365**		2.010	U
Iron	~	~	~	32,400		12,700		18,300		28,000		44,800		30,400		25,500	
Lead	63	400	450	22.700		**125**		**392**		**6,870**		27.800		**1,180**		28.100	
Magnesium	~	~	~	7,160		2,170		2,750		3,100		1,720		1,200		168	
Manganese	1600	2000	2000	824		68.600		109		**3,260**		446		243		8.670	
Nickel	30	310	130	**32**		9.960		13.700		**30.7**		24.800		**74.700**		2.440	
Potassium	~	~	~	3,830	B	1,370		1,020	B	2,110	B	1,160	B	871		1,670	
Selenium	3.9	180	4	2.460	U	2.370	U	2.470	U	2.600	U	2.560	U	3.200	U	2.510	U
Silver	2	180	8.3	0.495	U	0.478	U	0.499	U	0.525	U	0.516	U	0.646	U	0.506	U
Sodium	~	~	~	173		160		101		557		68.300		82.800		1,710	
Thallium	~	~	~	2.460	U	2.370	U	2.470	U	2.600	U	2.560	U	3.200	U	2.510	U
Vanadium	~	~	~	51.600		15.600		23.800		38.400		79.900		41.100		5.340	
Zinc	109	10,000	2,480	**117**		47.500		87.900		**1,400**		**125**		**476**		5.730	
Mercury by 7473 (mg/kg)																	
Mercury	0.18	0.81	0.73	0.0389	U	0.0376	U	0.0392	U	0.0412	U	0.0406	U	**1.060**		0.0362	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 4A - Total Metals in Soil
Remedial Investigation Report - NYCOER 2023 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION LAB SAMPLE ID SAMPLING DATE SAMPLE TYPE	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-9 (0-2') 23B0727-01 2/13/2023 9:05:00 AM Soil		SB-9 (4-6') 23B0727-02 2/13/2023 9:15:00 AM Soil		SB-10 (0-2') 23B0727-03 2/13/2023 9:35:00 AM Soil		SB-10 (4-6') 23B0727-04 2/13/2023 9:40:00 AM Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)											
Aluminum	~	~	~	1,290		8,330		478		610	
Antimony	~	~	~	4.900		2.440	U	4.300		4.230	
Arsenic	13	16	16	**23.200**		5.240		3.460		3.840	
Barium	350	400	820	59.900		44.200		147		42.300	
Beryllium	7.2	72	47	0.191		0.466		0.0940		0.114	
Cadmium	2.5	4.3	7.5	0.299		0.293	U	0.410		0.317	U
Calcium	~	~	~	830	B	536	B	544	B	420	B
Chromium	~	~	~	6.580		14.500		1.370		2.350	
Cobalt	~	~	~	4.760		6.250		0.810		0.804	
Copper	50	270	1720	46.500		35.200		18.100		3.330	
Iron	~	~	~	42,000		18,900		30,300		36,100	
Lead	63	400	450	**982**		13.200		**436**		22.400	
Magnesium	~	~	~	378		2,420		103		119	
Manganese	1600	2000	2000	56.500		247		20.800		6	
Nickel	30	310	130	9.560		15.400		5.510		1.900	
Potassium	~	~	~	1,260		1,340		1,100		2,030	
Selenium	3.9	180	4	2.410	U	2.440	U	2.470	U	2.640	U
Silver	2	180	8.3	0.486	U	0.492	U	0.498	U	0.533	U
Sodium	~	~	~	657		51.200		1,940		3,120	
Thallium	~	~	~	2.410	U	2.440	U	2.470	U	2.640	U
Vanadium	~	~	~	12.100		21.700		2.110		2.400	
Zinc	109	10,000	2,480	**289**		**300**		67.600		5.080	
Mercury by 7473 (mg/kg)											
Mercury	0.18	0.81	0.73	**0.847**		0.0352	U	**4.280**		0.0381	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 4B - Total Metals in Soil
Remedial Investigation Report - NYSDEC 2024 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-15 (1-3ft)		SB-15 (5-7ft)		SB-16 (1-3ft)		SB-16 (5-7ft)		SB-17 (1-3ft)	
LAB SAMPLE ID				24H0613-13		24H0613-14		24H0613-17		24H0613-18		24H0642-13	
SAMPLING DATE				8/8/2024 8:05:00 AM		8/8/2024 8:25:00 AM		8/8/2024 9:25:00 AM		8/8/2024 9:40:00 AM		8/9/2024 9:30:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)													
Aluminum	~	~	~	9,130		8,170		12,300		11,700		6,640	
Antimony	~	~	~	2.230	U	2.250	U	2.40	U	2.440	U	2.370	U
Arsenic	13	16	16	8.690		**27.9**		8.070		9.670		**18**	
Barium	350	400	820	82.90		64.7		81.20		30.800		69.70	
Beryllium	7.2	72	47	0.608		0.270		0.345		0.536		0.246	
Cadmium	2.5	4.3	7.5	0.268	U	0.503		0.690		0.292	U	0.474	
Calcium	~	~	~	2,340		7,750		29,000		2,320		3,310	
Chromium	~	~	~	7.140		27.1		47.10		38.700		12.80	
Cobalt	~	~	~	8.980		12.2		6.500		9.630		12.90	
Copper	50	270	1720	32.3		49		**296**		37.500		**103**	
Iron	~	~	~	47,700		50,200		42,800		25,400		33,700	
Lead	63	400	450	**185**		**908**		**2,630**		40.500		**451**	
Magnesium	~	~	~	1,130		3,390		8,010		3,560		1,560	
Manganese	1600	2000	2000	296		579		586		248		263	
Nickel	30	310	130	7.740		26.3		11.300		12.600		16.20	
Potassium	~	~	~	3,760		2,850		2,400		2,240		1,270	
Selenium	3.9	180	4	2.230	U	2.250	U	2.40	U	2.440	U	3.110	
Silver	2	180	8.3	0.450	U	0.453	U	0.483	U	0.491	U	0.477	U
Sodium	~	~	~	197		327		1,220		266		161	
Thallium	~	~	~	2.230	U	2.250	U	2.40	U	2.440	U	2.370	U
Vanadium	~	~	~	11.40		24.9		25.30		32		20.60	
Zinc	109	10,000	2480	**113**		**162**		**802**		**286**		**123**	
Mercury by 7473 (mg/kg)													
Mercury	0.18	0.81	0.73	0.0369		0.0512		0.150		**0.326**		**0.672**	

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 4B - Total Metals in Soil
Remedial Investigation Report - NYSDEC 2024 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-17 (5-7ft)		SB-18 (1-3ft)		SB-18 (5-7ft)		SB-19 (1-3 ft)		SB-19 (4-6 ft)	
LAB SAMPLE ID				24H0642-14		24H0965-01		24H0965-02		24H1202-01		24H1202-02	
SAMPLING DATE				8/9/2024 9:45:00 AM		8/14/2024 12:30:00 PM		8/14/2024 12:40:00 PM		8/15/2024 8:45:00 AM		8/15/2024 8:55:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)													
Aluminum	~	~	~	12,700		9,470		10,200		4,410		1,330	
Antimony	~	~	~	2.40	U	2.480	U	2.310	U	2.990		2.530	U
Arsenic	13	16	16	2.40		8.810		4.930		**19.4**		3.550	
Barium	350	400	820	109		28.90		27.10		**497**		37.50	
Beryllium	7.2	72	47	0.260		0.457	B	0.387	B	0.215	B	0.0610	B
Cadmium	2.5	4.3	7.5	0.288	U	0.298	U	0.277	U	**5.310**		0.304	U
Calcium	~	~	~	1,380		927		835		3,710		359	
Chromium	~	~	~	30.90		17.50		15.80		172		2.790	
Cobalt	~	~	~	8.840		8.680		5.510		16.30		0.404	U
Copper	50	270	1720	25.60		18.400		9.660		**2,620**		3.170	
Iron	~	~	~	29,200		27,200		15,000		55,800		43,500	
Lead	63	400	450	13.50		12.200		5.970		**1,420**		10.80	
Magnesium	~	~	~	5,580		2,880		2,550		1,280		149	
Manganese	1600	2000	2000	195		168		116		400		4.720	
Nickel	30	310	130	18.30		12.500		11.30		**443**		1.010	U
Potassium	~	~	~	4,300		1,120	B	1,670	B	959		2,140	
Selenium	3.9	180	4	2.400	U	2.480	U	2.310	U	2.450	U	2.530	U
Silver	2	180	8.3	0.485	U	0.501	U	0.465	U	0.841		0.510	U
Sodium	~	~	~	83.90		80.50		47.30		932		1,560	
Thallium	~	~	~	2.400	U	2.480	U	2.310	U	2.450	U	2.530	U
Vanadium	~	~	~	33.70		23.40		23.90		73.5		2.310	
Zinc	109	10,000	2480	87.60		40.80		71.60		**1,060**		2.950	
Mercury by 7473 (mg/kg)													
Mercury	0.18	0.81	0.73	0.0346	U	**2.850**		0.0332	U	**2.840**		0.0364	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 4B - Total Metals in Soil
Remedial Investigation Report - NYSDEC 2024 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-20 (1-3ft)		SB-20 (5-7ft)		SB-24 (1-3ft)		SB-24 (5-7ft)		SB-25 (1-3ft)		SB-25 (6-8ft)	
LAB SAMPLE ID				24H0613-29		24H0613-30		24H0613-26		24H0613-27		24H0613-20		24H0613-21	
SAMPLING DATE				8/8/2024 2:00:00 PM		8/8/2024 2:05:00 PM		8/8/2024 1:10:00 PM		8/8/2024 1:20:00 PM		8/8/2024 10:45:00 AM		8/8/2024 10:55:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)															
Aluminum	~	~	~	11,500		15,400		8,130		9,830		3,510		10,900	
Antimony	~	~	~	2.440	U	2.380	U	2.370	U	2.160	U	2.430	U	2.330	U
Arsenic	13	16	16	5.530		2.90		12.80		3.840		**15.4**		5.830	
Barium	350	400	820	41.10		105		35.20		60.30		109		31.20	
Beryllium	7.2	72	47	0.322		0.761		0.445		0.424		0.146		0.373	
Cadmium	2.5	4.3	7.5	0.293	U	0.437		0.284	U	0.259	U	0.768		0.280	U
Calcium	~	~	~	1,650		1,380		1,080		1,410		3,000		1,510	
Chromium	~	~	~	15.60		32.90		14.20		18.40		168		19.30	
Cobalt	~	~	~	5.540		17.10		13.40		11.30		29.60		5.970	
Copper	50	270	1720	**128**		31		39.80		18.60		**326**		14.10	
Iron	~	~	~	20,500		32,300		35,800		21,200		92,200		15,700	
Lead	63	400	450	**354**		14.60		**247**		9.580		**2,820**		14.70	
Magnesium	~	~	~	3,440		6,050		1,890		3,320		873		2,780	
Manganese	1600	2000	2000	127		923		170		632		333		111	
Nickel	30	310	130	18.10		26.50		13.80		17		**35.30**		11	
Potassium	~	~	~	1,520		3,870		1,940		2,240		848		2,440	
Selenium	3.9	180	4	2.440	U	2.380	U	2.370	U	2.160	U	2.430	U	2.330	U
Silver	2	180	8.3	0.492	U	0.479	U	0.478	U	0.436	U	0.490	U	0.470	U
Sodium	~	~	~	486		47.50	U	165		97.10		293		165	
Thallium	~	~	~	2.440	U	2.380	U	2.370	U	2.160	U	2.430	U	2.330	U
Vanadium	~	~	~	18.800		45.30		28.60		24.30		15.90		27.70	
Zinc	109	10,000	2480	**170**		**178**		43.10		**114**		**314**		39.20	
Mercury by 7473 (mg/kg)															
Mercury	0.18	0.81	0.73	0.126		0.0342	U	0.0455		0.0311	U	**1.60**		0.0335	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 4B - Total Metals in Soil
Remedial Investigation Report - NYSDEC 2024 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-26 (1-3ft)		SB-26 (5-7ft)		SB-27 (1-3ft)		SB-27 (6-8ft)		SB-28 (1-3 ft)		SB-28 (4-6 ft)	
LAB SAMPLE ID				24H0642-16		24H0642-19		24H0642-11		24H0642-12		24H1202-05		24H1202-06	
SAMPLING DATE				8/9/2024 10:25:00 AM		8/9/2024 10:40:00 AM		8/9/2024 8:55:00 AM		8/9/2024 9:15:00 AM		8/15/2024 12:20:00 PM		8/15/2024 12:50:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)															
Aluminum	~	~	~	9,830		11,500		5,580		6,560		7,820		5,660	
Antimony	~	~	~	2.290	U	2.390	U	2.360	U	2.310	U	2.550	U	2.390	U
Arsenic	13	16	16	11.10		3.690		7.640		5.600		10.20		4.710	
Barium	350	400	820	37.10		73		21.20		38.80		83.70		26.80	
Beryllium	7.2	72	47	0.311		0.441		0.151		0.0650		0.296	B	0.229	B
Cadmium	2.5	4.3	7.5	0.275	U	0.287		0.283	U	0.277	U	**4.340**		0.286	U
Calcium	~	~	~	9,260		1,120		255		1,230		1,810		741	
Chromium	~	~	~	26.30		33.90		12.40		18		27.80		13.50	
Cobalt	~	~	~	7.260		12.60		3.30		5.020		8.070		3.160	
Copper	50	270	1720	24.60		24.40		18.40		14.70		**442**		15.90	
Iron	~	~	~	24,900		22,800		18,500		22,900		37,700		17,000	
Lead	63	400	450	**103**		13.90		**67.900**		7.910		**647**		15.80	
Magnesium	~	~	~	2,570		4,380		1,500		2,100		2,370		1,730	
Manganese	1600	2000	2000	359		579		62.10		107		244		53.50	
Nickel	30	310	130	11.20		19.80		7.940		11.50		**62.50**		8.360	
Potassium	~	~	~	1,540		3,180		1,540		1,380		1,310		1,640	
Selenium	3.9	180	4	2.290	U	2.390	U	2.360	U	2.310	U	2.550	U	2.390	U
Silver	2	180	8.3	0.461	U	0.483	U	0.475	U	0.465	U	0.515	U	0.481	U
Sodium	~	~	~	93.10		74.10		293		308		170		188	
Thallium	~	~	~	2.290	U	2.390	U	2.360	U	2.310	U	2.550	U	2.390	U
Vanadium	~	~	~	26		32.10		24.90		28.50		20.40		20.40	
Zinc	109	10,000	2480	**136**		**131**		58.40		48.30		**219**		35.30	
Mercury by 7473 (mg/kg)															
Mercury	0.18	0.81	0.73	0.176		**0.233**		**2.730**		0.0753		**1.420**		0.0344	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 4B - Total Metals in Soil
Remedial Investigation Report - NYSDEC 2024 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-29 (1-3ft)		SB-29 (5-7ft)		SB-30 (1-3ft)		SB-30 (4-6ft)		SB-31 (1-3ft)		SB-31 (4-6ft)	
LAB SAMPLE ID				24H0269-12		24H0269-22		24H0372-13		24H0372-14		24H0372-21		24H0372-22	
SAMPLING DATE				8/5/2024 10:20:00 AM		8/5/2024 2:15:00 PM		8/6/2024 8:10:00 AM		8/6/2024 8:20:00 AM		8/6/2024 12:00:00 PM		8/6/2024 12:10:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)															
Aluminum	~	~	~	7,550		11,000		5,190		13,200		6,150		9,560	
Antimony	~	~	~	2.290	U	2.230	U	2.360	U	2.350	U	2.430	U	2.350	U
Arsenic	13	16	16	5.290		1.340	U	8.430		3.330		**43.6**		6.740	
Barium	350	400	820	40.50		91.50		79.10		90.600		162		41.40	
Beryllium	7.2	72	47	0.192		0.429		0.284		0.714		0.243		0.377	
Cadmium	2.5	4.3	7.5	0.275	U	0.268	U	0.284	U	0.282	U	0.291	U	0.283	U
Calcium	~	~	~	2,280		1,060		484		1,280		5,530		2,090	
Chromium	~	~	~	14.80		23.10		12.90		33.100		15		14.20	
Cobalt	~	~	~	7.580		13.70		5.250		13.800		9.680		7.070	
Copper	50	270	1720	36.80		29		**63.1**		36.600		**126**		13.20	
Iron	~	~	~	21,800		23,000		19,900		29,100		48,000		14,900.00	
Lead	63	400	450	**208**		6.880		**228**		9.270		**452**		12.50	
Magnesium	~	~	~	2,660		5,070		1,440		4,840		875		2,830	
Manganese	1600	2000	2000	398		746		102		354		125		185	
Nickel	30	310	130	18.60		23.60		12.80		23.300		20.90		12.30	
Potassium	~	~	~	1,120	B	3,480	B	1,090		3,330		860		1,520	
Selenium	3.9	180	4	2.290	U	2.230	U	2.360	U	2.350	U	2.430	U	2.350	U
Silver	2	180	8.3	0.462	U	0.450	U	0.477	U	0.473	U	0.515		0.475	U
Sodium	~	~	~	97.30		130		249		242		1,040		138	
Thallium	~	~	~	2.290	U	2.230	U	2.360	U	2.350	U	2.430	U	2.350	U
Vanadium	~	~	~	20.60		34.10		15.80		41.700		20.90		21.10	
Zinc	109	10,000	2480	54.80		74.50		51.50		109		**328**		43.10	
Mercury by 7473 (mg/kg)															
Mercury	0.18	0.81	0.73	**0.227**		0.0322	U	**0.334**		0.0339		**2.380**		0.0339	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 4B - Total Metals in Soil
Remedial Investigation Report - NYSDEC 2024 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-32 (1-3ft)		SB-32 (5-7ft)		SB-33 (1-3ft)		SB-33 (5-7ft)		SB-34 (1-3ft)		SB-34 (5-7ft)	
LAB SAMPLE ID				24H0499-03		24H0499-04		24H0269-09		24H0269-20		24H0269-15		24H0269-17	
SAMPLING DATE				8/7/2024 7:55:00 AM		8/7/2024 7:55:00 AM		8/5/2024 9:10:00 AM		8/5/2024 1:50:00 PM		8/5/2024 1:10:00 PM		8/5/2024 1:20:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)															
Aluminum	~	~	~	8,930		8,440		7,340		16,400		4,270		14,800	
Antimony	~	~	~	2.410	U	2.380	U	2.450	U	2.530	U	2.370	U	2.760	U
Arsenic	13	16	16	6.590		2.230		**18**		3.64		3.430		2.55	
Barium	350	400	820	**1,010**		42.80		173		122.00		68.90		228.00	
Beryllium	7.2	72	47	0.414		0.580		0.401		0.63		0.104		0.56	
Cadmium	2.5	4.3	7.5	0.289	U	0.285	U	0.558		0.30	U	0.284	U	0.33	U
Calcium	~	~	~	7,990		1,060		1,110		4260.00		2,090		5580.00	
Chromium	~	~	~	19.60		26.20		16.20		61.70		9.280		35.60	
Cobalt	~	~	~	7.380		10.30		13.500		20.40		9.670		19.40	
Copper	50	270	1720	41		18.30		**122**		37.40		**59.7**		32.30	
Iron	~	~	~	17,200		19,500		27,400		37700.00		12,000		33100.00	
Lead	63	400	450	**3,560**		7.430		**813**		30.60		**262**		**102.00**	
Magnesium	~	~	~	2,310		2,770		1,300		7120.00		1,050		7960.00	
Manganese	1600	2000	2000	378		215		287		1110.00		174		1450.00	
Nickel	30	310	130	15.10		16.60		17		**39.50**		22		**31.40**	
Potassium	~	~	~	1,780		1,820		940	B	5040	B	815	B	7150.00	B
Selenium	3.9	180	4	2.410	U	2.380	U	**4.41**		2.53	U	2.370	U	2.76	U
Silver	2	180	8.3	0.485	U	0.479	U	0.499		0.51	U	0.478	U	0.56	U
Sodium	~	~	~	1,210		47.50	U	167		252.00		141		282.00	
Thallium	~	~	~	2.410	U	2.380	U	2.450	U	2.53	U	2.370	U	2.76	U
Vanadium	~	~	~	27.30		35.30		26.80		54.60		16.10		47.30	
Zinc	109	10,000	2480	**350**		50.80		**181**		107		51.50		**116.00**	
Mercury by 7473 (mg/kg)															
Mercury	0.18	0.81	0.73	**0.465**		0.0788		**1.560**		0.0824		**0.181**		0.0397	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 4B - Total Metals in Soil
Remedial Investigation Report - NYSDEC 2024 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION / LAB SAMPLE ID / SAMPLING DATE / SAMPLE TYPE	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-35 (1-3ft) 24H0269-24 8/5/2024 3:05:00 PM Soil		SB-35 (7-9ft) 24H0269-26 8/5/2024 3:20:00 PM Soil		SB-36 (1-3ft) 24H0372-17 8/6/2024 10:20:00 AM Soil		SB-36 (5-7ft) 24H0372-18 8/6/2024 10:45:00 AM Soil		SB-37 (1-3ft) 24H0372-28 8/6/2024 2:05:00 PM Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)													
Aluminum	~	~	~	11,700		15,300		5,720		10,200		8,290	
Antimony	~	~	~	2.410	U	2.430	U	2.330	U	2.340	U	2.380	U
Arsenic	13	16	16	5.720		2.160		4.450		1.810		5.660	
Barium	350	400	820	60.30		109		34.90		51.500		45.60	
Beryllium	7.2	72	47	0.396		0.689		0.252		0.337		0.390	
Cadmium	2.5	4.3	7.5	0.290	U	0.291	U	0.280	U	0.281	U	0.285	U
Calcium	~	~	~	3,010		1,500		5,490		1,290		2,540	
Chromium	~	~	~	22.20		35.20		11.30		28		14.60	
Cobalt	~	~	~	10.40		16		5.550		7.370		4.980	
Copper	50	270	1720	26.80		32.30		20.80		20		11.50	
Iron	~	~	~	21,000		30,900		9,470		19,600		12,800	
Lead	63	400	450	30.50		10.100		56.90		5.760		23.10	
Magnesium	~	~	~	3,810		5,920		1,700		3,550		2,260	
Manganese	1600	2000	2000	220		480		106		209		98.20	
Nickel	30	310	130	26.20		29.70		8.110		16.700		10.60	
Potassium	~	~	~	1,900	B	3,790	B	1,200		2,430		1,680	
Selenium	3.9	180	4	2.410	U	2.430	U	2.330	U	2.340	U	2.380	U
Silver	2	180	8.3	0.487	U	0.489	U	0.471	U	0.472	U	0.479	U
Sodium	~	~	~	124		235		245		46.800	U	165	
Thallium	~	~	~	2.410	U	2.430	U	2.330	U	2.340	U	2.380	U
Vanadium	~	~	~	28.80		45.30		15.30		40		22.70	
Zinc	109	10,000	2480	63.50		**114**		68.70		52.700		55.90	
Mercury by 7473 (mg/kg)													
Mercury	0.18	0.81	0.73	**0.340**		0.0349	U	0.138		0.0337	U	0.0500	

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 4B - Total Metals in Soil
Remedial Investigation Report - NYSDEC 2024 Results

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-37 (5-7ft)		SB-38 (1-3ft)		SB-38 (4-6ft)		8.6.2024_Duplicate		8.8.2024-Duplicate		8.15.24- Duplicate	
LAB SAMPLE ID				24H0372-29		24H0372-25		24H0372-26		24H0372-16		24H0613-23		24H1202-08	
SAMPLING DATE				8/6/2024 2:15:00 PM		8/6/2024 1:05:00 PM		8/6/2024 1:15:00 PM		8/6/2024 9:05:00 AM		8/8/2024 3:00:00 PM		8/15/2024 3:00:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals (mg/kg)										*SB-30 (1-3') Dup		*SB-25 (1-3') Dup		*SB-28 (1-3') Dup	
Aluminum	~	~	~	9,090		8,680		12,600		6,040		9,130		8,520	
Antimony	~	~	~	2.390	U	2.420	U	2.420	U	2.450	U	2.380	U	2.420	U
Arsenic	13	16	16	7.210		6.340		2.650		6.290		8.400		7.180	
Barium	350	400	820	42.50		43.20		59.60		35.40		50.60		108	
Beryllium	7.2	72	47	0.477		0.367		0.485		0.196		0.257		0.184	B
Cadmium	2.5	4.3	7.5	0.286	U	0.290	U	0.291	U	0.295	U	0.333		0.792	
Calcium	~	~	~	1,520		1,070		1,170		373		1,100		59,000	
Chromium	~	~	~	25.90		14.20		52		14		124		27.30	
Cobalt	~	~	~	8.990		5.90		12.20		3.490		9.010		12.20	
Copper	50	270	1720	21.60		13.80		33.30		20.60		**107**		**238**	
Iron	~	~	~	23,700.00		13,200		34,800		15,800		29,500		20,800	
Lead	63	400	450	7.760		16.30		8.240		**77.90**		**823**		**221**	
Magnesium	~	~	~	2,900		2,350		3,920		1,560		2,780		35,500	
Manganese	1600	2000	2000	225		116		243		69.200		239		1,220	
Nickel	30	310	130	16.90		12.30		21.50		11.5		16.8		29.5	
Potassium	~	~	~	1,770		1,690		3,730		1,640		1,410		1,190	
Selenium	3.9	180	4	2.390	U	2.420	U	2.420	U	2.450	U	2.380	U	2.420	U
Silver	2	180	8.3	0.481	U	0.487	U	0.489	U	0.495	U	0.480	U	0.487	U
Sodium	~	~	~	60.70		171		48.50	U	359		266		210	
Thallium	~	~	~	2.390	U	2.420	U	2.420	U	2.450	U	2.380	U	2.420	U
Vanadium	~	~	~	43.10		22.70		84.70		19.100		20.600		26.900	
Zinc	109	10,000	2480	49.50		46.20		91.10		44.500		89.700		**187**	
Mercury by 7473 (mg/kg)															
Mercury	0.18	0.81	0.73	0.0344	U	0.0730		0.0349	U	**0.495**		**4.960**		**1.940**	

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Residential-Restricted Use SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential-Restricted Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 5A - Pesticides and Polychlorinated Biphenyls in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-1 (0-2)		SB-1 (4-6)		SB-2 (0-2)		SB-2 (4-6)		SB-3 (0-2)	
LAB SAMPLE ID				23B0662-01		23B0662-02		23B0662-03		23B0662-04		23B0662-13	
SAMPLING DATE													
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)													
4,4'-DDD	0.0033	13	14	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
4,4'-DDE	0.0033	8.9	17	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
4,4'-DDT	0.0033	7.9	136	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Aldrin	0.005	0.097	0.19	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
alpha-BHC	0.02	0.48	0.02	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
alpha-Chlordane	0.094	4.2	2.9	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
beta-BHC	0.036	0.36	0.09	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Chlordane, total	~	~	~	0.0368	U	0.0374	U	0.0403	U	0.0380	U	0.0359	U
delta-BHC	0.04	100	0.25	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Dieldrin	0.005	0.2	0.1	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Endosulfan I	2.4	24	102	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Endosulfan II	2.4	24	102	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Endosulfan sulfate	2.4	24	1000	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Endrin	0.014	11	0.06	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Endrin aldehyde	~	~	~	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Endrin ketone	~	~	~	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
gamma-Chlordane	~	~	~	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Heptachlor	0.042	2.1	0.38	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Heptachlor epoxide	~	~	~	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Methoxychlor	~	~	~	0.00184	U	0.00187	U	0.00202	U	0.00190	U	0.00180	U
Toxaphene	~	~	~	0.184	U	0.187	U	0.202	U	0.190	U	0.180	U
Polychlorinated Biphenyls (PCB) (mg/kg)													
Aroclor 1016	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U
Aroclor 1221	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U
Aroclor 1232	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U
Aroclor 1242	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U
Aroclor 1248	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U
Aroclor 1254	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U
Aroclor 1260	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U
Aroclor 1262	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U
Aroclor 1268	~	~	~	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U
Total PCBs	0.1	1	3.2	0.0186	U	0.0189	U	0.0204	U	0.0192	U	0.0181	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

NT: Not a target for this sample

~ : No Standards or Guidance Value.

Table 5A - Pesticides and Polychlorinated Biphenyls in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-3 (4-6)		SB-4 (0-2)		SB-4 (4-6)		SB-5 (0-2)		SB-5 (4-6)		SB-6 (0-2)	
LAB SAMPLE ID				23B0662-14		23B0662-11		23B0662-12		23B0662-09		23B0662-10		23B0662-05	
SAMPLING DATE															
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)															
4,4'-DDD	0.0033	13	14	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
4,4'-DDE	0.0033	8.9	17	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
4,4'-DDT	0.0033	7.9	136	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	NT	
Aldrin	0.005	0.097	0.19	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
alpha-BHC	0.02	0.48	0.02	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
alpha-Chlordane	0.094	4.2	2.9	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	NT	
beta-BHC	0.036	0.36	0.09	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
Chlordane, total	~	~	~	0.0362	U	0.0393	U	0.0370	U	0.0381	U	0.0385	U	NT	
delta-BHC	0.04	100	0.25	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00263	D
Dieldrin	0.005	0.2	0.1	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
Endosulfan I	2.4	24	102	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
Endosulfan II	2.4	24	102	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
Endosulfan sulfate	2.4	24	1000	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
Endrin	0.014	11	0.06	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
Endrin aldehyde	~	~	~	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
Endrin ketone	~	~	~	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
gamma-Chlordane	~	~	~	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	NT	
Heptachlor	0.042	2.1	0.38	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
Heptachlor epoxide	~	~	~	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
Methoxychlor	~	~	~	0.00181	U	0.00196	U	0.00185	U	0.00191	U	0.00193	U	0.00186	U
Toxaphene	~	~	~	0.181	U	0.196	U	0.185	U	0.191	U	0.193	U	0.186	U
Polychlorinated Biphenyls (PCB) (mg/kg)															
Aroclor 1016	~	~	~	0.0183	U	0.0198	U	0.0187	U	0.0193	U	0.0194	U	0.0188	U
Aroclor 1221	~	~	~	0.0183	U	0.0198	U	0.0187	U	0.0193	U	0.0194	U	0.0188	U
Aroclor 1232	~	~	~	0.0183	U	0.0198	U	0.0187	U	0.0193	U	0.0194	U	0.0188	U
Aroclor 1242	~	~	~	0.0183	U	0.0198	U	0.0187	U	0.0193	U	0.0194	U	0.0188	U
Aroclor 1248	~	~	~	0.0183	U	0.0198	U	0.0187	U	0.0193	U	0.0194	U	0.0188	U
Aroclor 1254	~	~	~	0.0183	U	0.0198	U	0.0187	U	0.0193	U	0.0194	U	0.0188	U
Aroclor 1260	~	~	~	0.0183	U	0.0198	U	0.0187	U	0.0193	U	0.0194	U	0.0188	U
Aroclor 1262	~	~	~	0.0183	U	0.0198	U	0.0187	U	0.0193	U	0.0194	U	0.0188	U
Aroclor 1268	~	~	~	0.0183	U	0.0198	U	0.0187	U	0.0193	U	0.0194	U	0.0188	U
Total PCBs	0.1	1	3.2	0.0183	U	0.0198	U	0.0187	U	0.0193	U	0.0194	U	0.0188	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

NT: Not a target for this sample

~ : No Standards or Guidance Value.

Table 5A - Pesticides and Polychlorinated Biphenyls in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-6 (4-6)		SB-7 (0-2)		SB-7 (4-6)		SB-8 (0-2')		SB-8 (4-6')		SB-9 (0-2')	
LAB SAMPLE ID				23B0662-06		23B0662-07		23B0662-08		23B0727-05		23B0727-06		23B0727-01	
SAMPLING DATE										2/13/2023 10:10:00 AM		2/13/2023 10:38:00 AM		2/13/2023 9:05:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)															
4,4'-DDD	0.0033	13	14	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	NT	
4,4'-DDE	0.0033	8.9	17	0.00194	U	NT		0.00201	U	**0.956**	D	**0.00995**	D	0.00234	D
4,4'-DDT	0.0033	7.9	136	0.00194	U	0.00278	D	0.00201	U	**0.307**	DP	**0.0230**	D	**0.00781**	D
Aldrin	0.005	0.097	0.19	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
alpha-BHC	0.02	0.48	0.02	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
alpha-Chlordane	0.094	4.2	2.9	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	NT	
beta-BHC	0.036	0.36	0.09	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
Chlordane, total	~	~	~	0.0388	U	0.0408	U	0.0402	U	0.0506	U	0.0396	U	NT	
delta-BHC	0.04	100	0.25	0.00194	UP	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
Dieldrin	0.005	0.2	0.1	0.00194	U	0.00204	U	0.00201	U	**0.369**	DP	NT		NT	
Endosulfan I	2.4	24	102	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
Endosulfan II	2.4	24	102	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
Endosulfan sulfate	2.4	24	1000	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
Endrin	0.014	11	0.06	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
Endrin aldehyde	~	~	~	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
Endrin ketone	~	~	~	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
gamma-Chlordane	~	~	~	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	NT	
Heptachlor	0.042	2.1	0.38	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
Heptachlor epoxide	~	~	~	0.00194	U	0.00204	U	0.00201	U	0.178	DP	0.00198	UP	0.00188	U
Methoxychlor	~	~	~	0.00194	U	0.00204	U	0.00201	U	0.00253	U	0.00198	U	0.00188	U
Toxaphene	~	~	~	0.194	U	0.204	U	0.201	U	0.253	U	0.198	U	0.188	U
Polychlorinated Biphenyls (PCB) (mg/kg)															
Aroclor 1016	~	~	~	0.0196	U	0.0206	U	0.0203	U	0.255	U	0.0200	U	0.0190	U
Aroclor 1221	~	~	~	0.0196	U	0.0206	U	0.0203	U	0.255	U	0.0200	U	0.0190	U
Aroclor 1232	~	~	~	0.0196	U	0.0206	U	0.0203	U	0.255	U	0.0200	U	0.0190	U
Aroclor 1242	~	~	~	0.0196	U	0.0206	U	0.0203	U	0.255	U	0.0200	U	0.0190	U
Aroclor 1248	~	~	~	0.0196	U	0.0206	U	0.0203	U	0.255	U	0.0200	U	0.0190	U
Aroclor 1254	~	~	~	0.0196	U	0.0206	U	0.0203	U	7.930	D	0.438		0.0190	U
Aroclor 1260	~	~	~	0.0196	U	0.0206	U	0.0203	U	0.255	U	0.0200	U	0.0321	
Aroclor 1262	~	~	~	0.0196	U	0.0206	U	0.0203	U	0.255	U	0.0200	U	0.0190	U
Aroclor 1268	~	~	~	0.0196	U	0.0206	U	0.0203	U	0.255	U	0.0200	U	0.0190	U
Total PCBs	0.1	1	3.2	0.0196	U	0.0206	U	0.0203	U	**7.930**	D	**0.438**		0.0321	

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

NT: Not a target for this sample

~ : No Standards or Guidance Value.

Table 5A - Pesticides and Polychlorinated Biphenyls in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION LAB SAMPLE ID SAMPLING DATE SAMPLE TYPE	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-9 (4-6') 23B0727-02 2/13/2023 9:15:00 AM Soil		SB-10 (0-2') 23B0727-03 2/13/2023 9:35:00 AM Soil		SB-10 (4-6') 23B0727-04 2/13/2023 9:40:00 AM Soil	
				Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)									
4,4'-DDD	0.0033	13	14	0.00193	U	NT		0.00207	U
4,4'-DDE	0.0033	8.9	17	0.00193	U	0.00264	D	0.00207	U
4,4'-DDT	0.0033	7.9	136	0.00193	U	**0.00565**	D	0.00207	U
Aldrin	0.005	0.097	0.19	0.00193	U	0.00195	U	0.00207	U
alpha-BHC	0.02	0.48	0.02	0.00193	U	0.00195	U	0.00207	U
alpha-Chlordane	0.094	4.2	2.9	0.00193	U	0.00195	U	0.00207	U
beta-BHC	0.036	0.36	0.09	0.00193	U	0.00195	U	0.00207	U
Chlordane, total	~	~	~	0.0386	U	NT		0.0413	U
delta-BHC	0.04	100	0.25	0.00193	U	0.00195	U	0.00207	U
Dieldrin	0.005	0.2	0.1	0.00193	U	0.00195	UP	0.00207	U
Endosulfan I	2.4	24	102	0.00193	U	0.00195	U	0.00207	U
Endosulfan II	2.4	24	102	0.00193	U	0.00195	U	0.00207	U
Endosulfan sulfate	2.4	24	1000	0.00193	U	0.00195	U	0.00207	U
Endrin	0.014	11	0.06	0.00193	U	0.00195	U	0.00207	U
Endrin aldehyde	~	~	~	0.00193	U	0.00195	U	0.00207	U
Endrin ketone	~	~	~	0.00193	U	0.00195	U	0.00207	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00193	U	0.00195	U	0.00207	U
gamma-Chlordane	~	~	~	0.00193	U	NT		0.00207	U
Heptachlor	0.042	2.1	0.38	0.00193	U	0.00195	U	0.00207	U
Heptachlor epoxide	~	~	~	0.00193	U	0.00195	U	0.00207	U
Methoxychlor	~	~	~	0.00193	U	0.00195	U	0.00207	U
Toxaphene	~	~	~	0.193	U	0.195	U	0.207	U
Polychlorinated Biphenyls (PCB) (mg/kg)									
Aroclor 1016	~	~	~	0.0195	U	0.0197	U	0.0209	U
Aroclor 1221	~	~	~	0.0195	U	0.0197	U	0.0209	U
Aroclor 1232	~	~	~	0.0195	U	0.0197	U	0.0209	U
Aroclor 1242	~	~	~	0.0195	U	0.0197	U	0.0209	U
Aroclor 1248	~	~	~	0.0195	U	0.0197	U	0.0209	U
Aroclor 1254	~	~	~	0.0195	U	0.0197	U	0.0209	U
Aroclor 1260	~	~	~	0.0195	U	0.0197	U	0.0209	U
Aroclor 1262	~	~	~	0.0195	U	0.0197	U	0.0209	U
Aroclor 1268	~	~	~	0.0195	U	0.0197	U	0.0209	U
Total PCBs	0.1	1	3.2	0.0195	U	0.0197	U	0.0209	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Residential Use, and Protection of Groundwater SCOs.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

NT: Not a target for this sample

~ : No Standards or Guidance Value.

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-15 (1-3ft)		SB-15 (5-7ft)		SB-16 (1-3ft)		SB-16 (5-7ft)	
LAB SAMPLE ID				24H0613-13		24H0613-14		24H0613-17		24H0613-18	
SAMPLING DATE				8/8/2024 8:05:00 AM		8/8/2024 8:25:00 AM		8/8/2024 9:25:00 AM		8/8/2024 9:40:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)											
4,4'-DDD	0.0033	13	14	0.00176	U	0.00177	U	0.00189	U	0.00192	U
4,4'-DDE	0.0033	8.9	17	0.00176	U	0.00177	U	0.00189	U	0.00192	U
4,4'-DDT	0.0033	7.9	136	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Aldrin	0.005	0.097	0.19	0.00176	U	0.00177	U	0.00189	U	0.00192	U
alpha-BHC	0.02	0.48	0.02	0.00176	U	0.00177	U	0.00189	U	0.00192	U
alpha-Chlordane	0.094	4.2	2.9	0.00176	U	0.00177	U	0.00189	U	0.00192	U
beta-BHC	0.036	0.36	0.09	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Chlordane, total	~	~	~	0.0353	U	0.0355	U	0.0378	U	0.0385	U
delta-BHC	0.04	100	0.25	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Dieldrin	0.005	0.2	0.1	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Endosulfan I	2.4	24	102	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Endosulfan II	2.4	24	102	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Endosulfan sulfate	2.4	24	1000	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Endrin	0.014	11	0.06	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Endrin aldehyde	~	~	~	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Endrin ketone	~	~	~	0.00176	U	0.00177	U	0.00189	U	0.00192	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00176	U	0.00177	U	0.00189	U	0.00192	U
gamma-Chlordane	~	~	~	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Heptachlor	0.042	2.1	0.38	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Heptachlor epoxide	~	~	~	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Methoxychlor	~	~	~	0.00176	U	0.00177	U	0.00189	U	0.00192	U
Toxaphene	~	~	~	0.176	U	0.177	U	0.189	U	0.192	U
Polychlorinated Biphenyls (PCB) (mg/kg)											
Aroclor 1016	~	~	~	0.0178	U	0.0179	U	0.0191	U	0.0194	U
Aroclor 1221	~	~	~	0.0178	U	0.0179	U	0.0191	U	0.0194	U
Aroclor 1232	~	~	~	0.0178	U	0.0179	U	0.0191	U	0.0194	U
Aroclor 1242	~	~	~	0.0178	U	0.0179	U	0.0191	U	0.0194	U
Aroclor 1248	~	~	~	0.0178	U	0.0179	U	0.0191	U	0.0194	U
Aroclor 1254	~	~	~	0.0178	U	0.0179	U	0.0191	U	0.0194	U
Aroclor 1260	~	~	~	0.0178	U	0.0179	U	0.0191	U	0.0194	U
Aroclor 1262	~	~	~	0.0178	U	0.0179	U	0.0191	U	0.0194	U
Aroclor 1268	~	~	~	0.0178	U	0.0179	U	0.0191	U	0.0194	U
Total PCBs	0.1	1	3.2	0.0178	U	0.0179	U	0.0191	U	0.0194	U
Herbicides, 8151 MASTER (mg/kg)											
2,4,5-T	~	~	~	0.0211	U	0.0214	U	0.0224	U	0.0232	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0211	U	0.0214	U	0.0224	U	0.0232	U
2,4-D	~	~	~	0.0211	U	0.0214	U	0.0224	U	0.0232	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

NT: Not tested

D: Result is from an analysis that required a dilution

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-17 (1-3ft)		SB-17 (5-7ft)		SB-18 (1-3ft)		SB-18 (5-7ft)	
LAB SAMPLE ID				24H0642-13		24H0642-14		24H0965-01		24H0965-02	
SAMPLING DATE				8/9/2024 9:30:00 AM		8/9/2024 9:45:00 AM		8/14/2024 12:30:00 PM		8/14/2024 12:40:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)											
4,4'-DDD	0.0033	13	14	0.00182	U	0.00189	U	0.00195	U	0.00181	U
4,4'-DDE	0.0033	8.9	17	0.00182	U	0.00189	U	0.00195	U	0.00181	U
4,4'-DDT	0.0033	7.9	136	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Aldrin	0.005	0.097	0.19	0.00182	U	0.00189	U	0.00195	U	0.00181	U
alpha-BHC	0.02	0.48	0.02	0.00182	U	0.00189	U	0.00195	U	0.00181	U
alpha-Chlordane	0.094	4.2	2.9	0.00182	U	0.00189	U	0.00195	U	0.00181	U
beta-BHC	0.036	0.36	0.09	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Chlordane, total	~	~	~	0.0364	U	0.0378	U	0.0390	U	0.0362	U
delta-BHC	0.04	100	0.25	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Dieldrin	0.005	0.2	0.1	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Endosulfan I	2.4	24	102	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Endosulfan II	2.4	24	102	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Endosulfan sulfate	2.4	24	1000	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Endrin	0.014	11	0.06	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Endrin aldehyde	~	~	~	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Endrin ketone	~	~	~	0.00182	U	0.00189	U	0.00195	U	0.00181	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00182	U	0.00189	U	0.00195	U	0.00181	U
gamma-Chlordane	~	~	~	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Heptachlor	0.042	2.1	0.38	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Heptachlor epoxide	~	~	~	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Methoxychlor	~	~	~	0.00182	U	0.00189	U	0.00195	U	0.00181	U
Toxaphene	~	~	~	0.182	U	0.189	U	0.195	U	0.181	U
Polychlorinated Biphenyls (PCB) (mg/kg)											
Aroclor 1016	~	~	~	0.0184	U	0.0191	U	0.0197	U	0.0183	U
Aroclor 1221	~	~	~	0.0184	U	0.0191	U	0.0197	U	0.0183	U
Aroclor 1232	~	~	~	0.0184	U	0.0191	U	0.0197	U	0.0183	U
Aroclor 1242	~	~	~	0.0184	U	0.0191	U	0.0197	U	0.0183	U
Aroclor 1248	~	~	~	0.0184	U	0.0191	U	0.0197	U	0.0183	U
Aroclor 1254	~	~	~	0.0184	U	0.0191	U	0.0197	U	0.0183	U
Aroclor 1260	~	~	~	0.0184	U	0.0191	U	0.0197	U	0.0183	U
Aroclor 1262	~	~	~	0.0184	U	0.0191	U	0.0197	U	0.0183	U
Aroclor 1268	~	~	~	0.0184	U	0.0191	U	0.0197	U	0.0183	U
Total PCBs	0.1	1	3.2	0.0184	U	0.0191	U	0.0197	U	0.0183	U
Herbicides, 8151 MASTER (mg/kg)											
2,4,5-T	~	~	~	0.0225	U	0.0229	U	0.0236	U	0.0219	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0225	U	0.0229	U	0.0236	U	0.0219	U
2,4-D	~	~	~	0.0225	U	0.0229	U	0.0236	U	0.0219	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

NT: Not tested

D: Result is from an analysis that required a dilution

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-19 (1-3 ft)		SB-19 (4-6 ft)		SB-20 (1-3ft)		SB-20 (5-7ft)	
LAB SAMPLE ID				24H1202-01		24H1202-02		24H0613-29		24H0613-30	
SAMPLING DATE				8/15/2024 8:45:00 AM		8/15/2024 8:55:00 AM		8/8/2024 2:00:00 PM		8/8/2024 2:05:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)											
4,4'-DDD	0.0033	13	14	0.00192	U	0.00198	U	0.00193	U	0.00187	U
4,4'-DDE	0.0033	8.9	17	0.00192	U	0.00198	U	0.00193	U	0.00187	U
4,4'-DDT	0.0033	7.9	136	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Aldrin	0.005	0.097	0.19	0.00192	U	0.00198	U	0.00193	U	0.00187	U
alpha-BHC	0.02	0.48	0.02	0.00192	U	0.00198	U	0.00193	U	0.00187	U
alpha-Chlordane	0.094	4.2	2.9	0.00192	U	0.00198	U	0.00193	U	0.00187	U
beta-BHC	0.036	0.36	0.09	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Chlordane, total	~	~	~	0.0384	U	0.0397	U	0.0385	U	0.0374	U
delta-BHC	0.04	100	0.25	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Dieldrin	0.005	0.2	0.1	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Endosulfan I	2.4	24	102	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Endosulfan II	2.4	24	102	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Endosulfan sulfate	2.4	24	1000	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Endrin	0.014	11	0.06	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Endrin aldehyde	~	~	~	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Endrin ketone	~	~	~	0.00192	U	0.00198	U	0.00193	U	0.00187	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00192	U	0.00198	U	0.00193	U	0.00187	U
gamma-Chlordane	~	~	~	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Heptachlor	0.042	2.1	0.38	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Heptachlor epoxide	~	~	~	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Methoxychlor	~	~	~	0.00192	U	0.00198	U	0.00193	U	0.00187	U
Toxaphene	~	~	~	0.192	U	0.198	U	0.193	U	0.187	U
Polychlorinated Biphenyls (PCB) (mg/kg)											
Aroclor 1016	~	~	~	0.0194	U	0.0200	U	0.0195	U	0.0189	U
Aroclor 1221	~	~	~	0.0194	U	0.0200	U	0.0195	U	0.0189	U
Aroclor 1232	~	~	~	0.0194	U	0.0200	U	0.0195	U	0.0189	U
Aroclor 1242	~	~	~	0.0194	U	0.0200	U	0.0195	U	0.0189	U
Aroclor 1248	~	~	~	0.0194	U	0.0200	U	0.0195	U	0.0189	U
Aroclor 1254	~	~	~	0.0194	U	0.0200	U	0.0195	U	0.0189	U
Aroclor 1260	~	~	~	0.0194	U	0.0200	U	0.0195	U	0.0189	U
Aroclor 1262	~	~	~	0.0194	U	0.0200	U	0.0195	U	0.0189	U
Aroclor 1268	~	~	~	0.0194	U	0.0200	U	0.0195	U	0.0189	U
Total PCBs	0.1	1	3.2	0.0194	U	0.0200	U	0.0195	U	0.0189	U
Herbicides, 8151 MASTER (mg/kg)											
2,4,5-T	~	~	~	0.0233	U	0.0242	U	0.0233	U	0.0227	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0233	U	0.0242	U	0.0233	U	0.0227	U
2,4-D	~	~	~	0.0233	U	0.0242	U	0.0233	U	0.0227	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

NT: Not tested

D: Result is from an analysis that required a dilution

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-24 (1-3ft)		SB-24 (5-7ft)		SB-25 (1-3ft)		SB-25 (6-8ft)	
LAB SAMPLE ID				24H0613-26		24H0613-27		24H0613-20		24H0613-21	
SAMPLING DATE				8/8/2024 1:10:00 PM		8/8/2024 1:20:00 PM		8/8/2024 10:45:00 AM		8/8/2024 10:55:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)											
4,4'-DDD	0.0033	13	14	0.00187	U	0.00169	U	0.00192	U	0.00184	U
4,4'-DDE	0.0033	8.9	17	0.00187	U	0.00169	U	0.00192	U	0.00184	U
4,4'-DDT	0.0033	7.9	136	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Aldrin	0.005	0.097	0.19	0.00187	U	0.00169	U	0.00192	U	0.00184	U
alpha-BHC	0.02	0.48	0.02	0.00187	U	0.00169	U	0.00192	U	0.00184	U
alpha-Chlordane	0.094	4.2	2.9	0.00187	U	0.00169	U	0.00192	U	0.00184	U
beta-BHC	0.036	0.36	0.09	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Chlordane, total	~	~	~	0.0374	U	0.0338	U	0.0384	U	0.0368	U
delta-BHC	0.04	100	0.25	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Dieldrin	0.005	0.2	0.1	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Endosulfan I	2.4	24	102	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Endosulfan II	2.4	24	102	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Endosulfan sulfate	2.4	24	1000	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Endrin	0.014	11	0.06	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Endrin aldehyde	~	~	~	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Endrin ketone	~	~	~	0.00187	U	0.00169	U	0.00192	U	0.00184	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00187	U	0.00169	U	0.00192	U	0.00184	U
gamma-Chlordane	~	~	~	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Heptachlor	0.042	2.1	0.38	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Heptachlor epoxide	~	~	~	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Methoxychlor	~	~	~	0.00187	U	0.00169	U	0.00192	U	0.00184	U
Toxaphene	~	~	~	0.187	U	0.169	U	0.192	U	0.184	U
Polychlorinated Biphenyls (PCB) (mg/kg)											
Aroclor 1016	~	~	~	0.0189	U	0.0171	U	0.0194	U	0.0186	U
Aroclor 1221	~	~	~	0.0189	U	0.0171	U	0.0194	U	0.0186	U
Aroclor 1232	~	~	~	0.0189	U	0.0171	U	0.0194	U	0.0186	U
Aroclor 1242	~	~	~	0.0189	U	0.0171	U	0.0194	U	0.0186	U
Aroclor 1248	~	~	~	0.0189	U	0.0171	U	0.0194	U	0.0186	U
Aroclor 1254	~	~	~	0.0189	U	0.0171	U	0.0194	U	0.0186	U
Aroclor 1260	~	~	~	0.0189	U	0.0171	U	0.0194	U	0.0186	U
Aroclor 1262	~	~	~	0.0189	U	0.0171	U	0.0194	U	0.0186	U
Aroclor 1268	~	~	~	0.0189	U	0.0171	U	0.0194	U	0.0186	U
Total PCBs	0.1	1	3.2	0.0189	U	0.0171	U	0.0194	U	0.0186	U
Herbicides, 8151 MASTER (mg/kg)											
2,4,5-T	~	~	~	0.0224	U	0.0206	U	0.0233	U	0.0223	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0224	U	0.0206	U	0.0233	U	0.0223	U
2,4-D	~	~	~	0.0224	U	0.0206	U	0.0233	U	0.0223	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

NT: Not tested

D: Result is from an analysis that required a dilution

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-26 (1-3ft)		SB-26 (5-7ft)		SB-27 (1-3ft)		SB-27 (6-8ft)	
LAB SAMPLE ID				24H0642-16		24H0642-19		24H0642-11		24H0642-12	
SAMPLING DATE				8/9/2024 10:25:00 AM		8/9/2024 10:40:00 AM		8/9/2024 8:55:00 AM		8/9/2024 9:15:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)											
4,4'-DDD	0.0033	13	14	0.00177	U	0.00187	U	0.00184	U	0.00179	U
4,4'-DDE	0.0033	8.9	17	0.00177	U	0.00187	U	0.00184	U	0.00179	U
4,4'-DDT	0.0033	7.9	136	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Aldrin	0.005	0.097	0.19	0.00177	U	0.00187	U	0.00184	U	0.00179	U
alpha-BHC	0.02	0.48	0.02	0.00177	U	0.00187	U	0.00184	U	0.00179	U
alpha-Chlordane	0.094	4.2	2.9	0.00177	U	0.00187	U	0.00184	U	0.00179	U
beta-BHC	0.036	0.36	0.09	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Chlordane, total	~	~	~	0.0354	U	0.0374	U	0.0367	U	0.0357	U
delta-BHC	0.04	100	0.25	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Dieldrin	0.005	0.2	0.1	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Endosulfan I	2.4	24	102	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Endosulfan II	2.4	24	102	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Endosulfan sulfate	2.4	24	1000	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Endrin	0.014	11	0.06	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Endrin aldehyde	~	~	~	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Endrin ketone	~	~	~	0.00177	U	0.00187	U	0.00184	U	0.00179	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00177	U	0.00187	U	0.00184	U	0.00179	U
gamma-Chlordane	~	~	~	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Heptachlor	0.042	2.1	0.38	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Heptachlor epoxide	~	~	~	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Methoxychlor	~	~	~	0.00177	U	0.00187	U	0.00184	U	0.00179	U
Toxaphene	~	~	~	0.177	U	0.187	U	0.184	U	0.179	U
Polychlorinated Biphenyls (PCB) (mg/kg)											
Aroclor 1016	~	~	~	0.0179	U	0.0189	U	0.0185	U	0.0180	U
Aroclor 1221	~	~	~	0.0179	U	0.0189	U	0.0185	U	0.0180	U
Aroclor 1232	~	~	~	0.0179	U	0.0189	U	0.0185	U	0.0180	U
Aroclor 1242	~	~	~	0.0179	U	0.0189	U	0.0185	U	0.0180	U
Aroclor 1248	~	~	~	0.0179	U	0.0189	U	0.0185	U	0.0180	U
Aroclor 1254	~	~	~	0.0179	U	0.0189	U	0.0185	U	0.0180	U
Aroclor 1260	~	~	~	0.0179	U	0.0189	U	0.0185	U	0.0180	U
Aroclor 1262	~	~	~	0.0179	U	0.0189	U	0.0185	U	0.0180	U
Aroclor 1268	~	~	~	0.0179	U	0.0189	U	0.0185	U	0.0180	U
Total PCBs	0.1	1	3.2	0.0179	U	0.0189	U	0.0185	U	0.0180	U
Herbicides, 8151 MASTER (mg/kg)											
2,4,5-T	~	~	~	0.0216	U	0.0229	U	0.0223	U	0.0219	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0216	U	0.0229	U	0.0223	U	0.0219	U
2,4-D	~	~	~	0.0216	U	0.0229	U	0.0223	U	0.0219	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

NT: Not tested

D: Result is from an analysis that required a dilution

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-28 (1-3 ft)		SB-28 (4-6 ft)		SB-29 (1-3ft)		SB-29 (5-7ft)	
LAB SAMPLE ID				24H1202-05		24H1202-06		24H0269-12		24H0269-22	
SAMPLING DATE				8/15/2024 12:20:00 PM		8/15/2024 12:50:00 PM		8/5/2024 10:20:00 AM		8/5/2024 2:15:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)											
4,4'-DDD	0.0033	13	14	0.00200	U	0.00187	U	0.00179	U	0.00174	U
4,4'-DDE	0.0033	8.9	17	0.00200	U	0.00187	U	0.00179	U	0.00174	U
4,4'-DDT	0.0033	7.9	136	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Aldrin	0.005	0.097	0.19	0.00200	U	0.00187	U	0.00179	U	0.00174	U
alpha-BHC	0.02	0.48	0.02	0.00200	U	0.00187	U	0.00179	U	0.00174	U
alpha-Chlordane	0.094	4.2	2.9	0.00200	U	0.00187	U	0.00179	U	0.00174	U
beta-BHC	0.036	0.36	0.09	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Chlordane, total	~	~	~	0.0400	U	0.0374	U	0.0358	U	0.0348	U
delta-BHC	0.04	100	0.25	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Dieldrin	0.005	0.2	0.1	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Endosulfan I	2.4	24	102	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Endosulfan II	2.4	24	102	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Endosulfan sulfate	2.4	24	1000	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Endrin	0.014	11	0.06	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Endrin aldehyde	~	~	~	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Endrin ketone	~	~	~	0.00200	U	0.00187	U	0.00179	U	0.00174	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00200	U	0.00187	U	0.00179	U	0.00174	U
gamma-Chlordane	~	~	~	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Heptachlor	0.042	2.1	0.38	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Heptachlor epoxide	~	~	~	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Methoxychlor	~	~	~	0.00200	U	0.00187	U	0.00179	U	0.00174	U
Toxaphene	~	~	~	0.200	U	0.187	U	0.179	U	0.174	U
Polychlorinated Biphenyls (PCB) (mg/kg)											
Aroclor 1016	~	~	~	0.0202	U	0.0189	U	0.0181	U	0.0176	U
Aroclor 1221	~	~	~	0.0202	U	0.0189	U	0.0181	U	0.0176	U
Aroclor 1232	~	~	~	0.0202	U	0.0189	U	0.0181	U	0.0176	U
Aroclor 1242	~	~	~	0.0202	U	0.0189	U	0.0181	U	0.0176	U
Aroclor 1248	~	~	~	0.0202	U	0.0189	U	0.0181	U	0.0176	U
Aroclor 1254	~	~	~	0.0202	U	0.0189	U	0.0181	U	0.0176	U
Aroclor 1260	~	~	~	0.0202	U	0.0189	U	0.0181	U	0.0176	U
Aroclor 1262	~	~	~	0.0202	U	0.0189	U	0.0181	U	0.0176	U
Aroclor 1268	~	~	~	0.0202	U	0.0189	U	0.0181	U	0.0176	U
Total PCBs	0.1	1	3.2	0.0202	U	0.0189	U	0.0181	U	0.0176	U
Herbicides, 8151 MASTER (mg/kg)											
2,4,5-T	~	~	~	0.0242	U	0.0224	U	0.0216	U	0.0210	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0242	U	0.0224	U	0.0216	U	0.0210	U
2,4-D	~	~	~	0.0242	U	0.0224	U	0.0216	U	0.0210	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

NT: Not tested

D: Result is from an analysis that required a dilution

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-30 (1-3ft)		SB-30 (4-6ft)		SB-31 (1-3ft)		SB-31 (4-6ft)	
LAB SAMPLE ID				24H0372-13		24H0372-14		24H0372-21		24H0372-22	
SAMPLING DATE				8/6/2024 8:10:00 AM		8/6/2024 8:20:00 AM		8/6/2024 12:00:00 PM		8/6/2024 12:10:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)											
4,4'-DDD	0.0033	13	14	0.00185	U	0.00184	U	0.00190	U	0.00184	U
4,4'-DDE	0.0033	8.9	17	0.00185	U	0.00184	U	0.00190	U	0.00184	U
4,4'-DDT	0.0033	7.9	136	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Aldrin	0.005	0.097	0.19	0.00185	U	0.00184	U	0.00190	U	0.00184	U
alpha-BHC	0.02	0.48	0.02	0.00185	U	0.00184	U	0.00190	U	0.00184	U
alpha-Chlordane	0.094	4.2	2.9	0.00185	U	0.00184	U	0.00190	U	0.00184	U
beta-BHC	0.036	0.36	0.09	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Chlordane, total	~	~	~	0.0369	U	0.0367	U	0.0379	U	0.0368	U
delta-BHC	0.04	100	0.25	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Dieldrin	0.005	0.2	0.1	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Endosulfan I	2.4	24	102	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Endosulfan II	2.4	24	102	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Endosulfan sulfate	2.4	24	1000	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Endrin	0.014	11	0.06	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Endrin aldehyde	~	~	~	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Endrin ketone	~	~	~	0.00185	U	0.00184	U	0.00190	U	0.00184	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00185	U	0.00184	U	0.00190	U	0.00184	U
gamma-Chlordane	~	~	~	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Heptachlor	0.042	2.1	0.38	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Heptachlor epoxide	~	~	~	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Methoxychlor	~	~	~	0.00185	U	0.00184	U	0.00190	U	0.00184	U
Toxaphene	~	~	~	0.185	U	0.184	U	0.190	U	0.184	U
Polychlorinated Biphenyls (PCB) (mg/kg)											
Aroclor 1016	~	~	~	0.0187	U	0.0185	U	0.0192	U	0.0186	U
Aroclor 1221	~	~	~	0.0187	U	0.0185	U	0.0192	U	0.0186	U
Aroclor 1232	~	~	~	0.0187	U	0.0185	U	0.0192	U	0.0186	U
Aroclor 1242	~	~	~	0.0187	U	0.0185	U	0.0192	U	0.0186	U
Aroclor 1248	~	~	~	0.0187	U	0.0185	U	0.0192	U	0.0186	U
Aroclor 1254	~	~	~	0.0187	U	0.0185	U	0.0192	U	0.0186	U
Aroclor 1260	~	~	~	0.0187	U	0.0185	U	0.0192	U	0.0186	U
Aroclor 1262	~	~	~	0.0187	U	0.0185	U	0.0192	U	0.0186	U
Aroclor 1268	~	~	~	0.0187	U	0.0185	U	0.0192	U	0.0186	U
Total PCBs	0.1	1	3.2	0.0187	U	0.0185	U	0.0192	U	0.0186	U
Herbicides, 8151 MASTER (mg/kg)											
2,4,5-T	~	~	~	0.0222	U	0.0225	U	0.0228	U	0.0222	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0222	U	0.0225	U	0.0228	U	0.0222	U
2,4-D	~	~	~	0.0222	U	0.0225	U	0.0228	U	0.0222	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

NT: Not tested

D: Result is from an analysis that required a dilution

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-32 (1-3ft)		SB-32 (5-7ft)		SB-33 (1-3ft)		SB-33 (5-7ft)	
LAB SAMPLE ID				24H0499-03		24H0499-04		24H0269-09		24H0269-20	
SAMPLING DATE				8/7/2024 7:55:00 AM		8/7/2024 7:55:00 AM		8/5/2024 9:10:00 AM		8/5/2024 1:50:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)											
4,4'-DDD	0.0033	13	14	0.00186	U	0.00186	U	0.00191	U	0.00197	U
4,4'-DDE	0.0033	8.9	17	0.00186	U	0.00186	U	0.00191	U	0.00197	U
4,4'-DDT	0.0033	7.9	136	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Aldrin	0.005	0.097	0.19	0.00186	U	0.00186	U	0.00191	U	0.00197	U
alpha-BHC	0.02	0.48	0.02	0.00186	U	0.00186	U	0.00191	U	0.00197	U
alpha-Chlordane	0.094	4.2	2.9	0.00186	U	0.00186	U	0.00191	U	0.00197	U
beta-BHC	0.036	0.36	0.09	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Chlordane, total	~	~	~	0.0372	U	0.0372	U	0.0382	U	0.0394	U
delta-BHC	0.04	100	0.25	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Dieldrin	0.005	0.2	0.1	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Endosulfan I	2.4	24	102	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Endosulfan II	2.4	24	102	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Endosulfan sulfate	2.4	24	1000	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Endrin	0.014	11	0.06	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Endrin aldehyde	~	~	~	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Endrin ketone	~	~	~	0.00186	U	0.00186	U	0.00191	U	0.00197	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00186	U	0.00186	U	0.00191	U	0.00197	U
gamma-Chlordane	~	~	~	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Heptachlor	0.042	2.1	0.38	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Heptachlor epoxide	~	~	~	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Methoxychlor	~	~	~	0.00186	U	0.00186	U	0.00191	U	0.00197	U
Toxaphene	~	~	~	0.186	U	0.186	U	0.191	U	0.197	U
Polychlorinated Biphenyls (PCB) (mg/kg)											
Aroclor 1016	~	~	~	0.0188	U	0.0188	U	0.0193	U	0.0199	U
Aroclor 1221	~	~	~	0.0188	U	0.0188	U	0.0193	U	0.0199	U
Aroclor 1232	~	~	~	0.0188	U	0.0188	U	0.0193	U	0.0199	U
Aroclor 1242	~	~	~	0.0188	U	0.0188	U	0.0193	U	0.0199	U
Aroclor 1248	~	~	~	0.0188	U	0.0188	U	0.0193	U	0.0199	U
Aroclor 1254	~	~	~	0.0188	U	0.0188	U	0.0193	U	0.0199	U
Aroclor 1260	~	~	~	0.0188	U	0.0188	U	0.0193	U	0.0199	U
Aroclor 1262	~	~	~	0.0188	U	0.0188	U	0.0193	U	0.0199	U
Aroclor 1268	~	~	~	0.0188	U	0.0188	U	0.0193	U	0.0199	U
Total PCBs	0.1	1	3.2	0.0188	U	0.0188	U	0.0193	U	0.0199	U
Herbicides, 8151 MASTER (mg/kg)											
2,4,5-T	~	~	~	0.0227	U	0.0222	U	0.0234	U	0.0236	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0227	U	0.0222	U	0.0234	U	0.0236	U
2,4-D	~	~	~	0.0227	U	0.0222	U	0.0234	U	0.0236	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

NT: Not tested

D: Result is from an analysis that required a dilution

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-34 (1-3ft)		SB-34 (5-7ft)		SB-35 (1-3ft)		SB-35 (7-9ft)	
LAB SAMPLE ID				24H0269-15		24H0269-17		24H0269-24		24H0269-26	
SAMPLING DATE				8/5/2024 1:10:00 PM		8/5/2024 1:20:00 PM		8/5/2024 3:05:00 PM		8/5/2024 3:20:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)											
4,4'-DDD	0.0033	13	14	0.00185	U	0.00215	U	0.00188	U	0.00189	U
4,4'-DDE	0.0033	8.9	17	0.00185	U	0.00215	U	0.00188	U	0.00189	U
4,4'-DDT	0.0033	7.9	136	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Aldrin	0.005	0.097	0.19	0.00185	U	0.00215	U	0.00188	U	0.00189	U
alpha-BHC	0.02	0.48	0.02	0.00185	U	0.00215	U	0.00188	U	0.00189	U
alpha-Chlordane	0.094	4.2	2.9	0.00185	U	0.00215	U	0.00188	U	0.00189	U
beta-BHC	0.036	0.36	0.09	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Chlordane, total	~	~	~	0.0370	U	0.0431	U	0.0376	U	0.0378	U
delta-BHC	0.04	100	0.25	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Dieldrin	0.005	0.2	0.1	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Endosulfan I	2.4	24	102	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Endosulfan II	2.4	24	102	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Endosulfan sulfate	2.4	24	1000	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Endrin	0.014	11	0.06	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Endrin aldehyde	~	~	~	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Endrin ketone	~	~	~	0.00185	U	0.00215	U	0.00188	U	0.00189	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00185	U	0.00215	U	0.00188	U	0.00189	U
gamma-Chlordane	~	~	~	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Heptachlor	0.042	2.1	0.38	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Heptachlor epoxide	~	~	~	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Methoxychlor	~	~	~	0.00185	U	0.00215	U	0.00188	U	0.00189	U
Toxaphene	~	~	~	0.185	U	0.215	U	0.188	U	0.189	U
Polychlorinated Biphenyls (PCB) (mg/kg)											
Aroclor 1016	~	~	~	0.0187	U	0.0218	U	0.0190	U	0.0191	U
Aroclor 1221	~	~	~	0.0187	U	0.0218	U	0.0190	U	0.0191	U
Aroclor 1232	~	~	~	0.0187	U	0.0218	U	0.0190	U	0.0191	U
Aroclor 1242	~	~	~	0.0187	U	0.0218	U	0.0190	U	0.0191	U
Aroclor 1248	~	~	~	0.0187	U	0.0218	U	0.0190	U	0.0191	U
Aroclor 1254	~	~	~	0.0187	U	0.0218	U	0.0190	U	0.0191	U
Aroclor 1260	~	~	~	0.0187	U	0.0218	U	0.0190	U	0.0191	U
Aroclor 1262	~	~	~	0.0187	U	0.0218	U	0.0190	U	0.0191	U
Aroclor 1268	~	~	~	0.0187	U	0.0218	U	0.0190	U	0.0191	U
Total PCBs	0.1	1	3.2	0.0187	U	0.0218	U	0.0190	U	0.0191	U
Herbicides, 8151 MASTER (mg/kg)											
2,4,5-T	~	~	~	0.0224	U	0.0260	U	0.0231	U	0.0231	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0224	U	0.0260	U	0.0231	U	0.0231	U
2,4-D	~	~	~	0.0224	U	0.0260	U	0.0231	U	0.0231	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

NT: Not tested

D: Result is from an analysis that required a dilution

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-36 (1-3ft)		SB-36 (5-7ft)		SB-37 (1-3ft)		SB-37 (5-7ft)	
LAB SAMPLE ID				24H0372-17		24H0372-18		24H0372-28		24H0372-29	
SAMPLING DATE				8/6/2024 10:20:00 AM		8/6/2024 10:45:00 AM		8/6/2024 2:05:00 PM		8/6/2024 2:15:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)											
4,4'-DDD	0.0033	13	14	0.00182	U	0.00183	U	0.00186	U	0.00186	U
4,4'-DDE	0.0033	8.9	17	0.00182	U	0.00183	U	0.00186	U	0.00186	U
4,4'-DDT	0.0033	7.9	136	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Aldrin	0.005	0.097	0.19	0.00182	U	0.00183	U	0.00186	U	0.00186	U
alpha-BHC	0.02	0.48	0.02	0.00182	U	0.00183	U	0.00186	U	0.00186	U
alpha-Chlordane	0.094	4.2	2.9	0.00182	U	0.00183	U	0.00186	U	0.00186	U
beta-BHC	0.036	0.36	0.09	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Chlordane, total	~	~	~	0.0365	U	0.0366	U	0.0372	U	0.0373	U
delta-BHC	0.04	100	0.25	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Dieldrin	0.005	0.2	0.1	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Endosulfan I	2.4	24	102	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Endosulfan II	2.4	24	102	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Endosulfan sulfate	2.4	24	1000	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Endrin	0.014	11	0.06	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Endrin aldehyde	~	~	~	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Endrin ketone	~	~	~	0.00182	U	0.00183	U	0.00186	U	0.00186	U
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00182	U	0.00183	U	0.00186	U	0.00186	U
gamma-Chlordane	~	~	~	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Heptachlor	0.042	2.1	0.38	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Heptachlor epoxide	~	~	~	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Methoxychlor	~	~	~	0.00182	U	0.00183	U	0.00186	U	0.00186	U
Toxaphene	~	~	~	0.182	U	0.183	U	0.186	U	0.186	U
Polychlorinated Biphenyls (PCB) (mg/kg)											
Aroclor 1016	~	~	~	0.0184	U	0.0185	U	0.0188	U	0.0188	U
Aroclor 1221	~	~	~	0.0184	U	0.0185	U	0.0188	U	0.0188	U
Aroclor 1232	~	~	~	0.0184	U	0.0185	U	0.0188	U	0.0188	U
Aroclor 1242	~	~	~	0.0184	U	0.0185	U	0.0188	U	0.0188	U
Aroclor 1248	~	~	~	0.0184	U	0.0185	U	0.0188		0.0188	U
Aroclor 1254	~	~	~	0.0184	U	0.0185	U	0.0188	U	0.0188	U
Aroclor 1260	~	~	~	0.0184	U	0.0185	U	0.0188	U	0.0188	U
Aroclor 1262	~	~	~	0.0184	U	0.0185	U	0.0188	U	0.0188	U
Aroclor 1268	~	~	~	0.0184	U	0.0185	U	0.0188	U	0.0188	U
Total PCBs	0.1	1	3.2	0.0184	U	0.0185	U	0.0188		0.0188	U
Herbicides, 8151 MASTER (mg/kg)											
2,4,5-T	~	~	~	0.0220	U	0.0224	U	0.0227	U	0.0227	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0220	U	0.0224	U	0.0227	U	0.0227	U
2,4-D	~	~	~	0.0220	U	0.0224	U	0.0227	U	0.0227	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.

J : Estimated value.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

NT: Not tested

D: Result is from an analysis that required a dilution

Table 5B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-38 (1-3ft)		SB-38 (4-6ft)		8.6.2024_Duplicate		8.8.2024-Duplicate		8.15.24- Duplicate	
LAB SAMPLE ID				24H0372-25		24H0372-26		24H0372-16		24H0613-23		24H1202-08	
SAMPLING DATE				8/6/2024 1:05:00 PM		8/6/2024 1:15:00 PM		8/6/2024 9:05:00 AM		8/8/2024 3:00:00 PM		8/15/2024 3:00:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (mg/kg)								*SB-30 (1-3') Dup		*SB-25 (1-3') Dup		*SB-28 (1-3') Dup	
4,4'-DDD	0.0033	13	14	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
4,4'-DDE	0.0033	8.9	17	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
4,4'-DDT	0.0033	7.9	136	0.00189	U	0.00189	U	0.00192	U	0.00186	U	**0.00336**	D
Aldrin	0.005	0.097	0.19	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
alpha-BHC	0.02	0.48	0.02	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
alpha-Chlordane	0.094	4.2	2.9	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
beta-BHC	0.036	0.36	0.09	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Chlordane, total	~	~	~	0.0378	U	0.0379	U	0.0384	U	0.0372	U	0.0379	U
delta-BHC	0.04	100	0.25	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Dieldrin	0.005	0.2	0.1	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Endosulfan I	2.4	24	102	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Endosulfan II	2.4	24	102	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Endosulfan sulfate	2.4	24	1000	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Endrin	0.014	11	0.06	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Endrin aldehyde	~	~	~	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Endrin ketone	~	~	~	0.00189	U	0.00189	U	0.00192	U	0.00186	U	NT	
gamma-BHC (Lindane)	0.1	1.3	0.1	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
gamma-Chlordane	~	~	~	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Heptachlor	0.042	2.1	0.38	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Heptachlor epoxide	~	~	~	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Methoxychlor	~	~	~	0.00189	U	0.00189	U	0.00192	U	0.00186	U	0.00189	U
Toxaphene	~	~	~	0.189	U	0.189	U	0.192	U	0.186	U	0.189	U
Polychlorinated Biphenyls (PCB) (mg/kg)													
Aroclor 1016	~	~	~	0.0191	U	0.0191	U	0.0194	U	0.0188	U	0.0191	U
Aroclor 1221	~	~	~	0.0191	U	0.0191	U	0.0194	U	0.0188	U	0.0191	U
Aroclor 1232	~	~	~	0.0191	U	0.0191	U	0.0194	U	0.0188	U	0.0191	U
Aroclor 1242	~	~	~	0.0191	U	0.0191	U	0.0194	U	0.0188	U	0.0191	U
Aroclor 1248	~	~	~	0.0191	U	0.0191	U	0.0194	U	0.0188	U	0.0191	U
Aroclor 1254	~	~	~	0.0191	U	0.0191	U	0.0194	U	0.0188	U	0.0191	U
Aroclor 1260	~	~	~	0.0191	U	0.0191	U	0.0194	U	0.0188	U	0.0228	
Aroclor 1262	~	~	~	0.0191	U	0.0191	U	0.0194	U	0.0188	U	0.0191	U
Aroclor 1268	~	~	~	0.0191	U	0.0191	U	0.0194	U	0.0188	U	0.0191	U
Total PCBs	0.1	1	3.2	0.0191	U	0.0191	U	0.0194	U	0.0188	U	0.0228	
Herbicides, 8151 MASTER (mg/kg)													
2,4,5-T	~	~	~	0.0227	U	0.0226	U	0.0235	U	0.0227	U	0.0230	U
2,4,5-TP (Silvex)	3.8	100	3.8	0.0227	U	0.0226	U	0.0235	U	0.0227	U	0.0230	U
2,4-D	~	~	~	0.0227	U	0.0226	U	0.0235	U	0.0227	U	0.0230	U

TABLE NOTES:

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
mg/kg: Milligrams per Kilogram.
~ : No Standards or Guidance Value.
NT: Not tested
D: Result is from an analysis that required a dilution

Table 6A - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-1 (0-2)		SB-1 (4-6)		SB-2 (0-2)		SB-2 (4-6)		SB-3 (0-2)		SB-3 (4-6)		SB-4 (0-2)		SB-4 (4-6)		SB-5 (0-2)	
LAB SAMPLE ID				23B0662-01		23B0662-02		23B0662-03		23B0662-04		23B0662-13		23B0662-14		23B0662-11		23B0662-12		23B0662-09	
SAMPLING DATE																					
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, Standard List (ug/kg)																					
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
N-EtFOSAA	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
N-MeFOSAA	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorobutanesulfonic acid (PFBS)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorodecanoic acid (PFDA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorododecanoic acid (PFDoA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoroheptanoic acid (PFHpA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorohexanoic acid (PFHxA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00220	D	NT		NT	
Perfluoro-n-butanoic acid (PFBA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorononanoic acid (PFNA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorooctanesulfonic acid (PFOS)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorooctanoic acid (PFOA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoropentanoic acid (PFPeA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorotetradecanoic acid (PFTA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluorotridecanoic acid (PFTrDA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	
Perfluoroundecanoic acid (PFUnA)	~	~	~	NT		NT		NT		NT		NT		NT		0.00142	U	NT		NT	

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.

D: Results is from an analysis that required a dilution.
NT: Not a target for this sample.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.

Table 6A - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2023 NYCOER RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-5 (4-6)		SB-6 (0-2)		SB-6 (4-6)		SB-7 (0-2)		SB-7 (4-6)		SB-8 (0-2')		SB-8 (4-6')		SB-9 (0-2')		SB-9 (4-6')		SB-10 (0-2')		SB-10 (4-6')	
LAB SAMPLE ID				23B0662-10		23B0662-05		23B0662-06		23B0662-07		23B0662-08		23B0727-05		23B0727-06		23B0727-01		23B0727-02		23B0727-03		23B0727-04	
SAMPLING DATE														2/13/2023 10:10:00 AM		2/13/2023 10:38:00 AM		2/13/2023 9:05:00 AM		2/13/2023 9:15:00 AM		2/13/2023 9:35:00 AM		2/13/2023 9:40:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, Standard List (ug/kg)																									
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
N-EtFOSAA	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
N-MeFOSAA	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluorodecanoic acid (PFDA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluorododecanoic acid (PFDoA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluorohexanoic acid (PFHxA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluorononanoic acid (PFNA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluorooctanesulfonic acid (PFOS)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluorooctanoic acid (PFOA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluoropentanoic acid (PFPeA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	NT		NT		0.00029	U	NT		NT		NT		NT		NT		NT		NT		0.298	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.

D: Results is from an analysis that required a dilution.
NT: Not a target for this sample.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-15 (1-3ft) PFAS		SB-15 (5-7ft) PFAS		SB-16 (1-3ft) PFAS		SB-16 (5-7ft) PFAS	
LAB SAMPLE ID				24H0613-01		24H0613-02		24H0613-03		24H0613-04	
SAMPLING DATE				8/8/2024 8:05:00 AM		8/8/2024 8:25:00 AM		8/8/2024 9:25:00 AM		8/8/2024 9:40:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)											
11CL-PF3OUdS	~	~	~	0.347	U	0.339	U	0.351	U	0.359	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.843	U	0.822	U	0.851	U	0.870	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.665	U	0.648	U	0.671	U	0.686	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.665	U	0.648	U	0.671	U	0.686	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.680	U	1.630	U	1.690	U	1.730	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.340	U	2.290	U	2.370	U	2.420	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.708	U	0.691	U	0.715	U	0.731	U
9CL-PF3ONS	~	~	~	0.275	U	0.268	U	0.277	U	0.284	U
ADONA	~	~	~	0.194	U	0.190	U	0.196	U	0.201	U
HFPO-DA (Gen-X)	~	~	~	0.679	U	0.662	U	0.686	U	0.701	U
N-EtFOSA	~	~	~	0.221	U	0.216	U	0.223	U	0.228	U
N-EtFOSAA	~	~	~	0.217	U	0.211	U	0.382		0.224	U
N-EtFOSE	~	~	~	0.779	U	0.759	U	0.786	U	0.804	U
N-MeFOSA	~	~	~	0.201	U	0.196	U	0.203	U	0.208	U
N-MeFOSAA	~	~	~	0.165	U	0.161	U	0.167	U	0.171	U
N-MeFOSE	~	~	~	0.683	U	0.665	U	0.689	U	0.704	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.155	U	0.151	U	0.157	U	0.160	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.213	U	0.208	U	0.215	U	0.220	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.173	U	0.169	U	0.175	U	0.179	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.139	U	0.135	U	0.140	U	0.143	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.163	U	0.159	U	0.285		0.168	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.175	U	0.171	U	0.177	U	0.181	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.216	U	0.210	U	0.218	U	0.223	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.069	U	0.068	U	0.070	U	0.072	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.107	U	0.105	U	0.108	U	0.111	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.124	U	0.121	U	0.125	U	0.128	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.213	U	0.208	U	0.215	U	0.220	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.189	U	0.184	U	0.191	U	0.195	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.182	U	0.178	U	0.184	U	0.188	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.117	U	0.114	U	0.118	U	0.121	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.200	U	0.195	U	0.202	U	0.206	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.059	U	0.058	U	0.060	U	0.061	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.122	U	0.119	U	0.123	U	0.126	U
Perfluorononanoic acid (PFNA)	~	~	~	0.211	U	0.206	U	0.213	U	0.218	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	0.187	U	0.182	U	**1.320**		0.354	
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.192	U	0.187	U	0.422		0.198	U
Perfluoropentanoic acid (PFPeA)	~	~	~	0.122	U	0.119	U	0.123	U	0.126	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.115	U	0.112	U	0.116	U	0.119	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.140	U	0.136	U	0.141	U	0.144	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.221	U	0.216	U	0.223	U	0.228	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-17 (1-3ft) PFAS		SB-17 (5-7ft) PFAS		SB-18 (1-3ft)		SB-18 (5-7ft)	
LAB SAMPLE ID				24H0642-03		24H0642-04		24H0965-01		24H0965-02	
SAMPLING DATE				8/9/2024 9:30:00 AM		8/9/2024 9:45:00 AM		8/14/2024 12:30:00 PM		8/14/2024 12:40:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)											
11CL-PF3OUdS	~	~	~	0.350	U	0.342	U	0.369	U	0.340	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.849	U	0.830	U	0.897	U	0.826	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.669	U	0.654	U	0.707	U	0.651	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.669	U	0.654	U	0.707	U	0.651	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.690	U	1.650	U	1.780	U	1.640	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.360	U	2.310	U	2.490	U	2.290	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.713	U	0.697	U	0.753	U	0.693	U
9CL-PF3ONS	~	~	~	0.277	U	0.271	U	0.292	U	0.269	U
ADONA	~	~	~	0.196	U	0.191	U	0.207	U	0.190	U
HFPO-DA (Gen-X)	~	~	~	0.684	U	0.669	U	0.722	U	0.665	U
N-EtFOSA	~	~	~	0.223	U	0.414		0.235	U	0.217	U
N-EtFOSAA	~	~	~	0.218	U	6.580		0.230	U	0.212	U
N-EtFOSE	~	~	~	0.784	U	0.767	U	0.828	U	0.762	U
N-MeFOSA	~	~	~	0.203	U	0.198	U	0.214	U	0.197	U
N-MeFOSAA	~	~	~	0.167	U	0.163	U	0.176	U	0.162	U
N-MeFOSE	~	~	~	0.687	U	0.672	U	0.726	U	0.668	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.156	U	0.153	U	0.165	U	0.152	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.215	U	0.210	U	0.227	U	0.209	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.174	U	0.170	U	0.184	U	0.169	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.140	U	0.136	U	0.147	U	0.136	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.164	U	9.830		0.173	U	0.160	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.177	U	0.173	U	0.186	U	0.172	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.217	U	0.212	U	0.229	U	0.211	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.070	U	0.068	U	0.074	U	0.068	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.108	U	0.106	U	0.114	U	0.105	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.125	U	0.122	U	0.132	U	0.121	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.215	U	0.210	U	0.227	U	0.209	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.190	U	0.186	U	0.201	U	0.185	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.183	U	0.179	U	0.194	U	0.178	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.118	U	0.115	U	0.125	U	0.115	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.201	U	0.197	U	0.213	U	0.196	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.060	U	0.058	U	0.071	J	0.058	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.123	U	0.120	U	0.129	U	0.119	U
Perfluorononanoic acid (PFNA)	~	~	~	0.213	U	0.208	U	0.224	U	0.207	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	**1.200**		**2.550**		**1.820**		0.192	J
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.194	U	0.189	U	**0.804**		0.188	U
Perfluoropentanoic acid (PFPeA)	~	~	~	0.123	U	0.120	U	0.129	U	0.119	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.116	U	0.113	U	0.122	U	0.113	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.141	U	0.137	U	0.148	U	0.137	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.223	U	0.218	U	0.235	U	0.217	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-19 (1-3 ft)		SB-19 (4-6 ft)		SB-20 (1-3ft) PFAS		SB-20 (5-7ft) PFAS	
LAB SAMPLE ID				24H1202-01		24H1202-02		24H0613-11		24H0613-12	
SAMPLING DATE				8/15/2024 8:45:00 AM		8/15/2024 8:55:00 AM		8/8/2024 2:00:00 PM		8/8/2024 2:05:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)											
11CL-PF3OUdS	~	~	~	0.360	U	0.377	U	0.350	U	0.352	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.874	U	0.915	U	0.850	U	0.855	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.689	U	0.721	U	0.670	U	0.674	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.689	U	0.721	U	0.670	U	0.674	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.740	U	1.820	U	1.690	U	1.700	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.430	U	2.540	U	2.360	U	2.380	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.734	U	0.768	U	0.714	U	0.718	U
9CL-PF3ONS	~	~	~	0.285	U	0.298	U	0.277	U	0.279	U
ADONA	~	~	~	0.201	U	0.211	U	0.196	U	0.197	U
HFPO-DA (Gen-X)	~	~	~	0.704	U	0.737	U	0.685	U	0.689	U
N-EtFOSA	~	~	~	0.229	U	0.240	U	0.223	U	0.224	U
N-EtFOSAA	~	~	~	0.225	U	0.235	U	0.219	U	0.220	U
N-EtFOSE	~	~	~	0.807	U	0.845	U	0.785	U	0.789	U
N-MeFOSA	~	~	~	0.208	U	0.218	U	0.203	U	0.204	U
N-MeFOSAA	~	~	~	0.171	U	0.179	U	0.167	U	0.168	U
N-MeFOSE	~	~	~	0.707	U	0.740	U	0.688	U	0.692	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.161	U	0.168	U	0.157	U	0.157	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.221	U	0.231	U	0.215	U	0.216	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.179	U	0.188	U	0.175	U	0.176	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.144	U	0.150	U	0.140	U	0.140	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.169	U	0.177	U	0.164	U	0.165	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.182	U	0.190	U	0.177	U	0.178	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.223	U	0.234	U	0.217	U	0.219	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.072	U	0.075	U	0.070	U	0.070	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.111	U	0.116	U	0.108	U	0.109	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.129	U	0.134	U	0.125	U	0.126	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.221	U	0.231	U	0.215	U	0.216	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.196	U	0.205	U	0.190	U	0.191	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.189	U	0.198	U	0.184	U	0.185	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.122	U	0.127	U	0.118	U	0.119	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.207	U	0.217	U	0.202	U	0.203	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.061	U	0.064	U	0.060	U	0.060	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.126	U	0.132	U	0.123	U	0.123	U
Perfluorononanoic acid (PFNA)	~	~	~	0.229	J	0.229	U	0.213	U	0.214	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	**1.210**		0.202	U	0.188	U	0.189	U
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.199	U	0.208	U	0.194	U	0.195	U
Perfluoropentanoic acid (PFPeA)	~	~	~	0.126	U	0.132	U	0.123	U	0.123	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.119	U	0.125	U	0.116	U	0.117	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.145	U	0.151	U	0.141	U	0.142	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.229	U	0.240	U	0.223	U	0.224	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-24 (1-3ft) PFAS		SB-24 (5-7ft) PFAS		SB-25 (1-3ft) PFAS		SB-25 (6-8ft) PFAS	
LAB SAMPLE ID				24H0613-09		24H0613-10		24H0613-05		24H0613-06	
SAMPLING DATE				8/8/2024 1:10:00 PM		8/8/2024 1:20:00 PM		8/8/2024 10:45:00 AM		8/8/2024 10:55:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)											
11CL-PF3OUdS	~	~	~	0.345	U	0.342	U	0.360	U	0.581	J
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.837	U	0.830	U	0.874	U	0.838	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.659	U	0.654	U	0.688	U	0.661	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.659	U	0.654	U	0.688	U	0.661	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.660	U	1.650	U	1.740	U	1.670	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.330	U	2.310	U	2.430	U	2.330	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.703	U	0.697	U	0.734	U	0.704	U
9CL-PF3ONS	~	~	~	0.273	U	0.271	U	0.285	U	0.273	U
ADONA	~	~	~	0.193	U	0.191	U	0.201	U	0.193	U
HFPO-DA (Gen-X)	~	~	~	0.674	U	0.669	U	0.704	U	0.675	U
N-EtFOSA	~	~	~	0.219	U	0.218	U	0.229	U	0.220	U
N-EtFOSAA	~	~	~	0.215	U	0.213	U	0.224	U	0.215	U
N-EtFOSE	~	~	~	0.773	U	0.767	U	0.806	U	0.774	U
N-MeFOSA	~	~	~	0.200	U	0.198	U	0.208	U	0.200	U
N-MeFOSAA	~	~	~	0.164	U	0.163	U	0.171	U	0.164	U
N-MeFOSE	~	~	~	0.677	U	0.672	U	0.707	U	0.678	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.154	U	0.153	U	0.161	U	0.154	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.212	U	0.210	U	0.221	U	0.212	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.172	U	0.170	U	0.179	U	0.172	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.137	U	0.136	U	0.143	U	0.138	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.162	U	0.161	U	0.169	U	0.162	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.174	U	0.173	U	0.182	U	0.174	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.214	U	0.212	U	0.223	U	0.214	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.069	U	0.068	U	0.072	U	0.069	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.106	U	0.106	U	0.111	U	0.107	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.123	U	0.122	U	0.128	U	0.123	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.212	U	0.210	U	0.221	U	0.212	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.187	U	0.186	U	0.196	U	0.188	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.181	U	0.179	U	0.189	U	0.181	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.116	U	0.115	U	0.121	U	0.117	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.198	U	0.197	U	0.243		0.199	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.059	U	0.058	U	0.061	U	0.059	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.121	U	0.120	U	0.126	U	0.121	U
Perfluorononanoic acid (PFNA)	~	~	~	0.209	U	0.208	U	0.219	U	0.210	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	0.185	U	0.184	U	**4.960**		0.185	U
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.191	U	0.189	U	0.504		0.191	U
Perfluoropentanoic acid (PFPeA)	~	~	~	0.121	U	0.120	U	0.126	U	0.121	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.114	U	0.113	U	0.119	U	0.114	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.139	U	0.137	U	0.145	U	0.139	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.219	U	0.218	U	0.229	U	0.220	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-26 (1-3ft) PFAS		SB-26 (5-7ft) PFAS		SB-27 (1-3ft) PFAS		SB-27 (6-8ft) PFAS	
LAB SAMPLE ID				24H0642-05		24H0642-06		24H0642-01		24H0642-02	
SAMPLING DATE				8/9/2024 10:25:00 AM		8/9/2024 10:40:00 AM		8/9/2024 8:55:00 AM		8/9/2024 9:15:00 AM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)											
11CL-PF3OUdS	~	~	~	0.346	U	0.335	U	0.350	U	0.348	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.839	U	0.813	U	0.849	U	0.844	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.661	U	0.641	U	0.669	U	0.665	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.661	U	0.641	U	0.669	U	0.665	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.670	U	1.620	U	1.690	U	1.680	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.330	U	2.260	U	2.360	U	2.350	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.705	U	0.683	U	0.713	U	0.709	U
9CL-PF3ONS	~	~	~	0.273	U	0.265	U	0.277	U	0.275	U
ADONA	~	~	~	0.193	U	0.187	U	0.196	U	0.195	U
HFPO-DA (Gen-X)	~	~	~	0.676	U	0.655	U	0.684	U	0.680	U
N-EtFOSA	~	~	~	0.220	U	0.213	U	0.223	U	0.221	U
N-EtFOSAA	~	~	~	0.216	U	0.209	U	0.218	U	0.217	U
N-EtFOSE	~	~	~	0.775	U	0.751	U	0.784	U	0.779	U
N-MeFOSA	~	~	~	0.200	U	0.194	U	0.203	U	0.201	U
N-MeFOSAA	~	~	~	0.164	U	0.159	U	0.167	U	0.166	U
N-MeFOSE	~	~	~	0.679	U	0.658	U	0.687	U	0.683	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.154	U	0.150	U	0.156	U	0.155	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.212	U	0.206	U	0.215	U	0.214	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.172	U	0.167	U	0.174	U	0.173	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.138	U	0.134	U	0.140	U	0.139	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.162	U	0.157	U	0.164	U	0.163	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.174	U	0.169	U	0.177	U	0.176	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.214	U	0.208	U	0.217	U	0.216	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.069	U	0.067	U	0.070	U	0.069	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.107	U	0.103	U	0.108	U	0.107	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.123	U	0.120	U	0.125	U	0.124	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.212	U	0.206	U	0.215	U	0.214	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.188	U	0.182	U	0.190	U	0.189	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.181	U	0.176	U	0.183	U	0.182	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.117	U	0.113	U	0.118	U	0.117	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.199	U	0.193	U	0.201	U	0.200	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.059	U	0.057	U	0.060	U	0.059	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.121	U	0.117	U	0.123	U	0.122	U
Perfluorononanoic acid (PFNA)	~	~	~	0.210	U	0.204	U	0.213	U	0.211	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	**1.430**		**4.410**		0.188	U	**1.800**	
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.191	U	0.185	U	0.194	U	0.192	U
Perfluoropentanoic acid (PFPeA)	~	~	~	0.121	U	0.117	U	0.123	U	0.122	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.114	U	0.111	U	0.116	U	0.115	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.139	U	0.135	U	0.141	U	0.140	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.220	U	0.213	U	0.223	U	0.221	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-28 (1-3 ft)		SB-28 (4-6 ft)		SB-29 (1-3ft) PFAS		SB-29 (5-7ft) PFAS	
LAB SAMPLE ID				24H1202-05		24H1202-06		24H0269-02		24H0269-06	
SAMPLING DATE				8/15/2024 12:20:00 PM		8/15/2024 12:50:00 PM		8/5/2024 10:20:00 AM		8/5/2024 2:15:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)											
11CL-PF3OUdS	~	~	~	0.377	U	0.562	J	0.341	U	0.343	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.916	U	0.856	U	0.828	U	0.832	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.722	U	0.675	U	0.652	U	0.656	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.722	U	0.675	U	0.652	U	0.656	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.820	U	1.700	U	1.640	U	1.650	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.550	U	2.380	U	2.300	U	2.310	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.769	U	0.719	U	0.695	U	0.698	U
9CL-PF3ONS	~	~	~	0.299	U	0.279	U	0.270	U	0.271	U
ADONA	~	~	~	0.211	U	0.197	U	0.191	U	0.192	U
HFPO-DA (Gen-X)	~	~	~	0.738	U	0.689	U	0.667	U	0.670	U
N-EtFOSA	~	~	~	0.240	U	0.224	U	0.217	U	0.218	U
N-EtFOSAA	~	~	~	0.235	U	0.220	U	0.213	U	0.214	U
N-EtFOSE	~	~	~	0.846	U	0.790	U	0.764	U	0.768	U
N-MeFOSA	~	~	~	0.218	U	0.204	U	0.197	U	0.198	U
N-MeFOSAA	~	~	~	0.180	U	0.168	U	0.162	U	0.163	U
N-MeFOSE	~	~	~	0.742	U	0.693	U	0.670	U	0.673	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.169	U	0.158	U	0.152	U	0.153	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.232	U	0.217	U	0.209	U	0.210	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.188	U	0.176	U	0.170	U	0.171	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.150	U	0.141	U	0.136	U	0.137	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.177	U	0.166	U	0.160	U	0.161	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.191	U	0.178	U	0.172	U	0.173	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.234	U	0.219	U	0.212	U	0.213	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.075	U	0.070	U	0.068	U	0.068	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.117	U	0.109	U	0.105	U	0.106	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.135	U	0.126	U	0.122	U	0.122	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.232	U	0.217	U	0.209	U	0.210	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.205	U	0.192	U	0.185	U	0.186	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.198	U	0.185	U	0.179	U	0.180	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.127	U	0.119	U	0.115	U	0.116	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.217	U	0.203	U	0.196	U	0.197	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.088	J	0.060	U	0.058	U	0.058	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.132	U	0.124	U	0.120	U	0.120	U
Perfluorononanoic acid (PFNA)	~	~	~	0.261		0.214	U	0.207	U	0.208	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	0.378		0.189	U	0.183	U	0.184	U
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.353		0.195	U	0.189	U	0.189	U
Perfluoropentanoic acid (PFPeA)	~	~	~	0.132	U	0.124	U	0.120	U	0.120	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.125	U	0.117	U	0.113	U	0.113	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.152	U	0.142	U	0.137	U	0.138	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.240	U	0.224	U	0.217	U	0.218	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION LAB SAMPLE ID SAMPLING DATE SAMPLE TYPE	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-30 (1-3ft) PFAS 24H0372-01 8/6/2024 8:10:00 AM Soil		SB-30 (4-6ft) PFAS 24H0372-02 8/6/2024 8:20:00 AM Soil		SB-31 (1-3ft) PFAS 24H0372-07 8/6/2024 12:00:00 PM Soil		SB-31 (4-6ft) PFAS 24H0372-08 8/6/2024 12:10:00 PM Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)											
11CL-PF3OUdS	~	~	~	0.358	U	0.365	U	0.349	U	0.352	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.868	U	0.886	U	0.848	U	0.855	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.684	U	0.698	U	0.668	U	0.674	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.684	U	0.698	U	0.668	U	0.674	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.720	U	1.760	U	1.680	U	1.700	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.410	U	2.460	U	2.360	U	2.380	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.729	U	0.744	U	0.712	U	0.718	U
9CL-PF3ONS	~	~	~	0.283	U	0.289	U	0.276	U	0.279	U
ADONA	~	~	~	0.200	U	0.204	U	0.195	U	0.197	U
HFPO-DA (Gen-X)	~	~	~	0.699	U	0.713	U	0.683	U	0.689	U
N-EtFOSA	~	~	~	0.228	U	0.232	U	0.222	U	0.224	U
N-EtFOSAA	~	~	~	0.223	U	0.228	U	0.218	U	0.220	U
N-EtFOSE	~	~	~	0.801	U	0.818	U	0.783	U	0.790	U
N-MeFOSA	~	~	~	0.207	U	0.211	U	0.202	U	0.204	U
N-MeFOSAA	~	~	~	0.170	U	0.174	U	0.166	U	0.168	U
N-MeFOSE	~	~	~	0.703	U	0.717	U	0.686	U	0.692	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.160	U	0.163	U	0.156	U	0.157	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.220	U	0.224	U	0.214	U	0.216	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.178	U	0.182	U	0.174	U	0.176	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.143	U	0.145	U	0.139	U	0.140	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.168	U	0.171	U	0.164	U	0.165	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.181	U	0.184	U	0.176	U	0.178	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.222	U	0.226	U	0.217	U	0.219	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.071	U	0.073	U	0.070	U	0.070	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.110	U	0.113	U	0.108	U	0.109	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.128	U	0.130	U	0.125	U	0.126	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.220	U	0.224	U	0.214	U	0.216	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.194	U	0.198	U	0.190	U	0.191	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.187	U	0.191	U	0.183	U	0.185	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.121	U	0.123	U	0.118	U	0.119	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.206	U	0.210	U	0.201	U	0.203	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.061	U	0.062	U	0.060	U	0.060	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.125	U	0.128	U	0.122	U	0.123	U
Perfluorononanoic acid (PFNA)	~	~	~	0.217	U	0.222	U	0.212	U	0.214	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	0.192	U	0.196	U	0.187	U	0.189	U
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.198	U	0.202	U	0.193	U	0.195	U
Perfluoropentanoic acid (PFPeA)	~	~	~	0.125	U	0.128	U	0.122	U	0.123	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.118	U	0.121	U	0.116	U	0.117	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.144	U	0.147	U	0.140	U	0.142	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.228	U	0.232	U	0.222	U	0.224	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-32 (1-3ft) PFAS		SB-32 (5-7ft) PFAS		SB-33 (1-3ft) PFAS		SB-33 (5-7ft) PFAS	
LAB SAMPLE ID				24H0499-01		24H0499-02		24H0269-01		24H0269-05	
SAMPLING DATE				8/7/2024 7:55:00 AM		8/7/2024 8:00:00 AM		8/5/2024 9:10:00 AM		8/5/2024 1:50:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)											
11CL-PF3OUdS	~	~	~	0.354	U	0.351	U	0.349	U	0.354	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.859	U	0.852	U	0.848	U	0.859	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.677	U	0.672	U	0.668	U	0.677	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.677	U	0.672	U	0.668	U	0.677	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.710	U	1.690	U	1.680	U	1.710	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.390	U	2.370	U	2.360	U	2.390	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.722	U	0.716	U	0.712	U	0.721	U
9CL-PF3ONS	~	~	~	0.280	U	0.278	U	0.276	U	0.280	U
ADONA	~	~	~	0.198	U	0.196	U	0.195	U	0.198	U
HFPO-DA (Gen-X)	~	~	~	0.692	U	0.686	U	0.683	U	0.691	U
N-EtFOSA	~	~	~	0.225	U	0.223	U	0.222	U	0.225	U
N-EtFOSAA	~	~	~	0.221	U	0.219	U	0.218	U	0.221	U
N-EtFOSE	~	~	~	0.793	U	0.787	U	0.783	U	0.793	U
N-MeFOSA	~	~	~	0.205	U	0.203	U	0.202	U	0.205	U
N-MeFOSAA	~	~	~	0.168	U	0.167	U	0.166	U	0.168	U
N-MeFOSE	~	~	~	0.695	U	0.690	U	0.686	U	0.695	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.158	U	0.157	U	0.156	U	0.158	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.217	U	0.216	U	0.214	U	0.217	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.176	U	0.175	U	0.174	U	0.176	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.141	U	0.140	U	0.139	U	0.141	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.166	U	0.165	U	0.164	U	0.166	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.179	U	0.177	U	0.176	U	0.179	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.220	U	0.218	U	0.217	U	0.219	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.071	U	0.070	U	0.070	U	0.071	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.109	U	0.108	U	0.108	U	0.109	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.126	U	0.125	U	0.125	U	0.126	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.217	U	0.216	U	0.214	U	0.217	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.192	U	0.191	U	0.190	U	0.192	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.186	U	0.184	U	0.183	U	0.185	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.120	U	0.119	U	0.118	U	0.119	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.204	U	0.202	U	0.201	U	0.204	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.060	U	0.060	U	0.060	U	0.060	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.124	U	0.123	U	0.122	U	0.124	U
Perfluorononanoic acid (PFNA)	~	~	~	0.215	U	0.213	U	0.212	U	0.215	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	0.190	U	0.188	U	0.188	U	0.190	U
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.196	U	0.194	U	0.193	U	0.196	U
Perfluoropentanoic acid (PFPeA)	~	~	~	0.124	U	0.123	U	0.122	U	0.124	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.117	U	0.116	U	0.116	U	0.117	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.142	U	0.141	U	0.140	U	0.142	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.225	U	0.223	U	0.222	U	0.225	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-34 (1-3ft) PFAS		SB-34 (5-7ft) PFAS		SB-35 (1-3ft) PFAS		SB-35 (7-9ft) PFAS	
LAB SAMPLE ID				24H0269-03		24H0269-04		24H0269-07		24H0269-08	
SAMPLING DATE				8/5/2024 1:10:00 PM		8/5/2024 1:20:00 PM		8/5/2024 3:05:00 PM		8/5/2024 3:20:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)											
11CL-PF3OUdS	~	~	~	0.343	U	0.385	U	0.353	U	0.371	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.833	U	0.935	U	0.857	U	0.901	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.656	U	0.737	U	0.676	U	0.710	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.656	U	0.737	U	0.676	U	0.710	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.650	U	1.860	U	1.700	U	1.790	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.310	U	2.600	U	2.380	U	2.500	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.699	U	0.785	U	0.720	U	0.757	U
9CL-PF3ONS	~	~	~	0.271	U	0.305	U	0.279	U	0.294	U
ADONA	~	~	~	0.192	U	0.215	U	0.198	U	0.208	U
HFPO-DA (Gen-X)	~	~	~	0.671	U	0.753	U	0.690	U	0.726	U
N-EtFOSA	~	~	~	0.218	U	0.245	U	0.225	U	0.236	U
N-EtFOSAA	~	~	~	0.214	U	0.240	U	0.220	U	0.232	U
N-EtFOSE	~	~	~	0.769	U	0.863	U	0.791	U	0.832	U
N-MeFOSA	~	~	~	0.199	U	0.223	U	0.204	U	0.215	U
N-MeFOSAA	~	~	~	0.163	U	0.183	U	0.168	U	0.177	U
N-MeFOSE	~	~	~	0.674	U	0.756	U	0.694	U	0.729	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.153	U	0.172	U	0.158	U	0.166	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.211	U	0.236	U	0.217	U	0.228	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.171	U	0.192	U	0.176	U	0.185	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.137	U	0.154	U	0.141	U	0.148	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.161	U	0.181	U	0.166	U	0.174	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.173	U	0.194	U	0.178	U	0.187	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.213	U	0.239	U	0.219	U	0.230	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.068	U	0.077	U	0.070	U	0.074	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.106	U	0.119	U	0.109	U	0.115	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.122	U	0.137	U	0.126	U	0.133	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.211	U	0.236	U	0.217	U	0.228	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.186	U	0.209	U	0.192	U	0.202	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.180	U	0.202	U	0.185	U	0.195	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.116	U	0.130	U	0.119	U	0.125	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.197	U	0.222	U	0.203	U	0.214	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.059	U	0.066	U	0.060	U	0.063	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.120	U	0.135	U	0.124	U	0.130	U
Perfluorononanoic acid (PFNA)	~	~	~	0.209	U	0.234	U	0.215	U	0.226	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	0.449		0.207	U	0.190	U	0.199	U
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.190	U	0.213	U	0.195	U	0.205	U
Perfluoropentanoic acid (PFPeA)	~	~	~	0.120	U	0.135	U	0.124	U	0.130	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.114	U	0.128	U	0.117	U	0.123	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.138	U	0.155	U	0.142	U	0.149	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.218	U	0.245	U	0.225	U	0.236	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-36 (1-3ft) PFAS		SB-36 (5-7ft) PFAS		SB-37 (1-3ft) PFAS		SB-37 (5-7ft) PFAS	
LAB SAMPLE ID				24H0372-04		24H0372-05		24H0372-11		24H0372-12	
SAMPLING DATE				8/6/2024 10:20:00 AM		8/6/2024 10:45:00 AM		8/6/2024 2:05:00 PM		8/6/2024 2:15:00 PM	
SAMPLE TYPE				Soil		Soil		Soil		Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)											
11CL-PF3OUdS	~	~	~	0.352	U	0.344	U	0.358	U	0.354	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.854	U	0.836	U	0.869	U	0.860	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.673	U	0.659	U	0.684	U	0.678	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.673	U	0.659	U	0.684	U	0.678	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.700	U	1.660	U	1.730	U	1.710	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.370	U	2.320	U	2.410	U	2.390	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.717	U	0.702	U	0.729	U	0.722	U
9CL-PF3ONS	~	~	~	0.278	U	0.272	U	0.283	U	0.280	U
ADONA	~	~	~	0.197	U	0.193	U	0.200	U	0.198	U
HFPO-DA (Gen-X)	~	~	~	0.688	U	0.673	U	0.699	U	0.692	U
N-EtFOSA	~	~	~	0.224	U	0.219	U	0.228	U	0.225	U
N-EtFOSAA	~	~	~	0.219	U	0.215	U	0.223	U	0.221	U
N-EtFOSE	~	~	~	0.789	U	0.771	U	0.802	U	0.794	U
N-MeFOSA	~	~	~	0.204	U	0.199	U	0.207	U	0.205	U
N-MeFOSAA	~	~	~	0.167	U	0.164	U	0.170	U	0.169	U
N-MeFOSE	~	~	~	0.691	U	0.676	U	0.703	U	0.696	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.157	U	0.154	U	0.160	U	0.158	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.216	U	0.211	U	0.220	U	0.218	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.175	U	0.172	U	0.178	U	0.177	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.140	U	0.137	U	0.143	U	0.141	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.165	U	0.162	U	0.168	U	0.166	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.178	U	0.174	U	0.181	U	0.179	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.218	U	0.214	U	0.222	U	0.220	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.070	U	0.069	U	0.071	U	0.071	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.109	U	0.106	U	0.110	U	0.109	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.126	U	0.123	U	0.128	U	0.126	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.216	U	0.211	U	0.220	U	0.218	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.191	U	0.187	U	0.194	U	0.192	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.184	U	0.180	U	0.188	U	0.186	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.119	U	0.116	U	0.121	U	0.120	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.203	U	0.198	U	0.206	U	0.204	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.060	U	0.059	U	0.061	U	0.060	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.123	U	0.121	U	0.125	U	0.124	U
Perfluorononanoic acid (PFNA)	~	~	~	0.214	U	0.209	U	0.217	U	0.215	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	0.189	U	0.185	U	0.192	U	0.190	U
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.195	U	0.190	U	0.198	U	0.196	U
Perfluoropentanoic acid (PFPeA)	~	~	~	0.123	U	0.121	U	0.125	U	0.124	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.117	U	0.114	U	0.118	U	0.117	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.141	U	0.138	U	0.144	U	0.142	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.224	U	0.219	U	0.228	U	0.225	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION LAB SAMPLE ID SAMPLING DATE SAMPLE TYPE	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	SB-38 (1-3ft) PFAS 24H0372-09 8/6/2024 1:05:00 PM Soil		SB-38 (4-6ft) PFAS 24H0372-10 8/6/2024 1:15:00 PM Soil		8.6.2024_Duplicate PFAS 24H0372-03 8/6/2024 8:20:00 AM Soil		8.8.2024-Duplicate PFAS 24H0613-07 8/8/2024 3:00:00 PM Soil	
				Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ug/kg)								*SB-30 (1-3') Dup		*SB-25 (1-3') Dup	
11CL-PF3OUdS	~	~	~	0.357	U	0.386	U	0.363	U	0.346	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.868	U	0.936	U	0.882	U	0.839	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.684	U	0.738	U	0.695	U	0.661	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.684	U	0.738	U	0.695	U	0.661	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.720	U	1.860	U	1.750	U	1.670	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.410	U	2.600	U	2.450	U	2.330	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.729	U	0.786	U	0.741	U	0.705	U
9CL-PF3ONS	~	~	~	0.283	U	0.305	U	0.287	U	0.273	U
ADONA	~	~	~	0.200	U	0.216	U	0.203	U	0.193	U
HFPO-DA (Gen-X)	~	~	~	0.699	U	0.754	U	0.710	U	0.676	U
N-EtFOSA	~	~	~	0.228	U	0.245	U	0.231	U	0.220	U
N-EtFOSAA	~	~	~	0.223	U	0.240	U	0.227	U	0.216	U
N-EtFOSE	~	~	~	0.801	U	0.864	U	0.814	U	0.775	U
N-MeFOSA	~	~	~	0.207	U	0.223	U	0.210	U	0.200	U
N-MeFOSAA	~	~	~	0.170	U	0.183	U	0.173	U	0.165	U
N-MeFOSE	~	~	~	0.702	U	0.757	U	0.714	U	0.679	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.160	U	0.172	U	0.162	U	0.155	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.220	U	0.237	U	0.223	U	0.212	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.178	U	0.192	U	0.181	U	0.172	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.143	U	0.154	U	0.145	U	0.138	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.168	U	0.181	U	0.171	U	0.162	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.180	U	0.195	U	0.183	U	0.175	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.222	U	0.239	U	0.225	U	0.215	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.071	U	0.077	U	0.0724	U	0.0689	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.110	U	0.119	U	0.112	U	0.107	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.128	U	0.138	U	0.130	U	0.123	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.220	U	0.237	U	0.223	U	0.212	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.194	U	0.209	U	0.197	U	0.188	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.187	U	0.202	U	0.190	U	0.181	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.121	U	0.130	U	0.123	U	0.122	J
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.206	U	0.222	U	0.209	U	0.316	
Perfluorohexanoic acid (PFHxA)	~	~	~	0.061	U	0.066	U	0.0619	U	0.0589	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.125	U	0.135	U	0.127	U	0.121	U
Perfluorononanoic acid (PFNA)	~	~	~	0.217	U	0.234	U	0.221	U	0.210	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	0.192	U	0.207	U	0.195	U	**4.390**	
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.198	U	0.213	U	0.201	U	**0.662**	
Perfluoropentanoic acid (PFPeA)	~	~	~	0.125	U	0.135	U	0.127	U	0.121	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.118	U	0.128	U	0.120	U	0.114	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.144	U	0.155	U	0.146	U	0.139	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.228	U	0.245	U	0.231	U	0.220	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 6B - Per- and Polyfluoroalkyl Substances in Soil
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street 60-62 Commercial Street / 29 Clay Street
Brooklyn, NY 11222
BCP Site Nos. C224390 and C22440

LOCATION LAB SAMPLE ID SAMPLING DATE SAMPLE TYPE	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives	8.15.24- Duplicate PFAS 24H1202-09 8/15/2024 3:00:00 PM Soil	
				Result	Q
PFAS, EPA 1633 Target List (ug/kg)				*SB-28 (1-3') Dup	
11CL-PF3OUdS	~	~	~	0.367	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	~	~	~	0.891	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	~	~	0.702	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	~	~	~	0.702	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	~	~	1.770	U
3-Perfluoropentyl propanoic acid (FPePA)	~	~	~	2.480	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	~	~	0.748	U
9CL-PF3ONS	~	~	~	0.290	U
ADONA	~	~	~	0.205	U
HFPO-DA (Gen-X)	~	~	~	0.718	U
N-EtFOSA	~	~	~	0.234	U
N-EtFOSAA	~	~	~	0.229	U
N-EtFOSE	~	~	~	0.823	U
N-MeFOSA	~	~	~	0.212	U
N-MeFOSAA	~	~	~	0.175	U
N-MeFOSE	~	~	~	0.721	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	~	~	0.164	U
Perfluoro-1-decanesulfonic acid (PFDS)	~	~	~	0.225	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	~	~	0.183	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	~	~	0.146	U
Perfluoro-1-octanesulfonamide (FOSA)	~	~	~	0.172	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	~	~	0.185	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	~	~	0.228	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	~	~	0.0732	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	~	~	0.113	U
Perfluorobutanesulfonic acid (PFBS)	~	~	~	0.131	U
Perfluorodecanoic acid (PFDA)	~	~	~	0.225	U
Perfluorododecanesulfonic acid (PFDoS)	~	~	~	0.199	U
Perfluorododecanoic acid (PFDoA)	~	~	~	0.192	U
Perfluoroheptanoic acid (PFHpA)	~	~	~	0.124	U
Perfluorohexanesulfonic acid (PFHxS)	~	~	~	0.211	U
Perfluorohexanoic acid (PFHxA)	~	~	~	0.0626	U
Perfluoro-n-butanoic acid (PFBA)	~	~	~	0.129	U
Perfluorononanoic acid (PFNA)	~	~	~	0.223	U
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7	0.335	
Perfluorooctanoic acid (PFOA)	0.66	33	1.1	0.304	
Perfluoropentanoic acid (PFPeA)	~	~	~	0.129	U
Perfluorotetradecanoic acid (PFTA)	~	~	~	0.122	U
Perfluorotridecanoic acid (PFTrDA)	~	~	~	0.148	U
Perfluoroundecanoic acid (PFUnA)	~	~	~	0.234	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/kg: Micrograms per Kilogram.
~ : No Standards or Guidance Value.
Value exceeds the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective
Value exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater Soil Cleanup Objectives

Table 7A - Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	GW-1		GW-2		GW-3		GW-X		GW-4	
LAB SAMPLE ID		23B0854-01		23B0854-03		23B0854-02		23B0854-04		23B0727-09	
SAMPLING DATE		Clay St.		Clay St.		Clay St.		Clay St.		Commercial St.	
SAMPLE TYPE		Water		Water		Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics by EPA 8260 (ug/L)											
1,1,1,2-Tetrachloroethane	5	0.216	U	0.216	U	0.216	U	0.216	U	0.216	U
1,1,1-Trichloroethane	5	0.266	U	0.266	U	0.266	U	0.266	U	0.266	U
1,1,2,2-Tetrachloroethane	5	0.256	U	0.256	U	0.256	U	0.256	U	0.256	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	5	0.850		0.286	U	0.286	U	0.286	U	0.286	U
1,1,2-Trichloroethane	1	**1.380**		0.249	U	0.249	U	0.249	U	0.249	U
1,1-Dichloroethane	5	0.650		0.272	U	0.272	U	0.272	U	0.272	U
1,1-Dichloroethylene	5	**11.200**		0.327	U	0.327	U	0.327	U	0.327	U
1,2,3-Trichlorobenzene	5	0.222	U	0.222	U	0.222	U	0.222	U	0.222	U
1,2,3-Trichloropropane	0.04	***0.273***	U	***0.273***	U	***0.273***	U	***0.273***	U	***0.273***	U
1,2,4-Trichlorobenzene	5	0.138	U	0.138	U	0.138	U	0.138	U	0.138	U
1,2,4-Trimethylbenzene	5	0.370	J	0.310	U	0.310	U	0.310	U	0.310	U
1,2-Dibromo-3-chloropropane	0.04	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U
1,2-Dibromoethane	0.0006	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U
1,2-Dichlorobenzene	3	0.270	U	0.270	U	0.270	U	0.270	U	0.270	U
1,2-Dichloroethane	0.6	0.510		0.377	U	0.377	U	0.377	U	0.377	U
1,2-Dichloropropane	1	0.327	U	0.327	U	0.327	U	0.327	U	0.327	U
1,3,5-Trimethylbenzene	5	0.347	U	0.347	U	0.347	U	0.347	U	0.347	U
1,3-Dichlorobenzene	3	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U
1,3-Dichloropropane	5	0.260	U	0.260	U	0.260	U	0.260	U	0.260	U
1,4-Dichlorobenzene	3	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U
1,4-Dioxane	~	35.300	U	35.300	U	35.300	U	35.300	U	35.300	U
2-Butanone	50	0.421	U	0.421	U	0.421	U	0.421	U	0.421	U
2-Hexanone	50	0.320	U	0.320	U	0.320	U	0.320	U	0.320	U
4-Methyl-2-pentanone	~	0.365	U	0.365	U	0.365	U	0.365	U	0.365	U
Acetone	50	1.340	U	3.940		1.340	U	1.340	U	1.340	U
Acrolein	~	0.447	U	0.447	U	0.447	U	0.447	U	0.447	U
Acrylonitrile	~	0.422	U	0.422	U	0.422	U	0.422	U	0.422	U
Benzene	1	0.279	U	0.279	U	0.279	U	0.279	U	0.279	U
Bromochloromethane	5	0.354	U	0.354	U	0.354	U	0.354	U	0.354	U
Bromodichloromethane	50	0.950		0.245	U	0.245	U	0.245	U	0.245	U
Bromoform	50	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U
Bromomethane	5	0.119	U	0.119	U	0.119	U	0.119	U	0.119	U
Carbon disulfide	~	0.362	U	0.362	U	0.362	U	0.362	U	0.362	U
Carbon tetrachloride	5	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U
Chlorobenzene	5	0.284	U	0.284	U	0.284	U	0.284	U	0.284	U
Chloroethane	5	0.448	U	0.448	U	0.448	U	0.448	U	0.448	U
Chloroform	7	**12**		0.243	U	0.390	J	0.370	J	0.930	
Chloromethane	5	0.372	U	0.372	U	0.372	U	0.372	U	0.372	U
cis-1,2-Dichloroethylene	5	**1,340**	D	0.330	J	1.580		0.740		1.990	
cis-1,3-Dichloropropylene	0.4	0.262	U	0.262	U	0.262	U	0.262	U	0.262	U
Cyclohexane	~	0.491	U	0.491	U	0.491	U	0.491	U	0.491	U
Dibromochloromethane	50	0.146	U	0.146	U	0.146	U	0.146	U	0.146	U
Dibromomethane	~	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U
Dichlorodifluoromethane	5	0.451	U	0.451	U	0.451	U	0.451	U	0.451	U
Ethyl Benzene	5	0.290	U	0.290	U	0.290	U	0.290	U	0.290	U
Hexachlorobutadiene	0.5	0.241	U	0.241	U	0.241	U	0.241	U	0.241	U
Isopropylbenzene	5	0.405	U	0.405	U	0.405	U	0.405	U	0.405	U
Methyl acetate	~	0.442	U	0.442	U	0.442	U	0.442	U	0.442	U
Methyl tert-butyl ether (MTBE)	10	0.244	U	0.244	U	3.030		2.350		0.244	U
Methylcyclohexane	~	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Methylene chloride	5	0.397	U	0.397	U	0.397	U	0.397	U	0.397	U
Naphthalene	10	0.560	J	0.590	J	0.212	U	0.212	U	0.212	U
n-Butylbenzene	5	0.399	U	0.399	U	0.399	U	0.399	U	0.399	U
n-Propylbenzene	5	0.384	U	0.384	U	0.384	U	0.384	U	0.384	U
o-Xylene	5	0.261	U	0.261	U	0.261	U	0.261	U	0.261	U
p- & m- Xylenes	~	0.578	U	0.578	U	0.578	U	0.578	U	0.578	U
p-Diethylbenzene	~	0.341	U	0.341	U	0.341	U	0.341	U	0.341	U
p-Ethyltoluene	~	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
p-Isopropyltoluene	5	0.377	U	0.377	U	0.377	U	0.377	U	0.377	U
sec-Butylbenzene	5	0.444	U	0.444	U	0.444	U	0.444	U	0.444	U
Styrene	5	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U
tert-Butyl alcohol (TBA)	~	0.608	U	0.608	U	0.608	U	0.608	U	0.608	U
tert-Butylbenzene	5	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U
Tetrachloroethylene	5	**6.280**		0.239	U	0.239	U	0.239	U	0.239	U
Toluene	5	0.346	U	0.346	U	0.346	U	0.346	U	0.346	U
trans-1,2-Dichloroethylene	5	**42.600**		0.279	U	0.279	U	0.279	U	0.279	U
trans-1,3-Dichloropropylene	0.4	0.229	U	0.229	U	0.229	U	0.229	U	0.229	U
Trichloroethylene	5	**6,370**	D	1.300		**15.200**		**11.200**		**11.900**	
Trichlorofluoromethane	5	0.337	U	0.337	U	0.337	U	0.337	U	0.337	U
Vinyl Chloride	2	**30.400**		0.469	U	0.469	U	0.469	U	0.469	U
Xylenes, Total	5	0.836	U	0.836	U	0.836	U	0.836	U	0.836	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 7A - Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	GW-5		S-FB-1		GW-FB-1	
LAB SAMPLE ID		23B0727-08		23B0854-05		23B0854-06	
SAMPLING DATE		Commercial St.					
SAMPLE TYPE		Water		Water		Water	
		Result	Q	Result	Q	Result	Q
Volatile Organics by EPA 8260 (ug/L)							
1,1,1,2-Tetrachloroethane	5	0.216	U	0.216	U	0.216	U
1,1,1-Trichloroethane	5	0.266	U	0.266	U	0.266	U
1,1,2,2-Tetrachloroethane	5	0.256	U	0.256	U	0.256	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	5	0.286	U	0.286	U	0.286	U
1,1,2-Trichloroethane	1	0.249	U	0.249	U	0.249	U
1,1-Dichloroethane	5	0.272	U	0.272	U	0.272	U
1,1-Dichloroethylene	5	0.327	U	0.327	U	0.327	U
1,2,3-Trichlorobenzene	5	0.222	U	0.222	U	0.222	U
1,2,3-Trichloropropane	0.04	***0.273***	U	***0.273***	U	***0.273***	U
1,2,4-Trichlorobenzene	5	0.138	U	0.138	U	0.138	U
1,2,4-Trimethylbenzene	5	0.310	U	0.310	U	0.310	U
1,2-Dibromo-3-chloropropane	0.04	***0.432***	U	***0.432***	U	***0.432***	U
1,2-Dibromoethane	0.0006	***0.215***	U	***0.215***	U	***0.215***	U
1,2-Dichlorobenzene	3	0.270	U	0.270	U	0.270	U
1,2-Dichloroethane	0.6	0.377	U	0.377	U	0.377	U
1,2-Dichloropropane	1	0.327	U	0.327	U	0.327	U
1,3,5-Trimethylbenzene	5	0.347	U	0.347	U	0.347	U
1,3-Dichlorobenzene	3	0.283	U	0.283	U	0.283	U
1,3-Dichloropropane	5	0.260	U	0.260	U	0.260	U
1,4-Dichlorobenzene	3	0.311	U	0.311	U	0.311	U
1,4-Dioxane	~	35.300	U	35.300	U	35.300	U
2-Butanone	50	1.330		0.421	U	0.421	U
2-Hexanone	50	0.320	U	0.320	U	0.320	U
4-Methyl-2-pentanone	~	0.365	U	0.365	U	0.365	U
Acetone	50	1.340	U	1.340	U	1.340	U
Acrolein	~	0.447	U	0.447	U	0.447	U
Acrylonitrile	~	0.422	U	0.422	U	0.422	U
Benzene	1	0.279	U	0.279	U	0.279	U
Bromochloromethane	5	0.354	U	0.354	U	0.354	U
Bromodichloromethane	50	0.245	U	0.245	U	0.245	U
Bromoform	50	0.163	U	0.163	U	0.163	U
Bromomethane	5	0.119	U	0.119	U	0.119	U
Carbon disulfide	~	0.362	U	0.362	U	0.362	U
Carbon tetrachloride	5	0.204	U	0.204	U	0.204	U
Chlorobenzene	5	0.284	U	0.284	U	0.284	U
Chloroethane	5	0.448	U	0.448	U	0.448	U
Chloroform	7	0.243	U	0.243	U	0.243	U
Chloromethane	5	0.372	U	0.372	U	0.372	U
cis-1,2-Dichloroethylene	5	**10.400**		0.294	U	0.294	U
cis-1,3-Dichloropropylene	0.4	0.262	U	0.262	U	0.262	U
Cyclohexane	~	0.491	U	0.491	U	0.491	U
Dibromochloromethane	50	0.146	U	0.146	U	0.146	U
Dibromomethane	~	0.203	U	0.203	U	0.203	U
Dichlorodifluoromethane	5	0.451	U	0.451	U	0.451	U
Ethyl Benzene	5	0.290	U	0.290	U	0.290	U
Hexachlorobutadiene	0.5	0.241	U	0.241	U	0.241	U
Isopropylbenzene	5	0.405	U	0.405	U	0.405	U
Methyl acetate	~	0.442	U	0.442	U	0.442	U
Methyl tert-butyl ether (MTBE)	10	0.360	J	0.244	U	0.244	U
Methylcyclohexane	~	0.477	U	0.477	U	0.477	U
Methylene chloride	5	0.397	U	0.680	JB	0.680	JB
Naphthalene	10	0.212	U	0.212	U	0.212	U
n-Butylbenzene	5	0.399	U	0.399	U	0.399	U
n-Propylbenzene	5	0.384	U	0.384	U	0.384	U
o-Xylene	5	0.261	U	0.261	U	0.261	U
p- & m- Xylenes	~	0.578	U	0.578	U	0.578	U
p-Diethylbenzene	~	0.450	J	0.341	U	0.341	U
p-Ethyltoluene	~	0.200	U	0.200	U	0.200	U
p-Isopropyltoluene	5	0.377	U	0.377	U	0.377	U
sec-Butylbenzene	5	0.444	U	0.444	U	0.444	U
Styrene	5	0.255	U	0.255	U	0.255	U
tert-Butyl alcohol (TBA)	~	0.608	U	0.608	U	0.608	U
tert-Butylbenzene	5	0.367	U	0.367	U	0.367	U
Tetrachloroethylene	5	0.239	U	0.239	U	0.239	U
Toluene	5	0.346	U	0.346	U	0.346	U
trans-1,2-Dichloroethylene	5	0.580		0.279	U	0.279	U
trans-1,3-Dichloropropylene	0.4	0.229	U	0.229	U	0.229	U
Trichloroethylene	5	**19.500**		0.370	J	0.280	J
Trichlorofluoromethane	5	0.337	U	0.337	U	0.337	U
Vinyl Chloride	2	0.469	U	0.469	U	0.469	U
Xylenes, Total	5	0.836	U	0.836	U	0.836	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 7B - Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-01S		MW-01M		MW-01D		MW-02S		MW-02M		MW-02D	
LAB SAMPLE ID		24I0079-03		24I0079-01		24I0356-08		24I0079-02		24I0079-04		24I0218-02	
SAMPLING DATE		9/3/2024 11:55:00 AM		9/3/2024 10:45:00 AM		9/6/2024 11:55:00 AM		9/3/2024 10:45:00 AM		9/3/2024 12:00:00 PM		9/4/2024 12:15:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics by EPA 8260 (ug/L)													
1,1,1,2-Tetrachloroethane	5	0.216	U	0.216	U	0.216	U	0.216	U	0.216	U	0.216	U
1,1,1-Trichloroethane	5	2.500		0.266	U	0.266	U	0.490	J	1.650		1.670	
1,1,2,2-Tetrachloroethane	5	0.256	U	0.256	U	0.256	U	0.256	U	0.256	U	0.256	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	5	0.286	U	0.286	U	1.140		0.286	U	0.286	U	0.286	U
1,1,2-Trichloroethane	1	0.249	U	**7.920**		**8.290**		0.249	U	0.249	U	0.249	U
1,1-Dichloroethane	5	0.950		**11.700**		**11.800**		0.272	U	0.920		2.090	
1,1-Dichloroethylene	5	0.540		**42.600**	D	**104**	E	0.327	U	0.327	U	0.820	
1,1-Dichloropropylene	5	0.314	U	0.314	U	0.314	U	0.314	U	0.314	U	0.314	U
1,2,3-Trichlorobenzene	5	0.222	U	0.222	U	0.222	U	0.222	U	0.222	U	0.222	U
1,2,3-Trichloropropane	0.04	***0.273***	U	***0.273***	U	**0.540**		***0.273***	U	***0.273***	U	***0.273***	U
1,2,4,5-Tetramethylbenzene	~	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U
1,2,4-Trichlorobenzene	5	0.138	U	0.138	U	0.138	U	0.138	U	0.138	U	0.138	U
1,2,4-Trimethylbenzene	5	0.310	U	0.310	U	0.310	U	0.310	U	0.310	U	0.310	U
1,2-Dibromo-3-chloropropane	0.04	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U
1,2-Dibromoethane	0.0006	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U
1,2-Dichlorobenzene	3	0.270	U	0.850		0.270	U	0.270	U	0.270	U	0.270	U
1,2-Dichloroethane	0.6	0.377	U	**8.300**		**6.690**		0.377	U	0.377	U	0.377	U
1,2-Dichloropropane	1	0.327	U	0.327	U	0.327	U	0.327	U	0.327	U	0.327	U
1,3,5-Trimethylbenzene	5	0.347	U	0.347	U	0.347	U	0.347	U	0.347	U	0.347	U
1,3-Dichlorobenzene	3	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U
1,3-Dichloropropane	5	0.260	U	0.260	U	0.260	U	0.260	U	0.260	U	0.260	U
1,4-Dichlorobenzene	3	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U
1,4-Dioxane	0.35	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U
2,2-Dichloropropane	5	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U
2-Butanone	50	0.421	U	0.421	U	0.421	U	0.421	U	0.421	U	0.421	U
2-Chlorotoluene	5	0.376	U	0.376	U	0.376	U	0.376	U	0.376	U	0.376	U
2-Hexanone	50	0.320	U	0.320	U	0.320	U	0.320	U	0.320	U	0.320	U
4-Chlorotoluene	5	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U
4-Methyl-2-pentanone	~	0.365	U	0.365	U	0.365	U	0.365	U	0.365	U	0.365	U
Acetone	50	1.340	U	1.340	U	1.340	U	1.340	U	1.340	U	1.340	U
Acrolein	~	0.447	U	0.447	U	0.447	U	0.447	U	0.447	U	0.447	U
Acrylonitrile	~	0.422	U	0.422	U	0.422	U	0.422	U	0.422	U	0.422	U
Benzene	1	0.279	U	**2.920**		**2.480**		0.279	U	0.279	U	0.279	U
Bromobenzene	5	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U
Bromochloromethane	5	0.354	U	0.354	U	0.354	U	0.354	U	0.354	U	0.354	U
Bromodichloromethane	50	0.245	U	0.245	U	0.245	U	0.245	U	0.245	U	0.245	U
Bromoform	50	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U
Bromomethane	5	0.119	U	0.119	U	0.119	U	0.119	U	0.119	U	0.119	U
Carbon disulfide	~	0.362	U	1.290		0.362	U	0.500		4.800		0.362	U
Carbon tetrachloride	5	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U
Chlorobenzene	5	0.284	U	0.310	J	0.284	U	0.284	U	0.284	U	0.284	U
Chloroethane	5	0.448	U	0.600		0.448	U	0.448	U	0.448	U	0.448	U
Chloroform	7	2.800		**24.100**		**7.330**		0.580		2.120		1.110	
Chloromethane	5	0.372	U	0.372	U	0.372	U	0.372	U	0.372	U	0.372	U
cis-1,2-Dichloroethylene	5	**29.500**		**2,100**	D	**4,650**	D	0.790		0.320	J	1.940	
cis-1,3-Dichloropropylene	0.4	0.262	U	0.262	U	0.262	U	0.262	U	0.262	U	0.262	U
Cyclohexane	~	0.491	U	2.010		0.491	U	0.491	U	0.491	U	0.491	U
Dibromochloromethane	50	0.146	U	0.146	U	0.146	U	0.146	U	0.146	U	0.146	U
Dibromomethane	~	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U
Dichlorodifluoromethane	5	0.451	U	0.451	U	0.451	U	0.451	U	0.451	U	0.451	U
Diisopropyl ether (DIPE)	~	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U
Ethyl Benzene	5	0.290	U	0.290	U	0.290	U	0.290	U	0.290	U	0.290	U
Ethyl tert-butyl ether (ETBE)	~	0.479	U	0.479	U	0.479	U	0.479	U	0.479	U	0.479	U
Hexachlorobutadiene	0.5	0.241	U	0.241	U	0.241	U	0.241	U	0.241	U	0.241	U
Iodomethane	~	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Isopropylbenzene	5	0.405	U	1.560		2.650		0.405	U	0.405	U	0.405	U
Methyl acetate	~	0.442	U	0.442	U	0.442	U	0.442	U	0.442	U	0.442	U
Methyl Methacrylate	~	0.415	U	0.415	U	0.415	U	0.415	U	0.415	U	0.415	U
Methyl tert-butyl ether (MTBE)	10	0.244	U	1.960		1.280		0.244	U	0.244	U	0.550	
Methylcyclohexane	~	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Methylene chloride	5	0.397	U	2.220		0.840	JB	0.397	U	0.397	U	0.397	U
Naphthalene	10	0.212	U	0.212	U	0.290	J	0.212	U	0.212	U	0.212	U
n-Butylbenzene	5	0.399	U	0.399	U	0.399	U	0.399	U	0.399	U	0.399	U
n-Propylbenzene	5	0.384	U	0.384	U	0.384	U	0.384	U	0.384	U	0.384	U
o-Xylene	5	0.261	U	0.290	J	1.450		0.261	U	0.261	U	0.261	U
p- & m- Xylenes	~	0.578	U	0.578	U	0.578	U	0.578	U	0.578	U	0.578	U
p-Diethylbenzene	~	0.341	U	0.341	U	0.341	U	0.341	U	0.341	U	0.341	U
p-Ethyltoluene	~	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
p-Isopropyltoluene	5	0.377	U	0.377	U	0.377	U	0.377	U	0.377	U	0.377	U
sec-Butylbenzene	5	0.444	U	3.550		0.770		0.444	U	0.444	U	0.444	U
Styrene	5	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U
tert-Amyl alcohol (TAA)	~	4.160	U	4.160	U	4.160	U	4.160	U	4.160	U	4.160	U
tert-Amyl methyl ether (TAME)	~	0.511	U	0.511	U	0.511	U	0.511	U	0.511	U	0.511	U
tert-Butyl alcohol (TBA)	~	0.608	U	26.600		17.300		0.608	U	0.608	U	0.608	U
tert-Butylbenzene	5	0.367	U	0.500		0.367	U	0.367	U	0.367	U	0.367	U
Tetrachloroethylene	5	0.430	J	**51.300**		**59.200**	E	0.239	U	0.239	U	0.239	U
Tetrahydrofuran	~	0.485	U	0.485	U	0.485	U	0.485	U	0.485	U	0.485	U
Toluene	5	0.346	U	0.660		2.430		0.346	U	0.346	U	0.346	U
trans-1,2-Dichloroethylene	5	0.279	U	**24.100**	D	**74.100**	E	0.279	U	0.279	U	0.279	U
trans-1,3-Dichloropropylene	0.4	0.229	U	0.229	U	0.229	U	0.229	U	0.229	U	0.229	U
trans-1,4-dichloro-2-butene	~	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U
Trichloroethylene	5	**740**	BD	**53,700**	D	**208,000**	D	**27.600**		**23.700**		**251**	D
Trichlorofluoromethane	5	0.337	U	0.337	U	0.337	U	0.337	U	0.337	U	0.337	U
Vinyl acetate	~	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Vinyl Chloride	2	0.469	U	**42**		**46.800**	E	0.469	U	0.469	U	0.469	U
Xylenes, Total	5	0.839	U	0.839	U	1.800		0.839	U	0.839	U	0.839	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 7B - Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-03S		MW-03M		MW-03D		MW-04S		MW-04M		MW-04D	
LAB SAMPLE ID		24I0218-01		24I0079-06		24I0356-05		24I0079-05		24I0079-07		24I0218-03	
SAMPLING DATE		9/4/2024 9:05:00 AM		9/3/2024 2:15:00 PM		9/6/2024 8:40:00 AM		9/3/2024 1:25:00 PM		9/3/2024 2:30:00 PM		9/4/2024 12:55:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics by EPA 8260 (ug/L)													
1,1,1,2-Tetrachloroethane	5	0.216	U	0.216	U	0.216	U	0.216	U	0.216	U	0.216	U
1,1,1-Trichloroethane	5	0.266	U	1.450		3.780		4.490		0.740		0.266	U
1,1,2,2-Tetrachloroethane	5	0.256	U	0.256	U	0.256	U	0.256	U	0.256	U	0.256	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	5	0.286	U	0.286	U	0.286	U	0.286	U	0.286	U	0.286	U
1,1,2-Trichloroethane	1	0.249	U	0.770		**3.260**		0.249	U	0.249	U	0.249	U
1,1-Dichloroethane	5	0.272	U	0.410	J	2.680		3.700		0.710		0.680	
1,1-Dichloroethylene	5	0.327	U	2.760		**64.600**	E	0.327	U	0.327	U	**12.300**	
1,1-Dichloropropylene	5	0.314	U	0.314	U	0.314	U	0.314	U	0.314	U	0.314	U
1,2,3-Trichlorobenzene	5	0.222	U	0.222	U	0.222	U	0.222	U	0.222	U	0.222	U
1,2,3-Trichloropropane	0.04	***0.273***	U	***0.273***	U	***0.273***	U	***0.273***	U	***0.273***	U	***0.273***	U
1,2,4,5-Tetramethylbenzene	~	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U
1,2,4-Trichlorobenzene	5	0.138	U	0.138	U	0.138	U	0.138	U	0.138	U	0.138	U
1,2,4-Trimethylbenzene	5	0.310	U	0.310	U	0.980		0.310	U	0.310	U	0.310	U
1,2-Dibromo-3-chloropropane	0.04	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U
1,2-Dibromoethane	0.0006	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U
1,2-Dichlorobenzene	3	0.270	U	0.270	U	0.270	U	0.270	U	0.270	U	0.270	U
1,2-Dichloroethane	0.6	*0.377*	U	0.377	U	**2.420**		0.377	U	0.377	U	0.377	U
1,2-Dichloropropane	1	0.327	U	0.327	U	0.327	U	0.327	U	0.327	U	0.327	U
1,3,5-Trimethylbenzene	5	0.347	U	0.347	U	0.510		0.347	U	0.347	U	0.347	U
1,3-Dichlorobenzene	3	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U
1,3-Dichloropropane	5	0.260	U	0.260	U	0.260	U	0.260	U	0.260	U	0.260	U
1,4-Dichlorobenzene	3	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U
1,4-Dioxane	0.35	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U
2,2-Dichloropropane	5	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U
2-Butanone	50	0.421	U	0.421	U	0.421	U	0.421	U	0.421	U	0.421	U
2-Chlorotoluene	5	0.376	U	0.376	U	0.376	U	0.376	U	0.376	U	0.376	U
2-Hexanone	50	0.320	U	0.320	U	0.320	U	0.320	U	0.320	U	0.320	U
4-Chlorotoluene	5	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U
4-Methyl-2-pentanone	~	0.365	U	0.365	U	4.530		0.365	U	0.365	U	0.365	U
Acetone	50	1.340	U	1.340	U	1.340	U	1.340	U	1.340	U	1.340	U
Acrolein	~	0.447	U	0.447	U	0.447	U	0.447	U	0.447	U	0.447	U
Acrylonitrile	~	0.422	U	0.422	U	0.422	U	0.422	U	0.422	U	0.422	U
Benzene	1	0.279	U	0.279	U	**1.180**		0.279	U	0.279	U	0.460	J
Bromobenzene	5	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U
Bromochloromethane	5	0.354	U	0.354	U	0.354	U	0.354	U	0.354	U	0.354	U
Bromodichloromethane	50	0.245	U	0.245	U	0.245	U	0.245	U	0.245	U	0.245	U
Bromoform	50	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U
Bromomethane	5	0.119	U	0.119	U	0.119	U	0.119	U	0.119	U	0.119	U
Carbon disulfide	~	0.362	U	0.362	U	0.362	U	0.362	U	0.362	U	0.362	U
Carbon tetrachloride	5	0.204	U	0.204	U	0.204	U	0.810		0.290	J	0.204	U
Chlorobenzene	5	0.284	U	0.284	U	0.284	U	0.284	U	0.284	U	0.284	U
Chloroethane	5	0.448	U	0.448	U	0.448	U	0.448	U	0.448	U	0.448	U
Chloroform	7	0.243	U	5.630		3.670		5.740		5.930		0.300	J
Chloromethane	5	0.372	U	0.372	U	0.372	U	0.372	U	0.372	U	0.372	U
cis-1,2-Dichloroethylene	5	0.294	U	**11.400**		**2,420**	D	0.294	U	1.400		**89.200**	D
cis-1,3-Dichloropropylene	0.4	0.262	U	0.262	U	0.262	U	0.262	U	0.262	U	0.262	U
Cyclohexane	~	0.491	U	0.491	U	0.491	U	0.491	U	0.491	U	0.491	U
Dibromochloromethane	50	0.146	U	0.146	U	0.146	U	0.146	U	0.146	U	0.146	U
Dibromomethane	~	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U
Dichlorodifluoromethane	5	0.451	U	0.451	U	0.451	U	0.451	U	0.451	U	0.451	U
Diisopropyl ether (DIPE)	~	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U
Ethyl Benzene	5	0.290	U	0.530		**19.800**		0.290	U	0.290	U	0.290	U
Ethyl tert-butyl ether (ETBE)	~	0.479	U	0.479	U	0.479	U	0.479	U	0.479	U	0.479	U
Hexachlorobutadiene	0.5	0.241	U	0.241	U	0.241	U	0.241	U	0.241	U	0.241	U
Iodomethane	~	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Isopropylbenzene	5	0.405	U	0.405	U	0.730		0.405	U	0.405	U	0.405	U
Methyl acetate	~	0.442	U	0.442	U	0.442	U	0.442	U	0.442	U	0.442	U
Methyl Methacrylate	~	0.415	U	0.415	U	0.415	U	0.415	U	0.415	U	0.415	U
Methyl tert-butyl ether (MTBE)	10	0.244	U	1.370		1.590		0.244	U	0.244	U	9.680	
Methylcyclohexane	~	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Methylene chloride	5	0.397	U	0.397	U	3.070	B	0.397	U	0.397	U	0.640	J
Naphthalene	10	0.212	U	0.530	JB	0.480	J	0.212	U	0.212	U	0.212	U
n-Butylbenzene	5	0.399	U	0.399	U	0.399	U	0.399	U	0.399	U	0.399	U
n-Propylbenzene	5	0.384	U	0.384	U	0.384	U	0.384	U	0.384	U	0.384	U
o-Xylene	5	0.261	U	1.230		**29.100**		0.261	U	0.261	U	0.261	U
p- & m- Xylenes	~	0.578	U	0.730	J	70.200		0.578	U	0.578	U	0.578	U
p-Diethylbenzene	~	0.341	U	0.341	U	0.341	U	0.341	U	0.341	U	0.341	U
p-Ethyltoluene	~	0.200	U	0.200	U	0.950		0.200	U	0.200	U	0.200	U
p-Isopropyltoluene	5	0.377	U	0.377	U	0.377	U	0.377	U	0.377	U	0.377	U
sec-Butylbenzene	5	0.444	U	0.444	U	0.444	U	0.444	U	0.444	U	0.444	U
Styrene	5	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U
tert-Amyl alcohol (TAA)	~	4.160	U	4.160	U	4.160	U	4.160	U	4.160	U	4.160	U
tert-Amyl methyl ether (TAME)	~	0.511	U	0.511	U	0.511	U	0.511	U	0.511	U	0.511	U
tert-Butyl alcohol (TBA)	~	0.608	U	0.608	U	10		0.608	U	0.608	U	0.608	U
tert-Butylbenzene	5	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U
Tetrachloroethylene	5	0.239	U	**11.500**		**32.400**		0.239	U	0.810		0.420	J
Tetrahydrofuran	~	0.485	U	0.485	U	0.485	U	0.485	U	0.485	U	0.485	U
Toluene	5	0.346	U	1.060		**40**		0.346	U	0.346	U	0.346	U
trans-1,2-Dichloroethylene	5	0.279	U	1.570		**53.700**	E	0.279	U	0.279	U	3.570	
trans-1,3-Dichloropropylene	0.4	0.229	U	0.229	U	0.229	U	0.229	U	0.229	U	0.229	U
trans-1,4-dichloro-2-butene	~	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U
Trichloroethylene	5	0.249	U	**558**	D	**37,500**	D	**43**		**251**	BD	**2,710**	D
Trichlorofluoromethane	5	0.337	U	0.337	U	0.337	U	0.337	U	0.337	U	0.337	U
Vinyl acetate	~	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Vinyl Chloride	2	0.469	U	0.469	U	**25.700**		0.469	U	0.469	U	1.180	
Xylenes, Total	5	0.839	U	1.960		**99.300**		0.839	U	0.839	U	0.839	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 7B - Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-05S		MW-05M		MW-05D		MW-06S		MW-06D		MW-07S		MW-07M		MW-07D	
LAB SAMPLE ID		24I0273-09		24I0273-10		24I0273-08		24I0525-02		24I0273-01		24I0273-03		24I0273-04		24I0273-02	
SAMPLING DATE		9/5/2024 1:00:00 PM		9/5/2024 1:00:00 PM		9/5/2024 11:45:00 AM		9/10/2024 11:45:00 AM		9/5/2024 8:05:00 AM		9/5/2024 1:00:00 PM		9/5/2024 2:30:00 PM		9/5/2024 10:20:00 AM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics by EPA 8260 (ug/L)																	
1,1,1,2-Tetrachloroethane	5	0.216	U	0.216	U	0.216	U	***10.800***	U	0.216	U	0.216	U	0.216	U	0.216	U
1,1,1-Trichloroethane	5	0.266	U	0.266	U	0.266	U	***13.300***	U	0.266	U	4.310		**72**	D	0.266	U
1,1,2,2-Tetrachloroethane	5	0.256	U	0.256	U	0.256	U	***12.800***	U	0.256	U	0.256	U	3.190		0.256	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	5	0.286	U	0.286	U	0.286	U	***14.300***	U	0.286	U	0.286	U	0.286	U	0.286	U
1,1,2-Trichloroethane	1	0.249	U	0.249	U	0.249	U	***12.400***	U	0.249	U	**4.790**		**60.500**	D	0.249	U
1,1-Dichloroethane	5	0.272	U	0.272	U	0.272	U	***13.600***	U	**16.500**		0.272	U	0.780		0.990	
1,1-Dichloroethylene	5	0.327	U	0.327	U	0.327	U	***16.400***	U	**106**	D	1.870		**29.100**		***164***	U
1,1-Dichloropropylene	5	0.314	U	0.314	U	0.314	U	***15.700***	U	0.314	U	0.314	U	0.314	U	0.314	U
1,2,3-Trichlorobenzene	5	0.222	U	0.222	U	0.222	U	***11.100***	U	0.222	U	0.222	U	0.222	U	0.222	U
1,2,3-Trichloropropane	0.04	***0.273***	U	***0.273***	U	***0.273***	U	***13.600***	U	***0.273***	U	***0.273***	U	**2.900**		***0.273***	U
1,2,4,5-Tetramethylbenzene	~	0.255	U	0.255	U	0.255	U	12.800	U	1.180		0.255	U	2.130		0.255	U
1,2,4-Trichlorobenzene	5	0.138	U	0.138	U	0.138	U	***6.900***	U	0.138	U	0.138	U	0.138	U	0.138	U
1,2,4-Trimethylbenzene	5	0.310	U	0.310	U	0.310	U	***15.500***	U	**51**	D	0.430	J	**28**		0.570	
1,2-Dibromo-3-chloropropane	0.04	***0.432***	U	***0.432***	U	***0.432***	U	***21.600***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U
1,2-Dibromoethane	0.0006	***0.215***	U	***0.215***	U	***0.215***	U	***10.800***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U
1,2-Dichlorobenzene	3	0.270	U	0.270	U	0.270	U	***13.500***	U	0.270	U	0.270	U	0.460	J	0.270	U
1,2-Dichloroethane	0.6	0.377	U	0.377	U	0.377	U	***18.800***	U	0.377	U	0.390	J	**4.220**		**2.310**	
1,2-Dichloropropane	1	0.327	U	0.327	U	0.327	U	***16.400***	U	0.327	U	0.327	U	0.327	U	0.327	U
1,3,5-Trimethylbenzene	5	0.347	U	0.347	U	0.347	U	***17.400***	U	**16.500**		0.347	U	**9.350**		0.347	U
1,3-Dichlorobenzene	3	0.283	U	0.283	U	0.283	U	***14.200***	U	0.283	U	0.283	U	0.283	U	0.283	U
1,3-Dichloropropane	5	0.260	U	0.260	U	0.260	U	***13***	U	0.260	U	0.260	U	0.260	U	0.260	U
1,4-Dichlorobenzene	3	0.311	U	0.311	U	0.311	U	***15.600***	U	0.311	U	0.311	U	0.311	U	0.311	U
1,4-Dioxane	0.35	***35.300***	U	***35.300***	U	***35.300***	U	***1,760***	U	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U
2,2-Dichloropropane	5	0.466	U	0.466	U	0.466	U	***23.300***	U	0.466	U	0.466	U	0.466	U	0.466	U
2-Butanone	50	0.421	U	0.421	U	0.421	U	21	U	0.421	U	0.421	U	0.421	U	0.421	U
2-Chlorotoluene	5	0.376	U	0.376	U	0.376	U	***18.800***	U	0.376	U	0.376	U	0.376	U	0.376	U
2-Hexanone	50	0.320	U	0.320	U	0.320	U	16	U	0.320	U	0.320	U	0.320	U	0.320	U
4-Chlorotoluene	5	0.311	U	0.311	U	0.311	U	***15.600***	U	0.311	U	0.311	U	0.311	U	0.311	U
4-Methyl-2-pentanone	~	0.365	U	0.365	U	0.365	U	18.200	U	2.400		1.530		75	D	182	U
Acetone	50	1.340	U	2.580		1.340	U	***67***	U	1.340	U	1.520	J	6.800		14.900	
Acrolein	~	0.447	U	0.447	U	0.447	U	22.400	U	0.447	U	0.447	U	0.447	U	0.447	U
Acrylonitrile	~	0.422	U	0.422	U	0.422	U	21.100	U	0.422	U	1.130		1.650		0.422	U
Benzene	1	0.279	U	0.279	U	0.279	U	***14***	U	0.740		0.300	J	**1.020**		**1.550**	
Bromobenzene	5	0.367	U	0.367	U	0.367	U	***18.400***	U	0.367	U	0.367	U	0.367	U	0.367	U
Bromochloromethane	5	0.354	U	0.354	U	0.354	U	***17.700***	U	0.354	U	0.354	U	0.354	U	0.354	U
Bromodichloromethane	50	0.245	U	0.245	U	0.245	U	12.200	U	0.245	U	0.245	U	0.245	U	0.245	U
Bromoform	50	0.163	U	0.163	U	0.163	U	8.150	U	0.163	U	0.163	U	0.163	U	0.163	U
Bromomethane	5	0.119	U	0.119	U	0.119	U	***5.950***	U	0.119	U	0.119	U	0.220	J	0.119	U
Carbon disulfide	~	0.362	U	0.362	U	0.362	U	18.100	U	0.362	U	0.362	U	0.362	U	0.362	U
Carbon tetrachloride	5	0.204	U	0.204	U	0.204	U	***10.200***	U	0.204	U	0.204	U	0.204	U	0.204	U
Chlorobenzene	5	0.284	U	0.284	U	0.284	U	***14.200***	U	0.284	U	0.284	U	0.284	U	0.284	U
Chloroethane	5	0.448	U	0.448	U	0.448	U	***22.400***	U	0.448	U	0.448	U	0.448	U	0.448	U
Chloroform	7	3.550		2.170		1.350		***12.200***	U	0.243	U	**20.900**		**68**	D	**9.910**	
Chloromethane	5	0.372	U	0.372	U	0.372	U	***18.600***	U	0.580		0.372	U	0.372	U	0.372	U
cis-1,2-Dichloroethylene	5	0.400	J	**5.930**		**9.460**		**116**	D	**48,000**	D	**10.400**		**23**		**410**	D
cis-1,3-Dichloropropylene	0.4	0.262	U	0.262	U	0.262	U	***13.100***	U	0.262	U	0.262	U	0.262	U	0.262	U
Cyclohexane	~	0.491	U	0.491	U	0.491	U	24.600	U	0.491	U	0.491	U	0.491	U	0.491	U
Dibromochloromethane	50	0.146	U	0.146	U	0.146	U	7.300	U	0.146	U	0.146	U	0.146	U	0.146	U
Dibromomethane	~	0.203	U	0.203	U	0.203	U	10.200	U	0.203	U	0.203	U	0.203	U	0.203	U
Dichlorodifluoromethane	5	0.451	U	0.451	U	0.451	U	***22.600***	U	0.451	U	0.451	U	0.451	U	0.451	U
Diisopropyl ether (DIPE)	~	0.466	U	0.466	U	0.466	U	23.300	U	0.466	U	0.466	U	0.466	U	0.466	U
Ethyl Benzene	5	0.290	U	0.290	U	0.290	U	***14.500***	U	**24**		2.350		**151**	D	4.240	
Ethyl tert-butyl ether (ETBE)	~	0.479	U	0.479	U	0.479	U	24	U	0.479	U	0.479	U	0.479	U	0.479	U
Hexachlorobutadiene	0.5	0.241	U	0.241	U	0.241	U	***12***	U	0.241	U	0.241	U	0.241	U	0.241	U
Iodomethane	~	0.477	U	0.477	U	0.477	U	23.800	U	0.477	U	0.477	U	0.477	U	0.477	U
Isopropylbenzene	5	0.405	U	0.405	U	0.405	U	***20.200***	U	**11.600**		0.405	U	**7.960**		0.470	J
Methyl acetate	~	0.442	U	0.442	U	0.442	U	22.100	U	0.442	U	0.442	U	0.442	U	0.442	U
Methyl Methacrylate	~	0.415	U	0.415	U	0.415	U	20.800	U	0.415	U	0.415	U	0.415	U	0.415	U
Methyl tert-butyl ether (MTBE)	10	0.244	U	7.760		6.420		***12.200***	U	0.244	U	0.244	U	0.244	U	7.610	
Methylcyclohexane	~	0.477	U	0.477	U	0.477	U	23.800	U	0.477	U	0.477	U	0.477	U	0.477	U
Methylene chloride	5	0.397	U	0.770	J	0.397	U	***19.800***	U	1.420	J	0.530	J	1.990	J	**6.500**	
Naphthalene	10	0.212	U	0.212	U	0.212	U	***10.600***	U	**12.300**		0.460	J	**21.500**		1.110	J
n-Butylbenzene	5	0.399	U	0.399	U	0.399	U	***20***	U	0.399	U	0.399	U	2.290		0.399	U
n-Propylbenzene	5	0.384	U	0.384	U	0.384	U	***19.200***	U	**10.700**		0.384	U	**5.710**		0.384	U
o-Xylene	5	0.261	U	0.261	U	0.261	U	***13***	U	**5.450**		**8.640**		**674**	D	**6.330**	
p- & m- Xylenes	~	0.578	U	0.578	U	0.578	U	28.900	U	17.100		1.540		218	D	3.880	
p-Diethylbenzene	~	0.341	U	0.341	U	0.341	U	17	U	1.640		0.341	U	2.480		0.341	U
p-Ethyltoluene	~	0.200	U	0.200	U	0.200	U	10	U	30.100		0.240	J	15.800		0.260	J
p-Isopropyltoluene	5	0.377	U	0.377	U	0.377	U	***18.800***	U	1.160		0.377	U	1.330		0.377	U
sec-Butylbenzene	5	0.444	U	0.444	U	0.444	U	***22.200***	U	2.790		0.444	U	3.990		0.444	U
Styrene	5	0.255	U	0.255	U	0.255	U	***12.800***	U	0.255	U	0.255	U	0.255	U	0.255	U
tert-Amyl alcohol (TAA)	~	4.160	U	4.160	U	4.160	U	208	U	4.160	U	4.160	U	4.160	U	4.160	U
tert-Amyl methyl ether (TAME)	~	0.511	U	0.511	U	0.511	U	25.600	U	0.511	U	0.511	U	0.511	U	0.511	U
tert-Butyl alcohol (TBA)	~	0.608	U	0.608	U	0.608	U	30.400	U	0.608	U	5.610		22.500		36.700	
tert-Butylbenzene	5	0.367	U	0.367	U	0.367	U	***18.400***	U	1.480		0.367	U	1.080		0.367	U
Tetrachloroethylene	5	0.239	U	0.239	U	0.239	U	***12***	U	**26**	JD	**18.300**		**263**	D	**30.100**	
Tetrahydrofuran	~	0.485	U	0.485	U	0.485	U	24.200	U	0.485	U	0.485	U	0.485	U	0.485	U
Toluene	5	0.346	U	0.346	U	0.346	U	***17.300***	U	**19.200**		4.260		**416**	D	**25.800**	
trans-1,2-Dichloroethylene	5	0.279	U	0.279	U	0.510		***14***	U	**179**	D	0.540		3.560		**33.100**	
trans-1,3-Dichloropropylene	0.4	0.229	U	0.229	U	0.229	U	***11.400***	U	0.229	U	0.229	U	0.229	U	0.229	U
trans-1,4-dichloro-2-butene	~	0.283	U	0.283	U	0.283	U	14.200	U	0.283	U	0.283	U	0.283	U	0.283	U
Trichloroethylene	5	**41**		**74.300**	BD	**16.500**		**610**	D	**206,000**	D	**8,640**	D	**93,200**	D	**45,900**	D
Trichlorofluoromethane	5	0.337	U	0.337	U	0.337	U	***16.800***	U	0.337	U	0.337	U	0.337	U	0.337	U
Vinyl acetate	~	0.477	U	0.477	U	0.477	U	23.800	U	0.477	U	0.477	U	0.477	U	0.477	U
Vinyl Chloride	2	0.469	U	0.469	U	0.469	U	***23.400***	U	**385**	D	0.469	U	0.469	U	**6.790**	
Xylenes, Total	5	0.839	U	0.839	U	0.839	U	***42***	U	**22.500**		**10.200**		**892**	D	**10.200**	

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 7B - Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-08S		MW-08M		MW-08D		MW-09S		MW-09M		MW-09D	
LAB SAMPLE ID		24I0356-04		24I0356-01		24I0218-09		24I0218-08		24I0356-02		24I0356-03	
SAMPLING DATE		9/6/2024 1:40:00 PM		9/6/2024 9:00:00 AM		9/4/2024 2:10:00 PM		9/4/2024 2:20:00 PM		9/6/2024 10:50:00 AM		9/6/2024 12:35:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics by EPA 8260 (ug/L)													
1,1,1,2-Tetrachloroethane	5	0.216	U	0.216	U	0.216	U	0.216	U	0.216	U	0.216	U
1,1,1-Trichloroethane	5	1.290		0.360	J	0.266	U	0.266	U	0.266	U	0.266	U
1,1,2,2-Tetrachloroethane	5	0.256	U	0.256	U	0.256	U	0.256	U	0.256	U	0.256	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	5	0.286	U	0.550		0.286	U	0.286	U	0.286	U	0.286	U
1,1,2-Trichloroethane	1	0.249	U	0.249	U	0.249	U	0.249	U	0.249	U	0.249	U
1,1-Dichloroethane	5	0.272	U	0.272	U	0.272	U	0.272	U	0.272	U	0.272	U
1,1-Dichloroethylene	5	0.327	U	1.900		0.730		1.090		1.100		0.840	
1,1-Dichloropropylene	5	0.314	U	0.314	U	0.314	U	0.314	U	0.314	U	0.314	U
1,2,3-Trichlorobenzene	5	0.222	U	0.222	U	0.222	U	0.222	U	0.222	U	0.222	U
1,2,3-Trichloropropane	0.04	***0.273***	U	***0.273***	U	***0.273***	U	***0.273***	U	***0.273***	U	***0.273***	U
1,2,4,5-Tetramethylbenzene	~	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U
1,2,4-Trichlorobenzene	5	0.138	U	0.138	U	0.138	U	0.138	U	0.138	U	0.138	U
1,2,4-Trimethylbenzene	5	0.310	U	0.310	U	0.310	U	0.310	U	0.310	U	0.310	U
1,2-Dibromo-3-chloropropane	0.04	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U
1,2-Dibromoethane	0.0006	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U
1,2-Dichlorobenzene	3	0.270	U	0.270	U	0.270	U	0.270	U	0.270	U	0.270	U
1,2-Dichloroethane	0.6	0.377	U	0.377	U	0.377	U	0.377	U	0.377	U	0.377	U
1,2-Dichloropropane	1	0.327	U	0.327	U	0.327	U	0.327	U	0.327	U	0.327	U
1,3,5-Trimethylbenzene	5	0.347	U	0.347	U	0.347	U	0.347	U	0.347	U	0.347	U
1,3-Dichlorobenzene	3	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U
1,3-Dichloropropane	5	0.260	U	0.260	U	0.260	U	0.260	U	0.260	U	0.260	U
1,4-Dichlorobenzene	3	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U
1,4-Dioxane	0.35	***35.300***	U	**39.100**	J	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U
2,2-Dichloropropane	5	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U
2-Butanone	50	0.421	U	0.421	U	0.421	U	0.421	U	0.421	U	0.421	U
2-Chlorotoluene	5	0.376	U	0.376	U	0.376	U	0.376	U	0.376	U	0.376	U
2-Hexanone	50	0.320	U	0.320	U	0.320	U	0.320	U	0.320	U	0.320	U
4-Chlorotoluene	5	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U
4-Methyl-2-pentanone	~	0.365	U	0.365	U	0.365	U	0.365	U	0.365	U	0.365	U
Acetone	50	1.590	J	1.340	U	1.780	J	1.340	U	1.340	U	1.340	U
Acrolein	~	0.447	U	0.447	U	0.447	U	0.447	U	0.447	U	0.447	U
Acrylonitrile	~	0.422	U	0.422	U	0.422	U	0.422	U	0.422	U	0.422	U
Benzene	1	0.279	U	0.279	U	0.279	U	0.279	U	0.279	U	0.279	U
Bromobenzene	5	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U
Bromochloromethane	5	0.354	U	0.354	U	0.354	U	0.354	U	0.354	U	0.354	U
Bromodichloromethane	50	0.245	U	0.245	U	0.245	U	0.245	U	0.245	U	0.245	U
Bromoform	50	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U
Bromomethane	5	0.119	U	0.119	U	0.119	U	0.119	U	0.119	U	0.119	U
Carbon disulfide	~	0.362	U	0.362	U	0.362	U	0.362	U	0.362	U	0.362	U
Carbon tetrachloride	5	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U
Chlorobenzene	5	0.284	U	0.284	U	0.284	U	0.284	U	0.284	U	0.284	U
Chloroethane	5	0.448	U	0.448	U	0.448	U	0.448	U	0.448	U	0.448	U
Chloroform	7	**16**		5.810		**8.130**		1.420		1.630		1.490	
Chloromethane	5	0.372	U	0.372	U	0.372	U	0.372	U	0.372	U	0.372	U
cis-1,2-Dichloroethylene	5	0.294	U	0.800		1.120		0.294	U	0.390	J	0.330	J
cis-1,3-Dichloropropylene	0.4	0.262	U	0.262	U	0.262	U	0.262	U	0.262	U	0.262	U
Cyclohexane	~	0.491	U	0.491	U	0.491	U	0.491	U	0.491	U	0.491	U
Dibromochloromethane	50	0.146	U	0.146	U	0.146	U	0.146	U	0.146	U	0.146	U
Dibromomethane	~	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U
Dichlorodifluoromethane	5	0.451	U	0.451	U	0.451	U	0.451	U	0.451	U	0.451	U
Diisopropyl ether (DIPE)	~	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U
Ethyl Benzene	5	0.290	U	0.290	U	0.290	U	0.290	U	0.290	U	0.290	U
Ethyl tert-butyl ether (ETBE)	~	0.479	U	0.479	U	0.479	U	0.479	U	0.479	U	0.479	U
Hexachlorobutadiene	0.5	0.241	U	0.241	U	0.241	U	0.241	U	0.241	U	0.241	U
Iodomethane	~	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Isopropylbenzene	5	0.405	U	0.405	U	0.405	U	0.405	U	0.405	U	0.405	U
Methyl acetate	~	0.442	U	0.442	U	0.442	U	0.442	U	0.442	U	0.442	U
Methyl Methacrylate	~	0.415	U	0.415	U	0.415	U	0.415	U	0.415	U	0.415	U
Methyl tert-butyl ether (MTBE)	10	0.244	U	0.244	U	0.244	U	**27.400**		**32**		**25.800**	
Methylcyclohexane	~	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Methylene chloride	5	1.170	JB	0.440	JB	0.810	J	0.397	U	0.397	U	0.397	U
Naphthalene	10	0.212	U	0.212	U	0.212	U	0.212	U	0.212	U	0.212	U
n-Butylbenzene	5	0.399	U	0.399	U	0.399	U	0.399	U	0.399	U	0.399	U
n-Propylbenzene	5	0.384	U	0.384	U	0.384	U	0.384	U	0.384	U	0.384	U
o-Xylene	5	0.261	U	0.261	U	0.261	U	0.261	U	0.261	U	0.261	U
p- & m- Xylenes	~	0.578	U	0.578	U	0.578	U	0.578	U	0.578	U	0.578	U
p-Diethylbenzene	~	0.341	U	0.341	U	0.341	U	0.341	U	0.341	U	0.341	U
p-Ethyltoluene	~	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
p-Isopropyltoluene	5	0.377	U	0.377	U	0.377	U	0.377	U	0.377	U	0.377	U
sec-Butylbenzene	5	0.444	U	0.444	U	0.444	U	0.444	U	0.444	U	0.444	U
Styrene	5	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U
tert-Amyl alcohol (TAA)	~	4.160	U	4.160	U	4.160	U	4.160	U	4.160	U	4.160	U
tert-Amyl methyl ether (TAME)	~	0.511	U	0.511	U	0.511	U	0.511	U	0.511	U	0.511	U
tert-Butyl alcohol (TBA)	~	1.110		1.590		0.608	U	0.608	U	0.608	U	0.608	U
tert-Butylbenzene	5	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U
Tetrachloroethylene	5	0.239	U	0.239	U	0.239	U	0.239	U	0.239	U	0.239	U
Tetrahydrofuran	~	0.485	U	0.485	U	0.485	U	0.485	U	0.485	U	0.485	U
Toluene	5	0.346	U	0.346	U	0.346	U	0.346	U	0.346	U	0.346	U
trans-1,2-Dichloroethylene	5	0.279	U	0.279	U	0.279	U	0.279	U	0.279	U	0.279	U
trans-1,3-Dichloropropylene	0.4	0.229	U	0.229	U	0.229	U	0.229	U	0.229	U	0.229	U
trans-1,4-dichloro-2-butene	~	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U
Trichloroethylene	5	**19.400**	BD	**380**	D	**225**	D	**14.400**		**18.500**	B	**13.400**	B
Trichlorofluoromethane	5	0.337	U	0.337	U	0.337	U	0.337	U	0.337	U	0.337	U
Vinyl acetate	~	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Vinyl Chloride	2	0.469	U	0.469	U	0.469	U	0.469	U	0.469	U	0.469	U
Xylenes, Total	5	0.839	U	0.839	U	0.839	U	0.839	U	0.839	U	0.839	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 7B - Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-10S		MW-10D		MW-11S		MW-11D		9.4.2024_Duplicate		9.5.2024_Duplicate		9.4.2024-FB-1		9.9.2024_FB-1	
LAB SAMPLE ID		24I0525-04		24I0429-04		24I0580-01		24I0429-05		24I0218-04		24I0273-05		24I0218-07		24I0429-02	
SAMPLING DATE		9/10/2024 2:15:00 PM		9/9/2024 9:20:00 AM		9/10/2024 8:45:00 PM		9/9/2024 9:25:00 AM		9/4/2024 9:05:00 AM		9/5/2024 1:00:00 PM		9/4/2024 4:10:00 PM		9/9/2024 9:05:00 AM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics by EPA 8260 (ug/L)										*MW-03S Duplicate		*MW-07M Duplicate					
1,1,1,2-Tetrachloroethane	5	***10.800***	U	1.080	U	0.370	J	0.216	U	0.216	U	0.216	U	0.216	U	0.216	U
1,1,1-Trichloroethane	5	**134**	D	1.330	U	**7.690**		0.266	U	0.266	U	**79**	D	0.266	U	0.266	U
1,1,2,2-Tetrachloroethane	5	***12.800***	U	1.280	U	**9.010**		0.256	U	0.256	U	3.470		0.256	U	0.256	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	5	***14.300***	U	1.430	U	0.286	U	0.286	U	0.286	U	0.286	U	0.286	U	0.286	U
1,1,2-Trichloroethane	1	**27.500**	D	**1.350**	JD	**8.780**		0.249	U	0.249	U	**62**	D	0.249	U	0.249	U
1,1-Dichloroethane	5	***13.600***	U	1.360	U	0.272	U	0.272	U	0.272	U	0.730		0.272	U	0.272	U
1,1-Dichloroethylene	5	***16.400***	U	**11.300**	D	0.327	U	0.327	U	0.327	U	**34.600**		0.327	U	0.327	U
1,1-Dichloropropylene	5	***15.700***	U	1.570	U	0.314	U	0.314	U	0.314	U	0.314	U	0.314	U	0.314	U
1,2,3-Trichlorobenzene	5	***11.100***	U	1.110	U	0.222	U	0.222	U	0.222	U	0.222	U	0.222	U	0.222	U
1,2,3-Trichloropropane	0.04	***13.600***	*U*	***1.360***	U	**1.590**		***0.273***	U	***0.273***	U	**3.320**		***0.273***	U	***0.273***	U
1,2,4,5-Tetramethylbenzene	~	13	JD	3.350	D	6.360		0.255	U	0.255	U	2.910		0.255	U	0.255	U
1,2,4-Trichlorobenzene	5	***6.900***	U	0.690	U	0.138	U	0.138	U	0.138	U	0.138	U	0.138	U	0.138	U
1,2,4-Trimethylbenzene	5	**526**	D	**103**	D	**132**	E	0.310	U	0.310	U	**44**	D	0.310	U	0.310	U
1,2-Dibromo-3-chloropropane	0.04	***21.600***	U	***2.160***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U	***0.432***	U
1,2-Dibromoethane	0.0006	***10.800***	U	***1.080***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U	***0.215***	U
1,2-Dichlorobenzene	3	***13.500***	U	1.350	U	0.270	U	0.270	U	0.270	U	0.520		0.270	U	0.270	U
1,2-Dichloroethane	0.6	***18.800***	U	***1.880***	U	**0.690**		0.377	U	0.377	U	**4.640**		0.377	U	0.377	U
1,2-Dichloropropane	1	***16.400***	U	***1.640***	U	0.327	U	0.327	U	0.327	U	0.327	U	0.327	U	0.327	U
1,3,5-Trimethylbenzene	5	**205**	D	**41.800**	D	**39.600**		0.347	U	0.347	U	**14.800**		0.347	U	0.347	U
1,3-Dichlorobenzene	3	***14.200***	U	1.420	U	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U
1,3-Dichloropropane	5	***13***	U	1.300	U	0.260	U	0.260	U	0.260	U	0.260	U	0.260	U	0.260	U
1,4-Dichlorobenzene	3	***15.600***	U	1.560	U	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U
1,4-Dioxane	0.35	***1,760***	U	***176***	U	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U	***35.300***	U
2,2-Dichloropropane	5	***23.300***	U	2.330	U	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U
2-Butanone	50	21	U	2.100	U	1.100		0.421	U	2.500		0.421	U	0.421	U	0.421	U
2-Chlorotoluene	5	***18.800***	U	1.880	U	0.376	U	0.376	U	0.376	U	0.376	U	0.376	U	0.376	U
2-Hexanone	50	16	U	1.600	U	2.730		0.320	U	0.320	U	0.320	U	0.320	U	0.320	U
4-Chlorotoluene	5	***15.600***	U	1.560	U	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U	0.311	U
4-Methyl-2-pentanone	~	19	JD	6.100	D	17.900		0.365	U	0.365	U	83	D	0.365	U	0.365	U
Acetone	50	***67***	U	6.700	U	3.790		1.340	U	11.500		7.980		1.340	U	1.340	U
Acrolein	~	22.400	U	2.240	U	0.447	U	0.447	U	0.447	U	0.447	U	0.447	U	0.447	U
Acrylonitrile	~	21.100	U	2.110	U	0.422	U	0.422	U	0.422	U	0.422	U	0.422	U	0.422	U
Benzene	1	***14***	U	**2.500**	D	0.279	U	0.279	U	0.279	U	**2.580**		0.279	U	0.279	U
Bromobenzene	5	***18.400***	U	1.840	U	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U	0.367	U
Bromochloromethane	5	***17.700***	U	1.770	U	0.354	U	0.354	U	0.354	U	0.354	U	0.354	U	0.354	U
Bromodichloromethane	50	12.200	U	1.220	U	0.245	U	0.245	U	0.245	U	0.245	U	1.540		0.940	
Bromoform	50	8.150	U	0.815	U	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U
Bromomethane	5	***5.950***	U	0.595	U	0.119	U	0.119	U	0.119	U	0.119	U	0.119	U	0.119	U
Carbon disulfide	~	18.100	U	1.810	U	0.362	U	0.362	U	0.362	U	0.362	U	0.362	U	0.362	U
Carbon tetrachloride	5	***10.200***	U	1.020	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U	0.204	U
Chlorobenzene	5	***14.200***	U	1.420	U	0.284	U	0.284	U	0.284	U	0.284	U	0.284	U	0.284	U
Chloroethane	5	***22.400***	U	2.240	U	0.448	U	0.448	U	0.448	U	0.448	U	0.448	U	0.448	U
Chloroform	7	**36.500**	D	4.400	D	2.180		0.243	U	0.243	U	**67.500**	D	**20.200**		**14.600**	
Chloromethane	5	***18.600***	U	1.860	U	0.372	U	0.372	U	0.372	U	0.372	U	0.372	U	0.372	U
cis-1,2-Dichloroethylene	5	**46**	D	**430**	D	1.400		1.400		0.294	U	**24.400**		0.294	U	0.294	U
cis-1,3-Dichloropropylene	0.4	***13.100***	U	***1.310***	U	0.262	U	0.262	U	0.262	U	0.262	U	0.262	U	0.262	U
Cyclohexane	~	24.600	U	2.460	U	0.491	U	0.491	U	0.491	U	0.491	U	0.491	U	0.491	U
Dibromochloromethane	50	7.300	U	0.730	U	0.146	U	0.146	U	0.146	U	0.146	U	0.146	U	0.146	U
Dibromomethane	~	10.200	U	1.020	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U	0.203	U
Dichlorodifluoromethane	5	***22.600***	U	2.260	U	0.451	U	0.451	U	0.451	U	0.451	U	0.451	U	0.451	U
Diisopropyl ether (DIPE)	~	23.300	U	2.330	U	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U	0.466	U
Ethyl Benzene	5	**2,260**	D	**130**	D	**17.300**		0.290	U	0.290	U	**156**	D	0.290	U	0.290	U
Ethyl tert-butyl ether (ETBE)	~	24	U	2.400	U	0.479	U	0.479	U	0.479	U	0.479	U	0.479	U	0.479	U
Hexachlorobutadiene	0.5	***12***	U	***1.200***	U	0.241	U	0.241	U	0.241	U	0.241	U	0.241	U	0.241	U
Iodomethane	~	23.800	U	2.380	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Isopropylbenzene	5	**29.500**	D	4.750	D	2.640		0.405	U	0.405	U	**9.750**		0.405	U	0.405	U
Methyl acetate	~	22.100	U	2.210	U	0.442	U	0.442	U	0.442	U	0.442	U	0.442	U	0.442	U
Methyl Methacrylate	~	20.800	U	2.080	U	0.415	U	0.415	U	0.415	U	0.415	U	0.415	U	0.415	U
Methyl tert-butyl ether (MTBE)	10	***12.200***	U	1.220	U	0.244	U	0.244	U	0.244	U	0.244	U	0.244	U	0.244	U
Methylcyclohexane	~	23.800	U	2.380	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Methylene chloride	5	**37**	JD	**6.150**	JD	0.397	U	0.397	U	0.397	U	2.140		0.397	U	0.397	U
Naphthalene	10	**92.500**	JBD	**21**	D	**58.100**		0.212	U	0.212	U	**29.200**		0.212	U	0.212	U
n-Butylbenzene	5	***20***	U	2.150	JD	1.910		0.399	U	0.399	U	3.280		0.399	U	0.399	U
n-Propylbenzene	5	**48**	D	**9**	D	**7.530**		0.384	U	0.384	U	**7.520**		0.384	U	0.384	U
o-Xylene	5	**2,850**	D	**160**	D	**40.300**		0.261	U	0.261	U	**699**	D	0.261	U	0.261	U
p- & m- Xylenes	~	6,810	D	600	D	108		0.578	U	0.578	U	240	D	0.578	U	0.578	U
p-Diethylbenzene	~	32	D	10.800	D	10.700		0.341	U	0.341	U	3.600		0.341	U	0.341	U
p-Ethyltoluene	~	254	D	50.100	D	52.200		0.200	U	0.200	U	22.100		0.200	U	0.200	U
p-Isopropyltoluene	5	***18.800***	U	**5.600**	D	3.800		0.377	U	0.377	U	1.800		0.377	U	0.377	U
sec-Butylbenzene	5	***22.200***	U	4.100	D	2.280		0.444	U	0.444	U	**5.210**		0.444	U	0.444	U
Styrene	5	**90.500**	D	1.280	U	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U	0.255	U
tert-Amyl alcohol (TAA)	~	208	U	20.800	U	4.160	U	4.160	U	4.160	U	4.160	U	4.160	U	4.160	U
tert-Amyl methyl ether (TAME)	~	25.600	U	2.560	U	0.511	U	0.511	U	0.511	U	0.511	U	0.511	U	0.511	U
tert-Butyl alcohol (TBA)	~	30.400	U	3.040	U	2.420		0.608	U	0.608	U	21.800		0.608	U	0.608	U
tert-Butylbenzene	5	***18.400***	U	1.840	U	0.460	J	0.367	U	0.367	U	1.330		0.367	U	0.367	U
Tetrachloroethylene	5	**532**	D	**72**	D	**25.500**		0.239	U	0.239	U	**270**	D	0.239	U	0.340	J
Tetrahydrofuran	~	24.200	U	2.420	U	0.485	U	0.485	U	0.485	U	0.485	U	0.485	U	0.485	U
Toluene	5	**5,570**	D	**381**	D	**118**	E	0.346	U	0.346	U	**448**	D	0.346	U	0.346	U
trans-1,2-Dichloroethylene	5	***14***	U	**27**	D	0.279	U	0.279	U	0.279	U	4.010		0.279	U	0.279	U
trans-1,3-Dichloropropylene	0.4	***11.400***	U	***1.140***	U	0.229	U	0.229	U	0.229	U	0.229	U	0.229	U	0.229	U
trans-1,4-dichloro-2-butene	~	14.200	U	1.420	U	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U	0.283	U
Trichloroethylene	5	**175,000**	D	**11,300**	D	**16,600**	D	**7.780**	B	**10.300**		**175,000**	D	0.249	U	0.249	U
Trichlorofluoromethane	5	***16.800***	U	1.680	U	0.337	U	0.337	U	0.337	U	0.337	U	0.337	U	0.337	U
Vinyl acetate	~	23.800	U	2.380	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U	0.477	U
Vinyl Chloride	2	***23.400***	U	***2.340***	U	0.469	U	0.469	U	0.469	U	0.469	U	0.469	U	0.469	U
Xylenes, Total	5	**9,660**	D	**760**	D	**148**		0.839	U	0.839	U	**939**	D	0.839	U	0.839	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution

J: Analyte detected at or above the method detection limit but below the reporting limit.

B: Analyte found in the analysis batch blank

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 8A - Semi-Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	GW-1		GW-2		GW-3		GW-X	
LAB SAMPLE ID		23B0854-01		23B0854-03		23B0854-02		23B0854-04	
SAMPLING DATE		Clay St.		Clay St.		Clay St.		Clay St.	
SAMPLE TYPE		Water		Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q
SVOA, 8270 LOW MASTER (ug/l)									
1,1-Biphenyl	~	2.700	U	2.940	U	2.630	U	2.700	U
1,2,4,5-Tetrachlorobenzene	~	2.700	U	2.940	U	2.630	U	2.700	U
1,2,4-Trichlorobenzene	5	2.700	U	2.940	U	2.630	U	2.700	U
1,2-Dichlorobenzene	3	2.700	U	2.940	U	2.630	U	2.700	U
1,2-Diphenylhydrazine (as Azobenze	~	2.700	U	2.940	U	2.630	U	2.700	U
1,3-Dichlorobenzene	3	2.700	U	2.940	U	2.630	U	2.700	U
1,4-Dichlorobenzene	3	2.700	U	2.940	U	2.630	U	2.700	U
2,3,4,6-Tetrachlorophenol	~	2.700	U	2.940	U	2.630	U	2.700	U
2,4,5-Trichlorophenol	1	***2.700***	U	***2.940***	U	***2.630***	U	***2.700***	U
2,4,6-Trichlorophenol	1	***2.700***	U	***2.940***	U	***2.630***	U	***2.700***	U
2,4-Dichlorophenol	5	2.700	U	2.940	U	2.630	U	2.700	U
2,4-Dimethylphenol	50	2.700	U	2.940	U	2.630	U	2.700	U
2,4-Dinitrophenol	10	2.700	U	2.940	U	2.630	U	2.700	U
2,4-Dinitrotoluene	5	2.700	U	2.940	U	2.630	U	2.700	U
2,6-Dinitrotoluene	5	2.700	U	2.940	U	2.630	U	2.700	U
2-Chloronaphthalene	10	2.700	U	2.940	U	2.630	U	2.700	U
2-Chlorophenol	1	***2.700***	U	***2.940***	U	***2.630***	U	***2.700***	U
2-Methylnaphthalene	~	2.700	U	2.940	U	2.630	U	2.700	U
2-Methylphenol	1	***2.700***	U	***2.940***	U	2.630	U	2.700	U
2-Nitroaniline	5	2.700	U	2.940	U	2.630	U	2.700	U
2-Nitrophenol	1	***2.700***	U	***2.940***	U	***2.630***	U	***2.700***	U
3- & 4-Methylphenols	1	***2.700***	U	***2.940***	U	2.630	U	2.700	U
3,3-Dichlorobenzidine	5	2.700	U	2.940	U	2.630	U	2.700	U
3-Nitroaniline	5	2.700	U	2.940	U	2.630	U	2.700	U
4,6-Dinitro-2-methylphenol	~	2.700	U	2.940	U	2.630	U	2.700	U
4-Bromophenyl phenyl ether	~	2.700	U	2.940	U	2.630	U	2.700	U
4-Chloro-3-methylphenol	1	***2.700***	U	***2.940***	U	***2.630***	U	***2.700***	U
4-Chloroaniline	5	2.700	U	2.940	U	2.630	U	2.700	U
4-Chlorophenyl phenyl ether	~	2.700	U	2.940	U	2.630	U	2.700	U
4-Nitroaniline	5	2.700	U	2.940	U	2.630	U	2.700	U
4-Nitrophenol	1	***5.410***	U	***5.880***	U	***5.260***	U	***5.410***	U
Acetophenone	~	2.700	U	2.940	U	2.630	U	2.700	U
Alpha Terpineol	~	5.410	U	5.880	U	5.260	U	5.410	U
Aniline	5	2.700	U	2.940	U	2.630	U	2.700	U
Benzaldehyde	~	2.700	U	2.940	U	2.630	U	2.700	U
Benzidine	~	5.410	U	5.880	U	5.260	U	5.410	U
Benzoic acid	~	2.700	U	2.940	U	2.630	U	2.700	U
Benzyl alcohol	~	2.700	U	2.940	U	2.630	U	2.700	U
Benzyl butyl phthalate	50	2.700	U	2.940	U	2.630	U	2.700	U
Bis(2-chloroethoxy)methane	5	2.700	U	2.940	U	2.630	U	2.700	U
Bis(2-chloroethyl)ether	1	***1.080***	U	***1.180***	U	***1.050***	U	***1.080***	U
Bis(2-chloroisopropyl)ether	5	2.700	U	2.940	U	2.630	U	2.700	U
Caprolactam	~	2.700	U	2.940	U	2.630	U	2.700	U
Carbazole	~	2.700	U	2.940	U	2.630	U	2.700	U
Dibenzofuran	~	2.700	U	2.940	U	2.630	U	2.700	U
Diethyl phthalate	50	2.700	U	2.940	U	2.630	U	2.700	U
Dimethyl phthalate	50	2.700	U	2.940	U	2.630	U	2.700	U
Di-n-butyl phthalate	50	2.700	U	2.940	U	2.630	U	2.700	U
Di-n-octyl phthalate	50	2.700	U	2.940	U	2.630	U	2.700	U
Hexachlorocyclopentadiene	5	***5.410***	U	***5.880***	U	***5.260***	U	***5.410***	U
Isophorone	50	2.700	U	2.940	U	2.630	U	2.700	U
N-nitroso-di-n-propylamine	~	2.700	U	2.940	U	2.630	U	2.700	U
N-Nitrosodiphenylamine	50	2.700	U	2.940	U	2.630	U	2.700	U
Phenol	1	***2.700***	U	***2.940***	U	***2.630***	U	***2.700***	U
SVOA, 8270 SIM MASTER (ug/l)									
Acenaphthene	20	0.0541	U	1.880		0.0526	U	0.0541	U
Acenaphthylene	~	0.0541	U	1.720		0.0526	U	0.0541	U
Anthracene	50	0.0541	U	15.100	D	0.0526	U	0.0541	U
Atrazine	~	0.541	U	0.588	U	0.526	U	0.541	U
Benzo(a)anthracene	0.002	***0.0541***	U	**47.100**	D	***0.0526***	U	***0.0541***	U
Benzo(a)pyrene	0.002	***0.0541***	U	**46.400**	D	***0.0526***	U	***0.0541***	U
Benzo(b)fluoranthene	0.002	***0.0541***	U	**36.200**	D	***0.0526***	U	***0.0541***	U
Benzo(g,h,i)perylene	~	0.0541	U	34.400	D	0.0526	U	0.0541	U
Benzo(k)fluoranthene	0.002	***0.0541***	U	**39.800**	D	***0.0526***	U	***0.0541***	U
Bis(2-ethylhexyl)phthalate	5	0.984		0.953		0.526	U	0.541	U
Chrysene	0.002	***0.0541***	U	**45.900**	D	***0.0526***	U	***0.0541***	U
Dibenzo(a,h)anthracene	~	0.0541	U	4.780		0.0526	U	0.0541	U
Fluoranthene	50	0.0541	U	**109**	D	0.0526	U	0.0541	U
Fluorene	50	0.0541	U	2.220		0.0526	U	0.0541	U
Hexachlorobenzene	0.04	0.0216	U	0.0235	U	0.0211	U	0.0216	U
Hexachlorobutadiene	0.5	***0.541***	U	0.588	U	***0.526***	U	***0.541***	U
Hexachloroethane	5	0.541	U	0.588	U	0.526	U	0.541	U
Indeno(1,2,3-cd)pyrene	0.002	***0.0541***	U	**31.300**	D	***0.0526***	U	***0.0541***	U
Naphthalene	10	0.0541	U	1.410		0.0526	U	0.0541	U
Nitrobenzene	0.4	0.270	U	0.294	U	0.263	U	0.270	U
N-Nitrosodimethylamine	~	0.541	U	0.588	U	0.526	U	0.541	U
Pentachlorophenol	1	0.270	U	0.294	U	0.263	U	0.270	U
Phenanthrene	50	0.0541	U	**62.800**	D	0.0526	U	0.0541	U
Pyrene	50	0.0541	U	**78.400**	D	0.0526	U	0.0541	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Aqueous (ug/l)									
1,4-Dioxane	0.35	1.230		0.300	U	0.300	U	0.300	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values.

U : Not detected at the reported detection limit for the sample.

B: Analyte found in the analysis batch blank

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 8A - Semi-Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	GW-5		GW-4		S-FB-1		GW-FB-1	
LAB SAMPLE ID		23B0727-08		23B0727-09		23B0854-05		23B0854-06	
SAMPLING DATE		Commercial St		Commercial St					
SAMPLE TYPE		Water		Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q
SVOA, 8270 LOW MASTER (ug/l)									
1,1-Biphenyl	~	2.700	U	2.630	U	3.330	U	4.550	U
1,2,4,5-Tetrachlorobenzene	~	2.700	U	2.630	U	3.330	U	4.550	U
1,2,4-Trichlorobenzene	5	2.700	U	2.630	U	3.330	U	4.550	U
1,2-Dichlorobenzene	3	2.700	U	2.630	U	***3.330***	U	***4.550***	U
1,2-Diphenylhydrazine (as Azobenze	~	2.700	U	2.630	U	3.330	U	4.550	U
1,3-Dichlorobenzene	3	2.700	U	2.630	U	***3.330***	U	***4.550***	U
1,4-Dichlorobenzene	3	2.700	U	2.630	U	***3.330***	U	***4.550***	U
2,3,4,6-Tetrachlorophenol	~	2.700	U	2.630	U	3.330	U	4.550	U
2,4,5-Trichlorophenol	1	***2.700***	U	***2.630***	U	***3.330***	U	***4.550***	U
2,4,6-Trichlorophenol	1	***2.700***	U	***2.630***	U	***3.330***	U	***4.550***	U
2,4-Dichlorophenol	5	2.700	U	2.630	U	3.330	U	4.550	U
2,4-Dimethylphenol	50	2.700	U	2.630	U	3.330	U	4.550	U
2,4-Dinitrophenol	10	2.700	U	2.630	U	3.330	U	4.550	U
2,4-Dinitrotoluene	5	2.700	U	2.630	U	3.330	U	4.550	U
2,6-Dinitrotoluene	5	2.700	U	2.630	U	3.330	U	4.550	U
2-Chloronaphthalene	10	2.700	U	2.630	U	3.330	U	4.550	U
2-Chlorophenol	1	***2.700***	U	***2.630***	U	***3.330***	U	***4.550***	U
2-Methylnaphthalene	~	2.700	U	2.630	U	3.330	U	4.550	U
2-Methylphenol	1	2.700	U	2.630	U	3.330	U	4.550	U
2-Nitroaniline	5	2.700	U	2.630	U	3.330	U	4.550	U
2-Nitrophenol	1	***2.700***	U	***2.630***	U	***3.330***	U	***4.550***	U
3- & 4-Methylphenols	1	2.700	U	2.630	U	3.330	U	4.550	U
3,3-Dichlorobenzidine	5	2.700	U	2.630	U	3.330	U	4.550	U
3-Nitroaniline	5	2.700	U	2.630	U	3.330	U	4.550	U
4,6-Dinitro-2-methylphenol	~	2.700	U	2.630	U	3.330	U	4.550	U
4-Bromophenyl phenyl ether	~	2.700	U	2.630	U	3.330	U	4.550	U
4-Chloro-3-methylphenol	1	***2.700***	U	***2.630***	U	***3.330***	U	***4.550***	U
4-Chloroaniline	5	2.700	U	2.630	U	3.330	U	4.550	U
4-Chlorophenyl phenyl ether	~	2.700	U	2.630	U	3.330	U	4.550	U
4-Nitroaniline	5	2.700	U	2.630	U	3.330	U	4.550	U
4-Nitrophenol	1	***5.410***	U	***5.260***	U	***6.670***	U	***9.090***	U
Acetophenone	~	2.700	U	2.630	U	3.330	U	4.550	U
Alpha Terpineol	~	5.410	U	5.260	U	6.670	U	9.090	U
Aniline	5	2.700	U	2.630	U	3.330	U	4.550	U
Benzaldehyde	~	2.700	U	2.630	U	3.330	U	4.550	U
Benzidine	~	5.410	U	5.260	U	6.670	U	9.090	U
Benzoic acid	~	2.700	U	2.630	U	3.330	U	4.550	U
Benzyl alcohol	~	2.700	U	2.630	U	3.330	U	4.550	U
Benzyl butyl phthalate	50	2.700	U	2.630	U	3.330	U	4.550	U
Bis(2-chloroethoxy)methane	5	2.700	U	2.630	U	3.330	U	4.550	U
Bis(2-chloroethyl)ether	1	***1.080***	U	***1.050***	U	***1.330***	U	***1.820***	U
Bis(2-chloroisopropyl)ether	5	2.700	U	2.630	U	3.330	U	4.550	U
Caprolactam	~	2.700	U	2.630	U	3.330	U	4.550	U
Carbazole	~	2.700	U	2.630	U	3.330	U	4.550	U
Dibenzofuran	~	2.700	U	2.630	U	3.330	U	4.550	U
Diethyl phthalate	50	2.700	U	2.630	U	3.330	U	4.550	U
Dimethyl phthalate	50	2.700	U	2.630	U	3.330	U	4.550	U
Di-n-butyl phthalate	50	2.700	U	2.630	U	3.330	U	4.550	U
Di-n-octyl phthalate	50	2.700	U	2.630	U	3.330	U	4.550	U
Hexachlorocyclopentadiene	5	***5.410***	U	***5.260***	U	***6.670***	U	***9.090***	U
Isophorone	50	2.700	U	2.630	U	3.330	U	4.550	U
N-nitroso-di-n-propylamine	~	2.700	U	2.630	U	3.330	U	4.550	U
N-Nitrosodiphenylamine	50	2.700	U	2.630	U	3.330	U	4.550	U
Phenol	1	***2.700***	U	***2.630***	U	***3.330***	U	***4.550***	U
SVOA, 8270 SIM MASTER (ug/l)									
Acenaphthene	20	0.195		0.0526	U	0.0667	U	0.0909	U
Acenaphthylene	~	0.0973		0.0526	U	0.0667	U	0.0909	U
Anthracene	50	0.0865		0.0526	U	0.0667	U	0.0909	U
Atrazine	~	0.541	U	0.526	U	0.667	U	0.909	U
Benzo(a)anthracene	0.002	***0.0541***	U	***0.0526***	U	***0.0667***	U	***0.0909***	U
Benzo(a)pyrene	0.002	***0.0541***	U	***0.0526***	U	***0.0667***	U	***0.0909***	U
Benzo(b)fluoranthene	0.002	***0.0541***	U	***0.0526***	U	***0.0667***	U	***0.0909***	U
Benzo(g,h,i)perylene	~	0.0541	U	0.0526	U	0.0667	U	0.0909	U
Benzo(k)fluoranthene	0.002	***0.0541***	U	***0.0526***	U	***0.0667***	U	***0.0909***	U
Bis(2-ethylhexyl)phthalate	5	4.710	BD	0.747	B	0.667	U	1.110	
Chrysene	0.002	***0.0541***	U	***0.0526***	U	***0.0667***	U	***0.0909***	U
Dibenzo(a,h)anthracene	~	0.0541	U	0.0526	U	0.0667	U	0.0909	U
Fluoranthene	50	0.0541	U	0.0526	U	0.0667	U	0.0909	U
Fluorene	50	0.173		0.0526	U	0.413		0.709	
Hexachlorobenzene	0.04	0.0216	U	0.0211	U	0.0267	U	0.0364	U
Hexachlorobutadiene	0.5	***0.541***	U	***0.526***	U	***0.667***	U	***0.909***	U
Hexachloroethane	5	0.541	U	0.526	U	0.667	U	0.909	U
Indeno(1,2,3-cd)pyrene	0.002	***0.0541***	U	***0.0526***	U	***0.0667***	U	***0.0909***	U
Naphthalene	10	0.346		0.0842		0.0667	U	0.0909	U
Nitrobenzene	0.4	0.270	U	0.263	U	0.333	U	***0.455***	U
N-Nitrosodimethylamine	~	0.541	U	0.526	U	0.667	U	0.909	U
Pentachlorophenol	1	0.270	U	0.263	U	0.333	U	0.455	U
Phenanthrene	50	0.692		0.0526	U	0.0667	U	0.0909	U
Pyrene	50	0.0541	U	0.0526	U	0.0800		0.145	
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Aqueous (ug/l)									
1,4-Dioxane	0.35	NT		0.300	U	0.300	U	0.300	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values.

U : Not detected at the reported detection limit for the sample.

B: Analyte found in the analysis batch blank

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

J: Analyte detected at or above the MDL (method detection limit) but below the RL (Reporting Limit)

D: Result is from an analysis that required a dilution

Table 8B - Semi-Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-01S		MW-01M		MW-02S		MW-02M		MW-03S		MW-03M	
LAB SAMPLE ID		24I0079-03		24I0079-01		24I0079-02		24I0079-04		24I0218-01		24I0079-06	
SAMPLING DATE		9/3/2024 11:55:00 AM		9/3/2024 10:45:00 AM		9/3/2024 10:45:00 AM		9/3/2024 12:00:00 PM		9/4/2024 9:05:00 AM		9/3/2024 2:15:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
SVOA, 8270 LOW MASTER (ug/l)													
1,1-Biphenyl	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
1,2,4,5-Tetrachlorobenzene	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
2,3,4,6-Tetrachlorophenol	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
2,4,5-Trichlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
2,4,6-Trichlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
2,4-Dichlorophenol	5	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
2,4-Dimethylphenol	50	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
2,4-Dinitrophenol	10	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
2,4-Dinitrotoluene	5	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
2,6-Dinitrotoluene	5	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
2-Chloronaphthalene	10	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
2-Chlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
2-Methylnaphthalene	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
2-Methylphenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
2-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
2-Nitrophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
3- & 4-Methylphenols	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
3,3-Dichlorobenzidine	5	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
3-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
4,6-Dinitro-2-methylphenol	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
4-Bromophenyl phenyl ether	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
4-Chloro-3-methylphenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
4-Chloroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
4-Chlorophenyl phenyl ether	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
4-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
4-Nitrophenol	1	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U
Acetophenone	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Benzaldehyde	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Benzyl butyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Bis(2-chloroethoxy)methane	5	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Bis(2-chloroethyl)ether	1	1	U	1	U	1	U	1	U	1	U	1	U
Bis(2-chloroisopropyl)ether	5	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Caprolactam	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Carbazole	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Dibenzofuran	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Diethyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Dimethyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Di-n-butyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Di-n-octyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Hexachlorocyclopentadiene	5	5	U	5	U	5	U	5	U	5	U	5	U
Isophorone	50	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
N-nitroso-di-n-propylamine	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
N-Nitrosodiphenylamine	50	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Phenol	1	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U	0.750	U
Propargite	~	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
Pyridine	50	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U	2.500	U
SVOA, 8270 SIM MASTER (ug/l)													
Acenaphthene	20	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Acenaphthylene	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Anthracene	50	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Atrazine	~	0.500	U	0.500	U	0.500	U	0.500	U	0.500	U	0.500	U
Benzo(a)anthracene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Benzo(a)pyrene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Benzo(b)fluoranthene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Benzo(g,h,i)perylene	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Benzo(k)fluoranthene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Bis(2-ethylhexyl)phthalate	5	0.500	U	0.500	U	4.590		0.500	U	0.500	U	0.500	U
Chrysene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Dibenzo(a,h)anthracene	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Fluoranthene	50	0.110		0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Fluorene	50	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.230	
Hexachlorobenzene	0.04	0.0200	U	0.0200	U	0.0200	U	*0.0200*	U	0.0200	U	0.0200	U
Hexachlorobutadiene	0.5	0.500	U	0.500	U	0.500	U	0.500	U	0.500	U	0.500	U
Hexachloroethane	5	0.500	U	0.500	U	0.500	U	0.500	U	0.500	U	0.500	U
Indeno(1,2,3-cd)pyrene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Naphthalene	10	0.250		0.0500	U	0.0500		0.0500	U	0.0500		0.0500	U
Nitrobenzene	0.4	0.250	U	0.250	U	0.250	U	0.250	U	0.250	U	0.250	U
N-Nitrosodimethylamine	~	0.500	U	0.500	U	0.500	U	0.500	U	0.500	U	0.500	U
Pentachlorophenol	1	0.250	U	0.250	U	0.250	U	0.250	U	0.250	U	0.250	U
Phenanthrene	50	0.0900		0.0500	U	0.0500	U	0.0500		0.0500	U	0.0500	U
Pyrene	50	0.0600		0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Aqueous (ug/l)													
1,4-Dioxane	0.35	**1.230**		**18.300**		**0.656**		**0.784**		0.300	U	**0.944**	

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values.

U : Not detected at the reported detection limit for the sample.

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank

D: Result is from an analysis that required a dilution

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 8B - Semi-Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-04S		MW-04M		MW-05S		MW-05M		MW-06S		MW-07S	
LAB SAMPLE ID		24I0079-05		24I0079-07		24I0273-09		24I0273-10		24I0525-02		24I0273-03	
SAMPLING DATE		9/3/2024 1:25:00 PM		9/3/2024 2:30:00 PM		9/5/2024 1:00:00 PM		9/5/2024 1:00:00 PM		9/10/2024 11:45:00 AM		9/5/2024 1:00:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
SVOA, 8270 LOW MASTER (ug/l)													
1,1-Biphenyl	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
1,2,4,5-Tetrachlorobenzene	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
2,3,4,6-Tetrachlorophenol	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
2,4,5-Trichlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.780***	U	***2.500***	U
2,4,6-Trichlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.780***	U	***2.500***	U
2,4-Dichlorophenol	5	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
2,4-Dimethylphenol	50	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
2,4-Dinitrophenol	10	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
2,4-Dinitrotoluene	5	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
2,6-Dinitrotoluene	5	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
2-Chloronaphthalene	10	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
2-Chlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.780***	U	***2.500***	U
2-Methylnaphthalene	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
2-Methylphenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.780***	U	***2.500***	U
2-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
2-Nitrophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.780***	U	***2.500***	U
3- & 4-Methylphenols	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.780***	U	***2.500***	U
3,3-Dichlorobenzidine	5	2.500	U	2.500	U	2.500	U	2.500	U	***2.780***	U	2.500	U
3-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
4,6-Dinitro-2-methylphenol	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
4-Bromophenyl phenyl ether	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
4-Chloro-3-methylphenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.780***	U	***2.500***	U
4-Chloroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
4-Chlorophenyl phenyl ether	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
4-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
4-Nitrophenol	1	***5***	U	***5***	U	***5***	U	***5***	U	***5.560***	U	***5***	U
Acetophenone	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Benzaldehyde	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Benzyl butyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Bis(2-chloroethoxy)methane	5	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Bis(2-chloroethyl)ether	1	1	U	1	U	1	U	1	U	***1.110***	U	1	U
Bis(2-chloroisopropyl)ether	5	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Caprolactam	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Carbazole	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Dibenzofuran	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Diethyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Dimethyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Di-n-butyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Di-n-octyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Hexachlorocyclopentadiene	5	5	U	5	U	5	U	5	U	***5.560***	U	5	U
Isophorone	50	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
N-nitroso-di-n-propylamine	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
N-Nitrosodiphenylamine	50	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Phenol	1	0.750	U	0.750	U	0.750	U	0.750	U	0.833	U	0.750	U
Propargite	~	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
Pyridine	50	2.500	U	2.500	U	2.500	U	2.500	U	2.780	U	2.500	U
SVOA, 8270 SIM MASTER (ug/l)													
Acenaphthene	20	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0556	U	0.0500	U
Acenaphthylene	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0556	B	0.0500	U
Anthracene	50	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0556	U	0.0500	U
Atrazine	~	0.500	U	0.500	U	0.500	U	0.500	U	0.556	U	0.500	U
Benzo(a)anthracene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0556***	U	***0.0500***	U
Benzo(a)pyrene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0556***	U	***0.0500***	U
Benzo(b)fluoranthene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0556***	U	***0.0500***	U
Benzo(g,h,i)perylene	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0556	U	0.0500	U
Benzo(k)fluoranthene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0556***	U	***0.0500***	U
Bis(2-ethylhexyl)phthalate	5	0.500	U	0.500	U	0.500	U	0.500	U	0.556	U	0.500	U
Chrysene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0556***	U	***0.0500***	U
Dibenzo(a,h)anthracene	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0556	U	0.0500	U
Fluoranthene	50	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0778	B	0.0500	U
Fluorene	50	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0556	B	0.0500	U
Hexachlorobenzene	0.04	0.0200	U	0.0200	U	0.0200	U	0.0200	U	0.0222	U	0.0200	U
Hexachlorobutadiene	0.5	0.500	U	0.500	U	0.500	U	0.500	U	***0.556***	U	0.500	U
Hexachloroethane	5	0.500	U	0.500	U	0.500	U	0.500	U	0.556	U	0.500	U
Indeno(1,2,3-cd)pyrene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0556***	U	***0.0500***	U
Naphthalene	10	0.0500	U	0.160		0.0500	U	0.0500	U	0.189	B	0.0500	U
Nitrobenzene	0.4	0.250	U	0.250	U	0.250	U	0.250	U	0.278	U	0.250	U
N-Nitrosodimethylamine	~	0.500	U	0.500	U	0.500	U	0.500	U	0.556	U	0.500	U
Pentachlorophenol	1	0.250	U	0.250	U	0.250	U	0.250	U	0.278	U	0.250	U
Phenanthrene	50	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.167	B	0.0500	U
Pyrene	50	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0778	B	0.0500	U
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Aqueous (ug/l)													
1,4-Dioxane	0.35	**0.432**		0.300	U	0.300	U	0.300	U	0.300	U	***3***	U

TABLE NOTES:

	Analyte exceeds the NYSDEC TOGS Standards and Guidance Values.
U :	Not detected at the reported detection limit for the sample.
ug/L:	Micrograms per Liter.
~ :	No Standards or Guidance Value.
B:	Analyte found in the analysis batch blank
D:	Result is from an analysis that required a dilution
Bold and Italics :	The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 8B - Semi-Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-07M		MW-08S		MW-08M		MW-09S		MW-09M		MW-10S		MW-11S	
LAB SAMPLE ID		24I0273-04		24I0356-04		24I0356-01		24I0218-08		24I0356-02		24I0525-04		24I0580-01	
SAMPLING DATE		9/5/2024 2:30:00 PM		9/6/2024 1:40:00 PM		9/6/2024 9:00:00 AM		9/4/2024 2:20:00 PM		9/6/2024 10:50:00 AM		9/10/2024 2:15:00 PM		9/10/2024 8:45:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
SVOA, 8270 LOW MASTER (ug/l)															
1,1-Biphenyl	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
1,2,4,5-Tetrachlorobenzene	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
2,3,4,6-Tetrachlorophenol	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
2,4,5-Trichlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.630***	U	***2.500***	U	***2.500***	U
2,4,6-Trichlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.630***	U	***2.500***	U	***2.500***	U
2,4-Dichlorophenol	5	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
2,4-Dimethylphenol	50	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
2,4-Dinitrophenol	10	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
2,4-Dinitrotoluene	5	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
2,6-Dinitrotoluene	5	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
2-Chloronaphthalene	10	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
2-Chlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.630***	U	***2.500***	U	***2.500***	U
2-Methylnaphthalene	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
2-Methylphenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.630***	U	***2.500***	U	***2.500***	U
2-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
2-Nitrophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.630***	U	***2.500***	U	***2.500***	U
3- & 4-Methylphenols	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.630***	U	***2.500***	U	***2.500***	U
3,3-Dichlorobenzidine	5	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
3-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
4,6-Dinitro-2-methylphenol	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
4-Bromophenyl phenyl ether	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
4-Chloro-3-methylphenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U	***2.630***	U	***2.500***	U	***2.500***	U
4-Chloroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
4-Chlorophenyl phenyl ether	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
4-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
4-Nitrophenol	1	***5***	U	***5***	U	***5***	U	***5***	U	***5.260***	U	***5***	U	***5***	U
Acetophenone	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Benzaldehyde	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Benzyl butyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Bis(2-chloroethoxy)methane	5	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Bis(2-chloroethyl)ether	1	1	U	1	U	1	U	1	U	***1.050***	U	1	U	1	U
Bis(2-chloroisopropyl)ether	5	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Caprolactam	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Carbazole	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Dibenzofuran	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Diethyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Dimethyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Di-n-butyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Di-n-octyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Hexachlorocyclopentadiene	5	5	U	5	U	5	U	5	U	***5.260***	U	5	U	5	U
Isophorone	50	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
N-nitroso-di-n-propylamine	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
N-Nitrosodiphenylamine	50	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Phenol	1	0.750	U	0.750	U	0.750	U	0.750	U	0.789	U	**6.180**		0.750	U
Propargite	~	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
Pyridine	50	2.500	U	2.500	U	2.500	U	2.500	U	2.630	U	2.500	U	2.500	U
SVOA, 8270 SIM MASTER (ug/l)															
Acenaphthene	20	2.500	U	0.0500	U	0.0500	U	0.0500	U	0.0526	U	2.500	U	0.0500	U
Acenaphthylene	~	2.500	U	0.0500	U	0.0500	U	0.0500	U	0.0526	U	2.500	U	0.0500	U
Anthracene	50	2.500	U	0.0500	U	0.0500	U	0.0500	U	0.0526	U	2.500	U	0.0600	
Atrazine	~	25	U	0.500	U	0.500	U	0.500	U	0.526	U	25	U	0.500	U
Benzo(a)anthracene	0.002	***2.500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0526***	U	***2.500***	U	*0.0500*	U
Benzo(a)pyrene	0.002	***2.500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0526***	U	***2.500***	U	*0.0500*	U
Benzo(b)fluoranthene	0.002	***2.500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0526***	U	***2.500***	U	**0.0500**	
Benzo(g,h,i)perylene	~	2.500	U	0.0500	U	0.0500	U	0.0500	U	0.0526	U	2.500	U	0.0500	U
Benzo(k)fluoranthene	0.002	***2.500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0526***	U	***2.500***	U	*0.0500*	U
Bis(2-ethylhexyl)phthalate	5	***25***	U	0.500	U	0.500	U	0.500	U	0.526	U	***25***	U	0.500	U
Chrysene	0.002	***2.500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0526***	U	***2.500***	U	**0.0500**	
Dibenzo(a,h)anthracene	~	2.500	U	0.0500	U	0.0500	U	0.0500	U	0.0526	U	2.500	U	0.0500	U
Fluoranthene	50	2.500	U	0.0500	U	0.0500		0.0500	U	0.0526	U	2.500	U	0.110	
Fluorene	50	2.500	U	0.270		0.0500	U	0.0500	U	0.0526	U	2.500	U	0.0500	U
Hexachlorobenzene	0.04	***1***	U	0.0200	U	0.0200	U	0.0200	U	0.0211	U	***1***	U	0.0200	U
Hexachlorobutadiene	0.5	***25***	U	0.500	U	0.500	U	0.500	U	***0.526***	U	***25***	U	0.500	U
Hexachloroethane	5	***25***	U	0.500	U	0.500	U	0.500	U	0.526	U	***25***	U	0.500	U
Indeno(1,2,3-cd)pyrene	0.002	***2.500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0526***	U	***2.500***	U	*0.0500*	U
Naphthalene	10	**19.500**	D	0.0500	U	0.350		0.0500	U	0.432		**45**	BD	0.600	B
Nitrobenzene	0.4	***12.500***	U	0.250	U	0.250	U	0.250	U	0.263	U	***12.500***	U	0.250	U
N-Nitrosodimethylamine	~	25	U	0.500	U	0.500	U	0.500	U	0.526	U	25	U	0.500	U
Pentachlorophenol	1	***12.500***	U	0.250	U	0.250	U	0.250	U	0.263	U	***12.500***	U	0.250	U
Phenanthrene	50	2.500	U	0.0500	U	0.0800		0.0500	U	0.0737		2.500	U	0.0600	B
Pyrene	50	2.500	U	0.0500	U	0.0500	U	0.0500	U	0.0526	U	2.500	U	0.0700	
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Aqueous (ug/l)															
1,4-Dioxane	0.35	0.300	U	**1.580**		**39.500**		**4.690**		**7.220**		0.300	U	0.544	

TABLE NOTES:

	Analyte exceeds the NYSDEC TOGS Standards and Guidance Values.
U :	Not detected at the reported detection limit for the sample.
ug/L:	Micrograms per Liter.
~ :	No Standards or Guidance Value.
B:	Analyte found in the analysis batch blank
D:	Result is from an analysis that required a dilution
Bold and Italics :	The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 8B - Semi-Volatile Organic Compounds in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	9.4.2024_Duplicate		9.5.2024_Duplicate		9.4.2024-FB-1		9.9.2024_FB-1	
LAB SAMPLE ID		24I0218-04		24I0273-05		24I0218-07		24I0429-02	
SAMPLING DATE		9/4/2024 9:05:00 AM		9/5/2024 1:00:00 PM		9/4/2024 4:10:00 PM		9/9/2024 9:05:00 AM	
SAMPLE TYPE		Ground Water		Ground Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q
SVOA, 8270 LOW MASTER (ug/l)		*MW-03S Duplicate		*MW-07M Duplicate					
1,1-Biphenyl	~	2.500	U	2.500	U	2.500	U	2.500	U
1,2,4,5-Tetrachlorobenzene	~	2.500	U	2.500	U	2.500	U	2.500	U
2,3,4,6-Tetrachlorophenol	~	2.500	U	2.500	U	2.500	U	2.500	U
2,4,5-Trichlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
2,4,6-Trichlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
2,4-Dichlorophenol	5	2.500	U	2.500	U	2.500	U	2.500	U
2,4-Dimethylphenol	50	2.500	U	2.500	U	2.500	U	2.500	U
2,4-Dinitrophenol	10	2.500	U	2.500	U	2.500	U	2.500	U
2,4-Dinitrotoluene	5	2.500	U	2.500	U	2.500	U	2.500	U
2,6-Dinitrotoluene	5	2.500	U	2.500	U	2.500	U	2.500	U
2-Chloronaphthalene	10	2.500	U	2.500	U	2.500	U	2.500	U
2-Chlorophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
2-Methylnaphthalene	~	2.500	U	2.500	U	2.500	U	2.500	U
2-Methylphenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
2-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U
2-Nitrophenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
3- & 4-Methylphenols	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
3,3-Dichlorobenzidine	5	2.500	U	2.500	U	2.500	U	2.500	U
3-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U
4,6-Dinitro-2-methylphenol	~	2.500	U	2.500	U	2.500	U	2.500	U
4-Bromophenyl phenyl ether	~	2.500	U	2.500	U	2.500	U	2.500	U
4-Chloro-3-methylphenol	1	***2.500***	U	***2.500***	U	***2.500***	U	***2.500***	U
4-Chloroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U
4-Chlorophenyl phenyl ether	~	2.500	U	2.500	U	2.500	U	2.500	U
4-Nitroaniline	5	2.500	U	2.500	U	2.500	U	2.500	U
4-Nitrophenol	1	***5***	U	***5***	U	***5***	U	***5***	U
Acetophenone	~	2.500	U	2.500	U	2.500	U	2.500	U
Benzaldehyde	~	2.500	U	2.500	U	2.500	U	2.500	U
Benzyl butyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U
Bis(2-chloroethoxy)methane	5	2.500	U	2.500	U	2.500	U	2.500	U
Bis(2-chloroethyl)ether	1	1	U	1	U	1	U	1	U
Bis(2-chloroisopropyl)ether	5	2.500	U	2.500	U	2.500	U	2.500	U
Caprolactam	~	2.500	U	2.500	U	2.500	U	2.500	U
Carbazole	~	2.500	U	2.500	U	2.500	U	2.500	U
Dibenzofuran	~	2.500	U	2.500	U	2.500	U	2.500	U
Diethyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U
Dimethyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U
Di-n-butyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U
Di-n-octyl phthalate	50	2.500	U	2.500	U	2.500	U	2.500	U
Hexachlorocyclopentadiene	5	5	U	5	U	5	U	5	U
Isophorone	50	2.500	U	2.500	U	2.500	U	2.500	U
N-nitroso-di-n-propylamine	~	2.500	U	2.500	U	2.500	U	2.500	U
N-Nitrosodiphenylamine	50	2.500	U	2.500	U	2.500	U	2.500	U
Phenol	1	0.750	U	0.750	U	0.750	U	0.750	U
Propargite	~	2.500	U	2.500	U	2.500	U	2.500	U
Pyridine	50	2.500	U	2.500	U	2.500	U	2.500	U
SVOA, 8270 SIM MASTER (ug/l)									
Acenaphthene	20	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Acenaphthylene	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Anthracene	50	0.0500	U	0.0500	U	0.0500	U	0.0700	
Atrazine	~	0.500	U	0.500	U	0.500	U	0.500	U
Benzo(a)anthracene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Benzo(a)pyrene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Benzo(b)fluoranthene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Benzo(g,h,i)perylene	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Benzo(k)fluoranthene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Bis(2-ethylhexyl)phthalate	5	0.500	U	0.500	U	0.500	U	0.500	U
Chrysene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Dibenzo(a,h)anthracene	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Fluoranthene	50	0.0500	U	0.0500	U	0.0500	U	0.110	
Fluorene	50	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Hexachlorobenzene	0.04	0.0200	U	0.0200	U	0.0200	U	0.0200	U
Hexachlorobutadiene	0.5	0.500	U	0.500	U	0.500	U	0.500	U
Hexachloroethane	5	0.500	U	0.500	U	0.500	U	0.500	U
Indeno(1,2,3-cd)pyrene	0.002	***0.0500***	U	***0.0500***	U	***0.0500***	U	***0.0500***	U
Naphthalene	10	0.0500	U	2.220		0.0500	U	0.800	
Nitrobenzene	0.4	0.250	U	0.250	U	0.250	U	0.250	U
N-Nitrosodimethylamine	~	0.500	U	0.500	U	0.500	U	0.500	U
Pentachlorophenol	1	0.250	U	0.250	U	0.250	U	0.250	U
Phenanthrene	50	0.0500	U	0.0500	U	0.0500	U	0.240	
Pyrene	50	0.0500	U	0.0500	U	0.0500	U	0.0900	
Semi-Volatiles, 1,4-Dioxane 8270 SIM-Aqueous (ug/l)									
1,4-Dioxane	0.35	0.300	U	***60***	U	0.300	U	0.300	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values.

U : Not detected at the reported detection limit for the sample.

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank

D: Result is from an analysis that required a dilution

Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 9A - Total Metals in Groundwater
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	GW-1		GW-2		GW-3		GW-X		GW-5		GW-4		S-FB-1		GW-FB-1	
LAB SAMPLE ID		23B0854-01		23B0854-03		23B0854-02		23B0854-04		23B0727-08		23B0727-09		23B0854-05		23B0854-06	
SAMPLING DATE		Clay St.		Clay St.		Clay St.		Clay St.		Commercial St.		Commercial St.					
SAMPLE TYPE		Water		Water		Water		Water		Water		Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Metals, Target Analyte, ICP (ug/L)																	
Aluminum	~	94.200		64,600		196		456		7,860		2,220		55.600	U	55.600	U
Barium	1,000	61.700		423		98.800		98.800		272		62.500	U	27.800	U	27.800	U
Calcium	~	107,000	B	274,000	B	202,000	B	203,000	B	62,800	B	45,900	B	189	B	165	B
Chromium	50	5.560	U	**165**		5.560	U	5.560	U	29.400		12.500	U	5.560	U	5.560	U
Cobalt	~	4.440	U	90.800		4.440	U	4.440	U	7.270		10	U	4.440	U	4.440	U
Copper	200	22.200	U	**319**		22.200	U	22.200	U	49.100		50	U	22.200	U	22.200	U
Iron	~	278	U	155,000	D	437		1,140		29,700		6,140		278	U	278	U
Lead	25	5.560	U	**159**		5.560	U	5.560	U	**75.400**		12.500	U	5.560	U	5.560	U
Magnesium	35,000	31,100		**60,500**		**40,300**		**38,300**		5,730		4,700		55.600	U	55.600	U
Manganese	300	**586**		**3,700**		**1,080**		**1,000**		**660**		225		5.560	U	5.560	U
Nickel	100	11.100	U	**168**		11.100	U	11.100	U	31.500		25	U	11.100	U	11.100	U
Potassium	~	7,730		41,900		4,860		5,040		16,300		15,000		163		132	
Silver	50	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	12.500	U	5.560	U	5.560	U
Sodium	20,000	**124,000**		**93,400**		**189,000**		**186,000**		13,900		**29,700**		556	U	556	U
Vanadium	~	11.100	U	217		11.100	U	11.100	U	23.900		25	U	11.100	U	11.100	U
Zinc	2,000	27.800	U	535		27.800	U	27.800	U	197		219		27.800	U	27.800	U
Metals, Target Analyte, ICP Dissolved (ug/L)																	
Aluminum	~	124		7,850		174		196		1,740	B	477	B	55.600	U	55.600	U
Barium	1,000	68.300		71.300		107		106		237		27.800	U	27.800	U	27.800	U
Calcium	~	107,000	B	275,000	B	208,000	B	202,000	B	68,200		49,700		157	B	105	B
Chromium	50	5.560	U	17.500		5.560	U	5.560	U	16.700		5.560	U	5.560	U	5.560	U
Cobalt	~	4.440	U	42.200		4.440	U	4.440	U	10	U	4.440	U	4.440	U	4.440	U
Copper	200	22.200	U	**230**		22.200	U	22.200	U	50	U	22.200	U	22.200	U	22.200	U
Iron	~	278	U	17,800		356		278	U	23,800		1,160		278	U	278	U
Lead	25	6.800		**86.600**		5.560	U	5.560	U	**69**		5.560	U	5.560	U	5.560	U
Magnesium	35,000	33,500		**39,000**		**41,900**		**41,700**		5,240		4,840		55.600	U	55.600	U
Manganese	300	**638**		**3,180**		**1,150**		**1,120**		**700**		230		5.560	U	5.560	U
Nickel	100	11.100	U	52.200		11.100	U	11.100	U	26		13.600		11.100	U	11.100	U
Potassium	~	8,670		30,100		5,480		5,150		16,000		16,600		55.600	U	55.600	U
Silver	50	5.560	U	5.560	U	5.560	U	5.560	U	12.500	U	5.560	U	5.560	U	5.560	U
Sodium	20,000	**126,000**		**94,200**		**196,000**		**189,000**		14,700		**31,900**		556	U	556	U
Vanadium	~	11.100	U	47.500		11.100	U	11.100	U	25	U	11.100	U	11.100	U	11.100	U
Zinc	2,000	51.900		193		27.800	U	27.800	U	200		230		27.800	U	27.800	U
Metals, Target Analyte, ICPMS (ug/L)																	
Antimony	3	1.110	U	1.110	U	1.110	U	1.110	U	2	U	2.500	U	1.110	U	1.110	U
Arsenic	25	1.110	U	7.540		1.110	U	1.110	U	9.230		2.500	U	1.110	U	1.110	U
Beryllium	3	0.333	U	1.240		0.333	U	0.333	U	0.642		0.750	U	0.333	U	0.333	U
Cadmium	5	0.556	U	0.821		0.556	U	0.556	U	1	U	1.250	U	0.556	U	0.556	U
Selenium	10	4.840		**47.600**		**17.300**		**15.300**		2	U	2.610		1.110	U	1.110	U
Thallium	~	1.110	U	1.110	U	1.110	U	1.110	U	2	U	2.500	U	1.110	U	1.110	U
Metals, Target Analyte, ICPMS Dissolved (ug/L)																	
Antimony	3	1.110	U	1.110	U	1.110	U	1.110	U	2	U	1.110	U	1.110	U	1.110	U
Arsenic	25	1.110	U	2.110		1.110	U	1.110	U	2.300		1.110	U	1.110	U	1.110	U
Beryllium	3	0.333	U	0.769		0.333	U	0.333	U	0.600	U	0.333	U	0.333	U	0.333	U
Cadmium	5	0.556	U	0.591		0.556	U	0.556	U	1	U	0.839		0.556	U	0.556	U
Selenium	10	6.470		**29**		**16.100**		**17.600**		2	U	1.110	U	1.110	U	1.110	U
Thallium	~	1.110	U	1.110	U	1.110	U	1.110	U	2	U	1.110	U	1.110	U	1.110	U
Mercury by 7470/7471 (ug/L)																	
Mercury	0.7	0.200	U	0.400		0.200	U	0.200	U	0.200	U	**2**	U	0.200	U	0.400	U
Mercury by 7473 (ug/L)																	
Mercury	0.7	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values - GA

U : Not detected at the reported detection limit for the sample.

mg/kg: Milligrams per Kilogram.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 9B - Total Metals in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-01S		MW-01M		MW-02S		MW-02M		MW-03S		MW-03M		MW-04S		MW-04M	
LAB SAMPLE ID		24I0079-03		24I0079-01		24I0079-02		24I0079-04		24I0218-01		24I0079-06		24I0079-05		24I0079-07	
SAMPLING DATE		9/3/2024 11:55:00 AM		9/3/2024 10:45:00 AM		9/3/2024 10:45:00 AM		9/3/2024 12:00:00 PM		9/4/2024 9:05:00 AM		9/3/2024 2:15:00 PM		9/3/2024 1:25:00 PM		9/3/2024 2:30:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Metals, Target Analyte, ICP (ug/L)																	
Aluminum	~	333		55.600	U	6,000		122		149		1,710		765		1,870	
Barium	1,000	146		38.300		251		73.400		29		38		49.400		27.800	U
Calcium	~	73,900		108,000		63,500		89,900		17,800		82,200		44,900		126,000	
Chromium	50	**104**		5.560	U	16.400		5.560	U	5.560	U	16.200		5.560	U	5.560	U
Cobalt	~	4.440	U	5.560		52.400		21.800		4.440		17.100		14.600		99.200	
Copper	200	22.200	U	22.200	U	59.300		22.200	U	22.200	U	22.200	U	22.200	U	38.200	
Iron	~	890		278	U	10,600		435		341		5,080		990		745	
Lead	25	**87.900**		5.560	U	**46.200**		5.560	U	5.560	U	14		5.560	U	5.560	U
Magnesium	35,000	17,500		**44,600**		12,400		22,200		2,390		34,300		6,000		20,300	
Manganese	300	**772**		**3,900**		**6,210**		**8,360**		**500**		**6,030**		**1,030**		**4,920**	
Nickel	100	11.100	U	11.200		99.300		26.600		11.100	U	20.400		23.300		**105**	
Potassium	~	16,100		4,170		11,700		6,190		881	B	9,300		5,460		8,540	
Silver	50	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Sodium	20,000	**136,000**		**134,000**		**179,000**		**77,600**		1,510		**82,100**		14,700		**29,000**	
Vanadium	~	11.100	U	11.100	U	28.800		11.100	U	11.100	U	11.100	U	11.100	U	11.100	U
Zinc	2,000	39.400		27.800	U	277		27.800	U	52.400		73.200		183		**2,510**	
Metals, Target Analyte, ICP Dissolved (ug/L)																	
Aluminum	~	55.600	U	56.100		55.600	U	55.600	U	55.600	U	55.600	U	157		1,660	
Barium	1,000	57.900		40.500		76.800		77.200		27.800	U	27.800	U	45.700		27.800	U
Calcium	~	74,000		110,000		55,200		82,800		17,900		81,000		43,200		123,000	
Chromium	50	**110**		5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Cobalt	~	4.440	U	5.990		4.820		13.400		4.440	U	11		14.400		97.600	
Copper	200	22.200	U	22.200	U	22.200	U	22.200	U	22.200	U	22.200	U	22.200	U	37.500	
Iron	~	278	U	278	U	278	U	278	U	278	U	278	U	278	U	278	U
Lead	25	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Magnesium	35,000	16,900		**44,100**		9,330		18,900		2,370		32,200		5,500		19,000	
Manganese	300	38.100		**4,060**		**1,170**		**6,280**		5.560	U	**5,970**		**1,040**		**5,050**	
Nickel	100	11.100	U	11.100	U	12.100		16.300		11.100	U	11.100	U	20.100		98.900	
Potassium	~	17,000		4,520		12,000		8,200		1,230		9,370		5,040		8,480	
Silver	50	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Sodium	20,000	**189,000**		**178,000**		**220,000**		**104,000**		1,300		**109,000**		19,500		**30,000**	
Vanadium	~	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U
Zinc	2,000	27.800	U	27.800	U	27.800	U	27.800	U	27.800	U	27.800	U	175		**2,410**	
Metals, Target Analyte, ICPMS (ug/L)																	
Antimony	3	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Arsenic	25	1.110	U	1.110	U	1.240		1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Beryllium	3	0.333	U	0.333	U	0.771		0.333	U	0.333	U	0.333	U	0.333	U	1.080	
Cadmium	5	0.556	U	0.556	U	2.420		0.556	U	0.556	U	0.840		1.170		**12.600**	
Selenium	10	2.900		1.750		2.780		2.840		1.110	U	5.680		2.710		1.110	U
Thallium	~	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Metals, Target Analyte, ICPMS Dissolved (ug/L)																	
Antimony	3	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Arsenic	25	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Beryllium	3	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.982	
Cadmium	5	0.556	U	0.556	U	0.556	U	0.556	U	0.556	U	0.642		1.180		**12.300**	
Selenium	10	5.390		2.140		4.900		1.850		5.380		4.470		4.870		2.160	
Thallium	~	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Mercury by 7470/7471 (ug/L)																	
Mercury	0.7	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U
Mercury by 7473 (ug/L)																	
Mercury	0.7	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values - GA

U : Not detected at the reported detection limit for the sample.

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 9B - Total Metals in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-05S		MW-05M		MW-06S		MW-07S		MW-07M		MW-08S		MW-08M		MW-09S		MW-09M	
LAB SAMPLE ID		24I0273-09		24I0273-10		24I0525-02		24I0273-03		24I0273-04		24I0356-04		24I0356-01		24I0218-08		24I0356-02	
SAMPLING DATE		9/5/2024 1:00:00 PM		9/5/2024 1:00:00 PM		9/10/2024 11:45:00 AM		9/5/2024 1:00:00 PM		9/5/2024 2:30:00 PM		9/6/2024 1:40:00 PM		9/6/2024 9:00:00 AM		9/4/2024 2:20:00 PM		9/6/2024 10:50:00 AM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Metals, Target Analyte, ICP (ug/L)																			
Aluminum	~	922		9,490		25,700		614		55.600	U	4,260		222		6,590		143	
Barium	1,000	64.600		95.300		720		66.600		85.400		132		62		213		82.800	
Calcium	~	197,000		759,000		57,200		50,900		104,000		80,100		127,000		200,000		164,000	
Chromium	50	5.560	U	**94.300**		49.200		5.560	U	5.560	U	12.100		5.560	U	15.400		5.560	U
Cobalt	~	12.400		45		44.400		7.330		40.300		13.200		4.440		22.800		4.440	U
Copper	200	22.200	U	**334**		122		53.400		22.200	U	39.600		22.200	U	66.200		22.200	U
Iron	~	2,270		51,200		60,200		1,290		278	U	10,100		756		15,400		475	
Lead	25	5.560	U	**373**		**5,310**		22.900		5.560	U	**45.800**		5.560	U	**210**		5.560	U
Magnesium	35,000	13,400		**165,000**		14,600		9,170		**37,100**		16,100		**57,100**		**86,700**		**75,600**	
Manganese	300	**3,230**		**7,360**		**3,360**		**2,130**		**11,400**		**869**		**1,470**		**2,840**		**1,700**	
Nickel	100	**119**		97		74.700		11.100	U	20.800		16.700		11.100	U	29.300		11.100	U
Potassium	~	12,900	B	11,700	B	9,700	B	17,500	B	6,020	B	6,350	B	5,790	B	7,540	B	6,220	B
Silver	50	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Sodium	20,000	**41,100**		**45,800**		**62,800**		**196,000**		**160,000**		**143,000**		**111,000**		**149,000**		**160,000**	
Vanadium	~	11.100	U	63.200		66.800		11.100	U	11.100	U	22.300		11.100	U	30.300		11.100	U
Zinc	2,000	644		1,430		319		49.600		37.400		93.600		27.800	U	104		27.800	U
Metals, Target Analyte, ICP Dissolved (ug/L)																			
Aluminum	~	55.600	U	55.600	U	55.600	U	55.600	U	55.600	U	58.100		55.600	U	61.900		55.600	U
Barium	1,000	54.400		32.800		28.800		61.500		86		52		59.400		103		80.400	
Calcium	~	191,000		537,000		32,400		49,600		102,000		54,100		126,000		156,000		160,000	
Chromium	50	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Cobalt	~	4.440	U	4.440	U	4.440	U	6.230		28.700		4.440	U	4.440	U	4.440	U	4.440	U
Copper	200	22.200	U	22.200	U	22.200	U	30.300		22.200	U	22.200	U	22.200	U	22.200	U	22.200	U
Iron	~	278	U	278	U	278	U	278	U	278	U	278	U	278	U	278	U	278	U
Lead	25	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Magnesium	35,000	12,900		**128,000**		4,590		8,450		**36,600**		9,370		**57,200**		**69,800**		**74,800**	
Manganese	300	**3,150**		**2,390**		41.600		**2,150**		**11,500**		212		**1,500**		**1,370**		**1,660**	
Nickel	100	90.900		11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U
Potassium	~	11,800	B	9,660	B	4,510	B	22,100		5,200	B	5,040		5,750		8,180		6,020	
Silver	50	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Sodium	20,000	**39,800**	B	**44,300**	B	**63,600**		**212,000**		**157,000**	B	**139,000**		**110,000**		**162,000**		**156,000**	
Vanadium	~	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U
Zinc	2,000	643		27.800	U	27.800	U	27.800	U	52.400		27.800	U	27.800	U	27.800	U	27.800	U
Metals, Target Analyte, ICPMS (ug/L)																			
Antimony	3	1.110	U	1.130		1.110	U	1.170		1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Arsenic	25	1.110	U	6.440		2.460		1.110	U	1.110	U	3.810		1.110	U	1.440		1.110	U
Beryllium	3	0.333	U	1.140		1.480		0.333	U	0.333	U	0.550		0.333	U	0.637		0.333	U
Cadmium	5	**10.200**		**19**		1.210		0.556	U	0.556	U	0.556	U	0.556	U	0.711		0.556	U
Selenium	10	1.390		2.980		1.110	U	**98.300**		**33.900**		9.550		9.080		**23.700**		8.870	
Thallium	~	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Metals, Target Analyte, ICPMS Dissolved (ug/L)																			
Antimony	3	1.110	U	1.110	U	1.110	U	1.160		1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Arsenic	25	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.850		1.110	U	1.110	U	1.110	U
Beryllium	3	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U
Cadmium	5	**8.880**		0.556	U	0.556	U	0.556	U	0.556	U	0.556	U	0.556	U	0.556	U	0.556	U
Selenium	10	2.500		3.010		2.720		**111**		**34.300**		6.790		**14.100**		**17.300**		**15.400**	
Thallium	~	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Mercury by 7470/7471 (ug/L)																			
Mercury	0.7	0.200	U	**2.500**		**1.100**		0.200	U	0.200	U	0.200	U	0.200	U	0.300		0.200	U
Mercury by 7473 (ug/L)																			
Mercury	0.7	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values - GA

U : Not detected at the reported detection limit for the sample.

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 9B - Total Metals in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-10S		MW-11S		9.4.2024_Duplicate		9.5.2024_Duplicate		9.4.2024-FB-1		9.9.2024_FB-1	
LAB SAMPLE ID		24I0525-04		24I0580-01		24I0218-04		24I0273-05		24I0218-07		24I0429-02	
SAMPLING DATE		9/10/2024 2:15:00 PM		9/10/2024 8:45:00 PM		9/4/2024 9:05:00 AM		9/5/2024 1:00:00 PM		9/4/2024 4:10:00 PM		9/9/2024 9:05:00 AM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q			Result	Q	Result	Q	Result	Q	Result	Q
Metals, Target Analyte, ICP (ug/L)						*MW-03S Duplicate		*MW-07M Duplicate					
Aluminum	~	6,010		6,900		447		55.600	U	55.600	U	55.600	U
Barium	1,000	132		195		32.900		84.900		27.800	U	27.800	U
Calcium	~	86,400		128,000	B	16,900		103,000		268		163	
Chromium	50	17.100		11.200		5.560	U	5.560	U	5.560	U	5.560	U
Cobalt	~	25.700		40.900		5		40.100		4.440	U	4.440	U
Copper	200	183		50.900		22.200	U	22.200	U	22.200	U	22.200	U
Iron	~	9,940		11,800		882		278	U	278	U	278	U
Lead	25	**123**		**127**		5.560	U	5.560	U	5.560	U	5.560	U
Magnesium	35,000	15,100		**37,700**		2,300		**37,900**		55.600	U	55.600	U
Manganese	300	**2,220**		**2,040**		**496**		**11,700**		5.560	U	5.560	U
Nickel	100	**282**		37.600		11.100	U	22		11.100	U	11.100	U
Potassium	~	3,630	B	11,300		952	B	5,660	B	55.600	U	55.600	U
Silver	50	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Sodium	20,000	**71,500**		**150,000**		1,530		**161,000**		940		573	
Vanadium	~	28.200		41.100		11.100	U	11.100	U	11.100	U	11.100	U
Zinc	2,000	160		130		58.900		35.700		27.800	U	27.800	U
Metals, Target Analyte, ICP Dissolved (ug/L)													
Aluminum	~	55.600	U	55.600	U	55.600	U	55.600	U	55.600	U	55.600	U
Barium	1,000	27.800	U	44.100		27.800	U	86.300		27.800	U	27.800	U
Calcium	~	62,400		79,800		15,300		103,000		210		165	
Chromium	50	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Cobalt	~	4.440	U	4.440	U	4.440	U	30.800		4.440	U	4.440	U
Copper	200	22.200	U	22.200	U	22.200	U	22.200	U	22.200	U	22.200	U
Iron	~	278	U	278	U	278	U	278	U	278	U	278	U
Lead	25	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Magnesium	35,000	7,860		21,400		1,970		**37,300**		55.600	U	55.600	U
Manganese	300	**537**		**303**		5.560	U	**11,700**		5.560	U	5.560	U
Nickel	100	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U
Potassium	~	2,790	B	9,030	B	1,120		5,190	B	55.600	U	55.600	U
Silver	50	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U	5.560	U
Sodium	20,000	**76,500**		**151,000**		1,270		**158,000**	B	748		843	
Vanadium	~	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U	11.100	U
Zinc	2,000	27.800	U	27.800	U	27.800	U	46.100		27.800	U	27.800	U
Metals, Target Analyte, ICPMS (ug/L)													
Antimony	3	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Arsenic	25	3.830		4.250		1.110	U	1.110	U	1.110	U	1.110	U
Beryllium	3	0.686		1.150		0.333	U	0.333	U	0.333	U	0.333	U
Cadmium	5	0.654		0.561		0.556	U	0.570		0.556	U	0.556	U
Selenium	10	5.520		**29.400**		1.110	U	**37.300**		3.340		1.110	U
Thallium	~	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Metals, Target Analyte, ICPMS Dissolved (ug/L)													
Antimony	3	1.110	U	1.280		1.110	U	1.110	U	1.110	U	1.110	U
Arsenic	25	2.400		1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Beryllium	3	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U
Cadmium	5	0.556	U	0.556	U	0.556	U	0.556	U	0.556	U	0.556	U
Selenium	10	5.910		**28.100**		1.110	U	**47.300**		2.510		1.110	U
Thallium	~	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U	1.110	U
Mercury by 7470/7471 (ug/L)													
Mercury	0.7	0.500		0.200		0.200	U	0.200	U	0.200	U	0.300	
Mercury by 7473 (ug/L)													
Mercury	0.7	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U	0.200	U

TABLE NOTES:

Analyte exceeds the NYSDEC TOGS Standards and Guidance Values - GA

U : Not detected at the reported detection limit for the sample.

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

B: Analyte found in the analysis batch blank.

Table 10A - Pesticides, Polychlorinated Biphenyls, and Herbicides in Groundwater
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	GW-1		GW-2		GW-3		GW-X	
LAB SAMPLE ID		23B0854-01		23B0854-03		23B0854-02		23B0854-04	
SAMPLING DATE		Clay St.		Clay St.		Clay St.		Clay St.	
SAMPLE TYPE		Water		Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (ug/L))									
4,4'-DDD	0.3	0.00421	U	0.00485	U	0.00444	U	0.00432	U
4,4'-DDE	0.2	0.00421	U	0.00485	U	0.00444	U	0.00432	U
4,4'-DDT	0.2	0.00421	U	0.00485	U	0.00444	U	0.00432	U
Aldrin	~	0.00421	U	0.00485	U	0.00444	U	0.00432	U
alpha-BHC	0.01	0.00421	U	0.00485	U	0.00444	U	0.00432	U
alpha-Chlordane	~	0.00421	U	0.00485	U	0.00444	U	NT	
beta-BHC	0.04	0.00421	U	0.00485	U	0.00444	U	0.00432	U
Chlordane, total	0.05	***0.211***	U	***0.242***	U	***0.222***	U	***0.216***	U
delta-BHC	0.04	0.00421	U	0.00779		NT		NT	
delta-BHC [2C]	~	NT		NT		0.00568		0.00432	U
Dieldrin	0.004	0.00211	U	NT		0.00222	U	0.00216	U
Endosulfan I	~	0.00421	U	0.00485	U	0.00444	U	0.00432	U
Endosulfan II	~	NT		0.00485	U	0.00444	U	0.00432	U
Endosulfan sulfate	~	0.00421	U	0.00485	U	0.00444	U	0.00432	U
Endrin	~	0.00421	U	0.00485	U	0.00444	U	0.00432	U
Endrin aldehyde	5	0.0105	U	0.0121	U	0.0111	U	0.0108	U
Endrin ketone	5	0.0105	U	0.0121	U	0.0111	U	0.0108	U
gamma-BHC (Lindane)	0.05	0.00421	U	0.00485	U	0.00444	U	0.00432	U
gamma-Chlordane	~	0.0105	U	0.0121	U	0.0111	U	NT	
Heptachlor	0.04	0.00421	U	0.00485	U	0.00444	U	0.00432	U
Heptachlor epoxide	0.03	0.00421	U	0.00485	U	0.00444	U	0.00432	U
Methoxychlor	35	0.00421	U	0.00485	U	0.00444	U	0.00432	U
Toxaphene	0.06	***0.105***	U	***0.121***	U	***0.111***	U	***0.108***	U
Polychlorinated Biphenyls (PCB) (ug/L)									
Aroclor 1016	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U
Aroclor 1221	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U
Aroclor 1232	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U
Aroclor 1242	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U
Aroclor 1248	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U
Aroclor 1254	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U
Aroclor 1260	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U
Aroclor 1262	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U
Aroclor 1268	~	0.0526	U	0.0606	U	0.0556	U	0.0541	U
Total PCBs	0.09	0.0526	U	0.0606	U	0.0556	U	0.0541	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.

NT: Not a target for this sample.

J : Estimated value.

ug/l: Micrograms per Liter.

~ : No Standards or Guidance Value.

Table 10A - Pesticides, Polychlorinated Biphenyls, and Herbicides in Groundwater
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	GW-5		GW-4		S-FB-1		GW-FB-1	
LAB SAMPLE ID		23B0727-08		23B0727-09		23B0854-05		23B0854-06	
SAMPLING DATE		Commercial St.		Commercial St.					
SAMPLE TYPE		Water		Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (ug/L))									
4,4'-DDD	0.3	0.00421	U	0.00421	U	0.00571	U	0.00457	U
4,4'-DDE	0.2	0.00421	U	0.00421	U	0.00571	U	NT	
4,4'-DDT	0.2	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Aldrin	~	0.00421	U	0.00421	U	0.00571	U	NT	
alpha-BHC	0.01	0.00421	U	0.00421	U	0.00571	U	0.00457	U
alpha-Chlordane	~	0.00421	U	0.00421	U	NT		NT	
beta-BHC	0.04	0.00421	U	0.00421	U	NT		0.00457	U
Chlordane, total	0.05	***0.211***	U	***0.211***	U	***0.286***	U	***0.229***	U
delta-BHC	0.04	0.00421	U	NT		0.00571	U	0.00457	U
delta-BHC [2C]	~	NT		0.00421	U	NT		NT	
Dieldrin	0.004	0.00211	U	0.00211	U	0.00286	U	0.00229	U
Endosulfan I	~	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Endosulfan II	~	0.00421	U	0.00421	U	NT		NT	
Endosulfan sulfate	~	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Endrin	~	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Endrin aldehyde	5	0.0105	U	0.0105	U	0.0143	U	0.0114	U
Endrin ketone	5	0.0105	U	0.0105	U	0.0143	U	0.0114	U
gamma-BHC (Lindane)	0.05	0.00421	U	0.00421	U	0.00571	U	0.00457	U
gamma-Chlordane	~	0.0105	U	0.0105	U	NT		NT	
Heptachlor	0.04	0.00421	U	0.00421	U	0.00571	U	NT	
Heptachlor epoxide	0.03	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Methoxychlor	35	0.00421	U	0.00421	U	0.00571	U	0.00457	U
Toxaphene	0.06	***0.105***	U	***0.105***	U	***0.143***	U	***0.114***	U
Polychlorinated Biphenyls (PCB) (ug/L)									
Aroclor 1016	~	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1221	~	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1232	~	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1242	~	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1248	~	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1254	~	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1260	~	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1262	~	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Aroclor 1268	~	0.0526	U	0.0526	U	0.0714	U	0.0571	U
Total PCBs	0.09	0.0526	U	0.0526	U	0.0714	U	0.0571	U

TABLE NOTES:

U : Not detected at t

NT: Not a target for tl

J : Estimated value.

ug/l: Micrograms per L

~ : No Standards or (

Table 10B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-01S		MW-01M		MW-02S		MW-02M		MW-03S		MW-03M		MW-04S		MW-04M	
LAB SAMPLE ID		24I0079-03		24I0079-01		24I0079-02		24I0079-04		24I0218-01		24I0079-06		24I0079-05		24I0079-07	
SAMPLING DATE		9/3/2024 11:55:00 AM		9/3/2024 10:45:00 AM		9/3/2024 10:45:00 AM		9/3/2024 12:00:00 PM		9/4/2024 9:05:00 AM		9/3/2024 2:15:00 PM		9/3/2024 1:25:00 PM		9/3/2024 2:30:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (ug/L))																	
4,4'-DDD	0.3	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
4,4'-DDE	0.2	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
4,4'-DDT	0.2	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Aldrin	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
alpha-BHC	0.01	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
alpha-Chlordane	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
beta-BHC	0.04	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Chlordane, total	0.05	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U
delta-BHC	0.04	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Dieldrin	0.004	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U
Endosulfan I	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endosulfan II	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endosulfan sulfate	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endrin	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endrin aldehyde	5	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
Endrin ketone	5	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
gamma-BHC (Lindane)	0.05	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
gamma-Chlordane	~	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
Heptachlor	0.04	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Heptachlor epoxide	0.03	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Methoxychlor	35	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Toxaphene	0.06	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U
Polychlorinated Biphenyls (PCB) (ug/L)																	
Aroclor 1016	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1221	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1232	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1242	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1248	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1254	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1260	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1262	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1268	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Total PCBs	0.09	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Herbicides, 8151 MASTER (ug/L)																	
2,4,5-T	35	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4,5-TP (Silvex)	0.26	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U
2,4-D	50	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DB	~	NT		NT		NT		NT		NT		NT		NT		NT	
Dalapon	~	NT		NT		NT		NT		NT		NT		NT		NT	
Dicamba	~	NT		NT		NT		NT		NT		NT		NT		NT	

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/L: Micrograms per Liter.
~ : No Standards or Guidance Value.
NT: This indicates the analyte was not a target for this sample.
P: Percent difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis.
Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 10B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-05S		MW-05M		MW-06S		MW-07S		MW-07M		MW-08S		MW-08M	
LAB SAMPLE ID		24I0273-09		24I0273-10		24I0525-02		24I0273-03		24I0273-04		24I0356-04		24I0356-01	
SAMPLING DATE		9/5/2024 1:00:00 PM		9/5/2024 1:00:00 PM		9/10/2024 11:45:00 AM		9/5/2024 1:00:00 PM		9/5/2024 2:30:00 PM		9/6/2024 1:40:00 PM		9/6/2024 9:00:00 AM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (ug/L))															
4,4'-DDD	0.3	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
4,4'-DDE	0.2	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
4,4'-DDT	0.2	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Aldrin	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
alpha-BHC	0.01	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
alpha-Chlordane	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
beta-BHC	0.04	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Chlordane, total	0.05	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U
delta-BHC	0.04	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Dieldrin	0.004	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U
Endosulfan I	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endosulfan II	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endosulfan sulfate	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endrin	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endrin aldehyde	5	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
Endrin ketone	5	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
gamma-BHC (Lindane)	0.05	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
gamma-Chlordane	~	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
Heptachlor	0.04	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Heptachlor epoxide	0.03	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Methoxychlor	35	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Toxaphene	0.06	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U
Polychlorinated Biphenyls (PCB) (ug/L)															
Aroclor 1016	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1221	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1232	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1242	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1248	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1254	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1260	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1262	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1268	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Total PCBs	0.09	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Herbicides, 8151 MASTER (ug/L)															
2,4,5-T	35	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4,5-TP (Silvex)	0.26	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U
2,4-D	50	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DB	~	5	U	5	U	5	U	5	U	5	U	NT		NT	
Dalapon	~	5	U	5	U	5	U	5	U	5	U	NT		NT	
Dicamba	~	5	U	5	U	5	U	5	U	5	U	NT		NT	

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/L: Micrograms per Liter.
~ : No Standards or Guidance Value.
NT: This indicates the analyte was not a target for this sample.
P: Percent difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis.
Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 10B - Pesticides, Polychlorinated Biphenyls, and Herbicides in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	MW-09S		MW-09M		MW-10S		MW-11S		9.4.2024_Duplicate		9.5.2024_Duplicate		9.4.2024-FB-1		9.9.2024_FB-1	
LAB SAMPLE ID		24I0218-08		24I0356-02		24I0525-04		24I0580-01		24I0218-04		24I0273-05		24I0218-07		24I0429-02	
SAMPLING DATE		9/4/2024 2:20:00 PM		9/6/2024 10:50:00 AM		9/10/2024 2:15:00 PM		9/10/2024 8:45:00 PM		9/4/2024 9:05:00 AM		9/5/2024 1:00:00 PM		9/4/2024 4:10:00 PM		9/9/2024 9:05:00 AM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Water		Water	
		Result	Q	Result	Q	Result	Q			Result	Q	Result	Q	Result	Q	Result	Q
Pesticides, 8081 (ug/L))										*MW-03S Duplicate		*MW-07M Duplicate					
4,4'-DDD	0.3	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
4,4'-DDE	0.2	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
4,4'-DDT	0.2	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Aldrin	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
alpha-BHC	0.01	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
alpha-Chlordane	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
beta-BHC	0.04	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Chlordane, total	0.05	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U	***0.200***	U
delta-BHC	0.04	0.00400	U	0.00400	U	0.0206	P	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Dieldrin	0.004	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U	0.00200	U
Endosulfan I	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endosulfan II	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endosulfan sulfate	~	0.00400	U	0.00400	U	0.0191		0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endrin	~	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Endrin aldehyde	5	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
Endrin ketone	5	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
gamma-BHC (Lindane)	0.05	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
gamma-Chlordane	~	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U	0.0100	U
Heptachlor	0.04	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Heptachlor epoxide	0.03	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Methoxychlor	35	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U	0.00400	U
Toxaphene	0.06	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U	***0.100***	U
Polychlorinated Biphenyls (PCB) (ug/L)																	
Aroclor 1016	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1221	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1232	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1242	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1248	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1254	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1260	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1262	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Aroclor 1268	~	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Total PCBs	0.09	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U	0.0500	U
Herbicides, 8151 MASTER (ug/L)																	
2,4,5-T	35	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4,5-TP (Silvex)	0.26	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U	***5***	U
2,4-D	50	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DB	~	NT		NT		5	U	NT		NT		5	U	NT		NT	
Dalapon	~	NT		NT		5	U	NT		NT		5	U	NT		NT	
Dicamba	~	NT		NT		5	U	NT		NT		5	U	NT		NT	

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
J : Estimated value.
ug/L: Micrograms per Liter.
~ : No Standards or Guidance Value.
NT: This indicates the analyte was not a target for this sample.
P: Percent difference for detected concentrations that exceed method dictated limits between the two GC columns used for analysis.
Bold and Italics : The analyte was not detected above the reporting limit; however, the reporting limit is greater than one or more of the soil cleanup objectives.

Table 11A - PFAS in Groundwater
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	GW-1		GW-2		GW-3		GW-X	
LAB SAMPLE ID		23B0854-01		23B0854-03		23B0854-02		23B0854-04	
SAMPLING DATE		Clay St.		Clay St.		Clay St.		Clay St.	
SAMPLE TYPE		Water		Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ng/L)									
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS	~	0.00500	U	0.00500	U	0.00481	U	NT	
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS	~	0.0125	U	0.0248	D	0.0120	U	NT	
N-EtFOSAA	~	0.00100	U	0.00100	U	0.00096	U	NT	
N-MeFOSAA	~	0.00100	U	0.00100	U	0.00096	U	NT	
Perfluoro-1-decanesulfonic acid (PFDS)	~	0.00100	U	0.00100	U	0.00096	U	NT	
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	0.00105		0.00100	U	0.00096	U	NT	
Perfluoro-1-octanesulfonamide (FOSA)	~	0.00100	U	0.00100	U	0.00096	U	NT	
Perfluorobutanesulfonic acid (PFBS)	~	0.00414		0.00415		0.0197		NT	
Perfluorodecanoic acid (PFDA)	~	0.00100	U	0.00100	U	0.00096	U	NT	
Perfluorododecanoic acid (PFDoA)	~	0.00100	U	0.00100	U	0.00096	U	NT	
Perfluoroheptanoic acid (PFHpA)	~	0.0113		0.00333		0.0303		NT	
Perfluorohexanesulfonic acid (PFHxS)	~	0.00381		0.00168		0.0195		NT	
Perfluorohexanoic acid (PFHxA)	~	0.0103		0.00588		0.0317		NT	
Perfluoro-n-butanoic acid (PFBA)	~	0.00690		0.00439		0.0243		NT	
Perfluorononanoic acid (PFNA)	~	0.00170		0.00100	U	0.00096	U	NT	
Perfluorooctanesulfonic acid (PFOS)	~	0.0187		0.00182		0.00703		NT	
Perfluorooctanoic acid (PFOA)	~	0.0884		0.00920		0.111		NT	
Perfluoropentanoic acid (PFPeA)	~	0.00916		0.00505		0.0316		NT	
Perfluorotetradecanoic acid (PFTA)	~	0.00100	U	0.00100	U	0.00096	U	NT	
Perfluorotridecanoic acid (PFTrDA)	~	0.00100	U	0.00100	U	0.00096	U	NT	
Perfluoroundecanoic acid (PFUnA)	~	0.00100	U	0.00260		0.00096	U	NT	

TABLE NOTES:

NT: Not a target for this sample.

D: Analysis reuired dilution.

U : Not detected at the reported detection limit for the sample.

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

Table 11A - PFAS in Groundwater
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDEC TOGS Standards and Guidance Values - GA	GW-5		GW-4		S-FB-1		GW-FB-1	
LAB SAMPLE ID		23B0727-08		23B0727-09		23B0854-05		23B0854-06	
SAMPLING DATE		Commercial St.		Commercial St.					
SAMPLE TYPE		Water		Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ng/L)									
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS	~	NT		0.00463	U	NT		NT	
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS	~	NT		0.00231	U	NT		NT	
N-EtFOSAA	~	NT		0.00093	U	NT		NT	
N-MeFOSAA	~	NT		0.00093	U	NT		NT	
Perfluoro-1-decanesulfonic acid (PFDS)	~	NT		0.00093	U	NT		NT	
Perfluoro-1-heptanesulfonic acid (PFHpS)	~	NT		0.00093	U	NT		NT	
Perfluoro-1-octanesulfonamide (FOSA)	~	NT		0.00093	U	NT		NT	
Perfluorobutanesulfonic acid (PFBS)	~	NT		0.00664		NT		NT	
Perfluorodecanoic acid (PFDA)	~	NT		0.00093	U	NT		NT	
Perfluorododecanoic acid (PFDoA)	~	NT		0.00093	U	NT		NT	
Perfluoroheptanoic acid (PFHpA)	~	NT		0.0225		NT		NT	
Perfluorohexanesulfonic acid (PFHxS)	~	NT		0.00171		NT		NT	
Perfluorohexanoic acid (PFHxA)	~	NT		0.00993		NT		NT	
Perfluoro-n-butanoic acid (PFBA)	~	NT		0.0107		NT		NT	
Perfluorononanoic acid (PFNA)	~	NT		0.0172		NT		NT	
Perfluorooctanesulfonic acid (PFOS)	~	NT		0.0318		NT		NT	
Perfluorooctanoic acid (PFOA)	~	NT		0.0747		NT		NT	
Perfluoropentanoic acid (PFPeA)	~	NT		0.00562		NT		NT	
Perfluorotetradecanoic acid (PFTA)	~	NT		0.00093	U	NT		NT	
Perfluorotridecanoic acid (PFTrDA)	~	NT		0.00093	U	NT		NT	
Perfluoroundecanoic acid (PFUnA)	~	NT		0.00093	U	NT		NT	

TABLE NOTES:

NT: Not a target for this sample.

D: Analysis reuired dilution.

U : Not detected at the reported detection limit for the sample.

ug/L: Micrograms per Liter.

~ : No Standards or Guidance Value.

Table 11B - PFAS in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYDEC Part 375 PFAS Remedial Program Water Oct 2020	MW-01S		MW-01M		MW-02S		MW-02M		MW-03S		MW-03M		MW-04S	
LAB SAMPLE ID		24I0079-03		24I0079-01		24I0079-02		24I0079-04		24I0218-01		24I0079-06		24I0079-05	
SAMPLING DATE		9/3/2024 11:55:00 AM		9/3/2024 10:45:00 AM		9/3/2024 10:45:00 AM		9/3/2024 12:00:00 PM		9/4/2024 9:05:00 AM		9/3/2024 2:15:00 PM		9/3/2024 1:25:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ng/L)															
11CL-PF3OUdS	100	1.27	U	1.31	U	1.26	U	1.33	U	1.38	U	1.33	U	1.33	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	100	1.88	U	1.94	U	1.88	U	1.98	U	2.05	U	1.98	U	1.97	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	1.65	U	1.70	U	1.64	U	1.73	U	1.79	U	1.73	U	1.72	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	100	0.97	U	1.92	J	0.97	U	3.32	J	1.06	U	1.97	J	1.02	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	8.70	U	8.98	U	8.67	U	9.14	U	9.47	U	9.14	U	9.12	U
3-Perfluoropentyl propanoic acid (FPePA)	~	6.74	U	6.95	U	6.71	U	7.08	U	7.33	U	7.08	U	7.06	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	1.87	U	1.93	U	1.86	U	1.96	U	2.03	U	1.96	U	1.96	U
9CL-PF3ONS	100	0.64	U	0.66	U	0.64	U	0.68	U	0.70	U	0.68	U	0.67	U
ADONA	100	0.49	U	0.50	U	0.49	U	0.51	U	0.53	U	0.51	U	0.51	U
HFPO-DA (Gen-X)	100	2.97	U	3.06	U	2.96	U	3.12	U	3.23	U	3.12	U	3.11	U
N-EtFOSA	~	1.65	U	1.71	U	1.65	U	1.74	U	1.80	U	1.74	U	1.73	U
N-EtFOSAA	100	0.95	U	0.98	U	0.94	U	9.70		3.47		2.40		0.99	U
N-EtFOSE	~	3.67	U	3.79	U	3.65	U	3.85	U	3.99	U	3.85	U	3.84	U
N-MeFOSA	~	1.45	U	1.50	U	1.45	U	1.53	U	1.58	U	1.53	U	1.52	U
N-MeFOSAA	100	0.73	U	0.75	U	0.72	U	0.76	U	0.79	U	0.76	U	0.76	U
N-MeFOSE	~	3.67	U	3.79	U	3.65	U	3.85	U	3.99	U	3.85	U	3.84	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	0.46	U	0.47	U	0.46	U	0.48	U	0.50	U	0.48	U	0.48	U
Perfluoro-1-decanesulfonic acid (PFDS)	100	1.21	U	1.25	U	1.21	U	1.27	U	1.32	U	1.27	U	1.27	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	100	10.70		6.04		48.20		34.30		0.91	U	19.40		3.72	
Perfluoro-1-nonanesulfonic acid (PFNS)	~	0.79	U	0.82	U	0.79	U	0.83	U	0.86	U	0.83	U	0.83	U
Perfluoro-1-octanesulfonamide (FOSA)	100	0.81	U	0.84	U	0.81	U	1.32	J	9.05		7.56		0.85	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	41.50		31.80		71.30		77.00		0.76	U	17.60		12.50	
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	1.97	U	2.03	U	1.96	U	2.07	U	2.14	U	2.07	U	2.06	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	0.23	U	0.24	U	0.23	U	0.24	U	0.25	U	0.24	U	0.24	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	0.34	U	0.35	U	0.34	U	0.36	U	0.37	U	0.36	U	0.36	U
Perfluorobutanesulfonic acid (PFBS)	100	44.80		34.80		72.50		87.20		0.47	U	16.40		11.40	
Perfluorodecanoic acid (PFDA)	100	0.69	U	0.71	U	0.69	U	0.72	U	0.75	U	0.72	U	0.72	U
Perfluorododecanesulfonic acid (PFDoS)	~	0.86	U	0.88	U	0.85	U	0.90	U	0.93	U	0.90	U	0.90	U
Perfluorododecanoic acid (PFDoA)	100	0.81	U	0.84	U	0.81	U	0.85	U	0.88	U	0.85	U	0.85	U
Perfluoroheptanoic acid (PFHpA)	100	70.20		44.10		82.70		**113**		2.06		45.10		33.80	
Perfluorohexanesulfonic acid (PFHxS)	100	98.60		57.30		**182**		**166**		0.68	U	56.60		59.10	
Perfluorohexanoic acid (PFHxA)	100	30.40		32.60		36.50		53.80		2.94		33.40		18.60	
Perfluoro-n-butanoic acid (PFBA)	100	16.30		19.90		20.00		29.30		14.50		19.60		13.40	
Perfluorononanoic acid (PFNA)	100	1.71	J	0.58	J	1.34	J	3.03		0.69	J	2.76		3.42	
Perfluorooctanesulfonic acid (PFOS)	10	**58.1**		**23.10**		**35.90**		**55.70**		**91.30**		**333**		**59.60**	
Perfluorooctanoic acid (PFOA)	10	**230**		**128**		**624**	D	**447**		4.70		**149**		**164.0**	
Perfluoropentanoic acid (PFPeA)	100	17.90		41.90		22.50		30.20		1.81	J	56.10		22.90	
Perfluorotetradecanoic acid (PFTA)	100	0.63	U	0.66	U	0.63	U	0.67	U	0.69	U	0.67	U	0.67	U
Perfluorotridecanoic acid (PFTrDA)	100	0.68	U	0.70	U	0.68	U	0.71	U	0.74	U	0.71	U	0.71	U
Perfluoroundecanoic acid (PFUnA)	100	1.04	U	1.07	U	1.03	U	1.09	U	1.13	U	1.09	U	1.09	U
Taurochenodeoxycholic Acid (TCDCA)	~	NT		NT		NT		NT		NT		NT		NT	
Taurodeoxycholic Acid (TDCA)	~	NT		NT		NT		NT		NT		NT		NT	
Tauroursodeoxycholic Acid (TUDCA)	~	NT		NT		NT		NT		NT		NT		NT	

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
D: Result is from an analysis that required a dilution.
J : Estimated value.
E: Result is estimated and cannot be accurately reported due to levels encountered or interferences
ng/L: nanograms per liter
~ : No Standards or Guidance Value.
NT: Indicates the analyte was not a target for this sample.
Value exceeds the NYDEC Part 375 PFAS Remedial Program Water Oct 2020

Table 11B - PFAS in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYDEC Part 375 PFAS Remedial Program Water Oct 2020	MW-04M		MW-05S		MW-05M		MW-06S		MW-07S		MW-07M		MW-08S	
LAB SAMPLE ID		24I0079-07		24I0273-09		24I0273-10		24I0525-02		24I0273-03		24I0273-04		24I0356-04	
SAMPLING DATE		9/3/2024 2:30:00 PM		9/5/2024 1:00:00 PM		9/5/2024 1:00:00 PM		9/10/2024 11:45:00 AM		9/5/2024 1:00:00 PM		9/5/2024 2:30:00 PM		9/6/2024 1:40:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ng/L)															
11CL-PF3OUdS	100	1.31	U	1.27	U	1.27	U	1.29	U	1.29	U	1.29	U	1.33	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	100	1.95	U	1.89	U	1.88	U	1.92	U	1.92	U	1.92	U	1.97	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	1.70	U	1.65	U	1.64	U	1.68	U	1.67	U	1.67	U	1.72	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	100	1.01	U	0.98	U	0.97	U	1.07	J	0.99	U	0.99	U	1.02	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	9.00	U	8.74	U	8.69	U	8.88	U	8.85	U	8.85	U	9.11	U
3-Perfluoropentyl propanoic acid (FPePA)	~	6.97	U	6.76	U	6.72	U	6.88	U	6.85	U	6.85	U	7.05	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	1.93	U	1.87	U	1.86	U	1.90	U	1.90	U	1.90	U	1.95	U
9CL-PF3ONS	100	0.67	U	0.65	U	0.64	U	0.66	U	0.65	U	0.65	U	0.67	U
ADONA	100	0.50	U	0.49	U	0.49	U	0.50	U	0.50	U	0.50	U	0.51	U
HFPO-DA (Gen-X)	100	3.07	U	2.98	U	2.96	U	3.03	U	3.02	U	3.02	U	3.11	U
N-EtFOSA	~	1.71	U	1.66	U	1.65	U	1.69	U	1.68	U	1.68	U	1.73	U
N-EtFOSAA	100	0.98	U	0.95	U	0.95	U	0.97	U	3.44		0.96	U	0.99	U
N-EtFOSE	~	3.79	U	3.68	U	3.66	U	3.74	U	3.73	U	3.73	U	3.84	U
N-MeFOSA	~	1.50	U	1.46	U	1.45	U	1.48	U	1.48	U	1.48	U	1.52	U
N-MeFOSAA	100	0.75	U	0.73	U	0.73	U	0.74	U	0.74	U	0.74	U	0.76	U
N-MeFOSE	~	3.79	U	3.68	U	3.66	U	3.74	U	3.73	U	3.73	U	3.84	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	0.48	U	0.46	U	0.46	U	0.47	U	0.47	U	0.47	U	0.48	U
Perfluoro-1-decanesulfonic acid (PFDS)	100	1.25	U	1.22	U	1.21	U	1.24	U	1.23	U	1.23	U	1.27	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	100	24.20		0.84	U	3.69		0.85	U	5.31		62.60		0.88	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	0.82	U	0.79	U	0.79	U	0.81	U	0.80	U	0.80	U	0.83	U
Perfluoro-1-octanesulfonamide (FOSA)	100	0.84	U	0.81	U	0.81	U	0.83	U	0.89	J	0.82	U	0.85	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	7.14		0.70	U	1.73		0.79	J	2.38		14.50		0.73	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	2.03	U	1.97	U	1.96	U	2.01	U	2.00	U	2.00	U	2.06	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	0.24	U	0.23	U	0.23	U	0.24	U	0.23	U	0.23	U	0.24	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	0.35	U	0.34	U	0.34	U	0.35	U	0.35	U	0.35	U	0.36	U
Perfluorobutanesulfonic acid (PFBS)	100	7.09		4.88		4.71		2.27		4.72		11.10		7.41	
Perfluorodecanoic acid (PFDA)	100	0.71	U	0.69	U	1.40	J	0.70	U	0.70	U	0.70	U	0.72	U
Perfluorododecanesulfonic acid (PFDoS)	~	0.88	U	0.86	U	0.85	U	0.87	U	0.87	U	0.87	U	0.89	U
Perfluorododecanoic acid (PFDoA)	100	0.84	U	0.81	U	0.81	U	0.83	U	0.82	U	0.82	U	0.85	U
Perfluoroheptanoic acid (PFHpA)	100	72.30		7.43		11.40		0.67	U	7.22		25.00		5.69	
Perfluorohexanesulfonic acid (PFHxS)	100	44.00		0.88	J	6.33		1.96		8.91		63.80		1.70	J
Perfluorohexanoic acid (PFHxA)	100	28.90		9.76		8.47		4.52		7.09		16.40		5.59	
Perfluoro-n-butanoic acid (PFBA)	100	15.00		15.50		11.00		3.21	J	4.78	J	6.86	J	0.32	U
Perfluorononanoic acid (PFNA)	100	3.34		3.18		2.74		0.98	J	0.60	J	5.19		0.74	J
Perfluorooctanesulfonic acid (PFOS)	10	**447**		10.00		**10.4**		2.77		**65.6**		**543**	DE	6.70	
Perfluorooctanoic acid (PFOA)	10	**361**		**11.10**		**57.1**		**24.50**		**31.1**		**180**		**20.80**	
Perfluoropentanoic acid (PFPeA)	100	35.00		10.30		8.33		3.38	J	5.08		7.27		7.73	
Perfluorotetradecanoic acid (PFTA)	100	0.66	U	0.64	U	0.63	U	0.65	U	0.65	U	0.65	U	0.66	U
Perfluorotridecanoic acid (PFTrDA)	100	0.70	U	0.68	U	0.68	U	0.69	U	0.69	U	0.69	U	0.71	U
Perfluoroundecanoic acid (PFUnA)	100	1.07	U	1.04	U	1.04	U	1.06	U	1.06	U	1.06	U	1.09	U
Taurochenodeoxycholic Acid (TCDCA)	~	NT		0.00	U	0.00	U	0.00	U	0.00	U	0.00	U	NT	
Taurodeoxycholic Acid (TDCA)	~	NT		0.00	U	0.00	U	0.00	U	0.00	U	0.00	U	NT	
Tauroursodeoxycholic Acid (TUDCA)	~	NT		0.00	U	0.00	U	0.00	U	0.00	U	0.00	U	NT	

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
D: Result is from an analysis that required a dilution.
J : Estimated value.
E: Result is estimated and cannot be accurately reported due to levels encountered or interferences
ng/L: nanograms per liter
~ : No Standards or Guidance Value.
NT: Indicates the analyte was not a target for this sample.
Value exceeds the NYDEC Part 375 PFAS Remedial Program Water Oct 2020

Table 11B - PFAS in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYDEC Part 375 PFAS Remedial Program Water Oct 2020	MW-08M		MW-09S		MW-09M		MW-10S		MW-11S		9.4.2024_Duplicate		9.5.2024_Duplicate	
LAB SAMPLE ID		24I0356-01		24I0218-08		24I0356-02		24I0525-04		24I0580-01		24I0218-04		24I0273-05	
SAMPLING DATE		9/6/2024 9:00:00 AM		9/4/2024 2:20:00 PM		9/6/2024 10:50:00 AM		9/10/2024 2:15:00 PM		9/10/2024 8:45:00 PM		9/4/2024 9:05:00 AM		9/5/2024 1:00:00 PM	
SAMPLE TYPE		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water		Ground Water	
		Result	Q	Result	Q	Result	Q	Result	Q			Result	Q	Result	Q
PFAS, EPA 1633 Target List (ng/L)												*MW-03S Duplicate		*MW-07M Duplicate	
11CL-PF3OUdS	100	1.27	U	1.29	U	1.28	U	1.27	U	1.280	U	14.80		1.32	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	100	1.89	U	1.91	U	1.90	U	1.88	U	1.890	U	2.22	U	1.96	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	1.65	U	1.67	U	1.66	U	1.64	U	1.650	U	1.94	U	1.71	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	100	0.98	U	0.99	U	2.23	J	0.97	U	1.390	J	4.68	J	1.02	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	8.72	U	8.83	U	8.77	U	8.69	U	8.750	U	11.80	J	9.07	U
3-Perfluoropentyl propanoic acid (FPePA)	~	6.75	U	6.84	U	6.79	U	6.72	U	6.770	U	7.95	U	7.02	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	1.87	U	1.89	U	1.88	U	1.86	U	1.880	U	2.20	U	1.94	U
9CL-PF3ONS	100	0.65	U	0.65	U	0.65	U	0.64	U	0.647	U	2.07	J	0.67	U
ADONA	100	0.49	U	0.49	U	0.49	U	0.49	U	0.490	U	1.11	J	0.51	U
HFPO-DA (Gen-X)	100	2.97	U	3.01	U	2.99	U	2.96	U	2.990	U	3.50	U	3.09	U
N-EtFOSA	~	1.66	U	1.68	U	1.67	U	1.65	U	1.660	U	2.51		1.72	U
N-EtFOSAA	100	0.95	U	1.26	J	0.95	U	23.80		1.060	J	35.00		0.99	U
N-EtFOSE	~	3.67	U	3.72	U	3.69	U	3.66	U	3.690	U	17.60	J	3.82	U
N-MeFOSA	~	1.45	U	1.47	U	1.46	U	1.45	U	1.460	U	1.71	U	1.51	U
N-MeFOSAA	100	0.73	U	2.01		0.73	U	0.73	U	0.730	U	42.80		0.76	U
N-MeFOSE	~	3.67	U	3.72	U	3.69	U	3.66	U	3.690	U	9.06	J	3.82	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	0.46	U	0.47	U	0.46	U	0.46	U	0.462	U	0.54	U	0.48	U
Perfluoro-1-decanesulfonic acid (PFDS)	100	1.22	U	1.23	U	1.22	U	1.21	U	1.220	U	1.43	U	1.26	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	100	0.84	U	2.19		0.84	U	0.84	U	0.841	U	0.99	U	66.40	
Perfluoro-1-nonanesulfonic acid (PFNS)	~	0.79	U	0.80	U	0.80	U	0.79	U	0.795	U	0.93	U	0.82	U
Perfluoro-1-octanesulfonamide (FOSA)	100	0.81	U	1.23	J	0.82	U	4.26		0.813	U	1.80	J	0.84	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	0.94	J	1.14	J	19.70		1.08	J	3.310		0.82	U	7.61	
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	1.97	U	2.00	U	1.98	U	1.96	U	1.980	U	2.32	U	2.05	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	0.23	U	0.23	U	0.23	U	0.23	U	0.231	U	0.27	U	0.24	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	0.34	U	0.35	U	0.34	U	0.60	J	0.750	J	0.46	J	0.35	U
Perfluorobutanesulfonic acid (PFBS)	100	2.56		3.28		28.00		3.24		2.490		0.51	U	13.50	
Perfluorodecanoic acid (PFDA)	100	0.69	U	0.75	J	0.69	U	0.69	U	0.693	U	1.06	J	0.72	U
Perfluorododecanesulfonic acid (PFDoS)	~	0.86	U	0.87	U	0.86	U	0.85	U	0.860	U	1.64	J	0.89	U
Perfluorododecanoic acid (PFDoA)	100	0.81	U	0.82	U	0.82	U	0.81	U	0.813	U	2.44		0.84	U
Perfluoroheptanoic acid (PFHpA)	100	4.72		19.10		34.50		6.01		7.680		1.69	J	22.70	
Perfluorohexanesulfonic acid (PFHxS)	100	1.39	J	3.84		28.00		3.26		2.710		0.97	J	64.00	
Perfluorohexanoic acid (PFHxA)	100	4.07		26.20		47.40		7.46		6.870		4.72		16.30	
Perfluoro-n-butanoic acid (PFBA)	100	0.30	U	0.31	U	30.00		0.30	U	0.305	U	0.36	U	0.32	U
Perfluorononanoic acid (PFNA)	100	0.48	U	1.89		0.48	U	1.26	J	0.481	U	1.43	J	5.12	
Perfluorooctanesulfonic acid (PFOS)	10	0.76	U	**124.0**		0.76	U	**17.0**		0.758	U	3.01		**636**	DE
Perfluorooctanoic acid (PFOA)	10	**10.90**		**48.3**		**39.4**		**21.3**		5.230		1.90	J	**188**	
Perfluoropentanoic acid (PFPeA)	100	4.29		27.30		39.20		0.21	U	5.810		0.25	U	6.25	
Perfluorotetradecanoic acid (PFTA)	100	0.64	U	0.64	U	0.64	U	0.63	U	0.638	U	4.31		0.66	U
Perfluorotridecanoic acid (PFTrDA)	100	0.68	U	0.69	U	0.69	U	0.68	U	0.684	U	5.32		0.71	U
Perfluoroundecanoic acid (PFUnA)	100	1.04	U	1.05	U	1.05	U	1.04	U	1.040	U	1.23	U	1.08	U
Taurochenodeoxycholic Acid (TCDCA)	~	NT		NT		NT		0.00	U	NT		NT		0.00	U
Taurodeoxycholic Acid (TDCA)	~	NT		NT		NT		0.00	U	NT		NT		0.00	U
Tauroursodeoxycholic Acid (TUDCA)	~	NT		NT		NT		0.00	U	NT		NT		0.00	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
D: Result is from an analysis that required a dilution.
J : Estimated value.
E: Result is estimated and cannot be accurately reported due to levels encountered or interferences
ng/L: nanograms per liter
~ : No Standards or Guidance Value.
NT: Indicates the analyte was not a target for this sample.
Value exceeds the NYDEC Part 375 PFAS Remedial Program Water Oct 2020

Table 11B - PFAS in Groundwater
Remedial Investigation Report - 2024 NYSDEC RI

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYDEC Part 375 PFAS Remedial Program Water Oct 2020	9.3.2024-PFAS Blank		9.4.2024_PFAS Blank		9.5.2024_PFAS Blank		9.6.2024_PFAS Blank		9.10.2024-PFAS Blank	
LAB SAMPLE ID		24I0079-09		24I0218-06		24I0273-06		24I0356-06		24I0525-01	
SAMPLING DATE		9/3/2024 3:25:00 PM		9/4/2024 4:00:00 PM		9/5/2024 4:20:00 PM		9/6/2024 11:35:00 AM		9/10/2024 7:55:00 AM	
SAMPLE TYPE		Water		Water		Water		Water		Water	
		Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PFAS, EPA 1633 Target List (ng/L)											
11CL-PF3OUdS	100	1.35	U	1.31	U	1.33	U	1.31	U	1.31	U
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	100	2.00	U	1.95	U	1.97	U	1.94	U	1.94	U
1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	~	1.74	U	1.70	U	1.72	U	1.70	U	1.70	U
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	100	1.03	U	1.01	U	1.02	U	1.00	U	1.01	U
3-Perfluoroheptyl propanoic acid (FHpPA)	~	9.23	U	9.02	U	9.11	U	8.97	U	8.98	U
3-Perfluoropentyl propanoic acid (FPePA)	~	7.14	U	6.98	U	7.05	U	6.94	U	6.95	U
3-Perfluoropropyl propanoic acid (FPrPA)	~	1.98	U	1.93	U	1.95	U	1.92	U	1.93	U
9CL-PF3ONS	100	0.68	U	0.67	U	0.67	U	0.66	U	0.66	U
ADONA	100	0.52	U	0.51	U	0.51	U	0.50	U	0.50	U
HFPO-DA (Gen-X)	100	3.15	U	3.08	U	3.11	U	3.06	U	3.06	U
N-EtFOSA	~	1.75	U	1.71	U	1.73	U	1.70	U	1.71	U
N-EtFOSAA	100	1.00	U	0.98	U	0.99	U	0.98	U	0.98	U
N-EtFOSE	~	3.89	U	3.80	U	3.84	U	3.78	U	3.79	U
N-MeFOSA	~	1.54	U	1.50	U	1.52	U	1.50	U	1.50	U
N-MeFOSAA	100	0.77	U	0.75	U	0.76	U	0.75	U	0.75	U
N-MeFOSE	~	3.89	U	3.80	U	3.84	U	3.78	U	3.79	U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	~	0.49	U	0.48	U	0.48	U	0.47	U	0.47	U
Perfluoro-1-decanesulfonic acid (PFDS)	100	1.29	U	1.26	U	1.27	U	1.25	U	1.25	U
Perfluoro-1-heptanesulfonic acid (PFHpS)	100	0.89	U	0.87	U	0.88	U	0.86	U	0.86	U
Perfluoro-1-nonanesulfonic acid (PFNS)	~	0.84	U	0.82	U	0.83	U	0.81	U	0.82	U
Perfluoro-1-octanesulfonamide (FOSA)	100	0.86	U	0.84	U	0.85	U	0.83	U	0.84	U
Perfluoro-1-pentanesulfonate (PFPeS)	~	0.74	U	0.72	U	0.73	U	0.72	U	0.72	U
Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	~	2.09	U	2.04	U	2.06	U	2.03	U	2.03	U
Perfluoro-4-oxapentanoic acid (PFMPA)	~	0.24	U	0.24	U	0.24	U	0.24	U	0.24	U
Perfluoro-5-oxahexanoic acid (PFMBA)	~	0.36	U	0.35	U	0.36	U	0.35	U	0.35	U
Perfluorobutanesulfonic acid (PFBS)	100	0.46	U	0.45	U	0.45	U	0.45	U	0.45	U
Perfluorodecanoic acid (PFDA)	100	0.73	U	0.71	U	0.72	U	0.71	U	0.71	U
Perfluorododecanesulfonic acid (PFDoS)	~	0.91	U	0.89	U	0.89	U	0.88	U	0.88	U
Perfluorododecanoic acid (PFDoA)	100	0.86	U	0.84	U	0.85	U	0.83	U	0.84	U
Perfluoroheptanoic acid (PFHpA)	100	0.69	U	0.68	U	0.68	U	0.67	U	0.67	U
Perfluorohexanesulfonic acid (PFHxS)	100	0.66	U	0.65	U	0.65	U	0.64	U	0.65	U
Perfluorohexanoic acid (PFHxA)	100	0.34	U	0.33	U	0.34	U	0.33	U	0.33	U
Perfluoro-n-butanoic acid (PFBA)	100	0.32	U	0.31	U	0.32	U	0.43	J	0.31	U
Perfluorononanoic acid (PFNA)	100	0.51	U	0.50	U	0.50	U	0.49	U	0.49	U
Perfluorooctanesulfonic acid (PFOS)	10	0.80	U	0.78	U	0.79	U	0.78	U	0.78	U
Perfluorooctanoic acid (PFOA)	10	0.41	U	0.40	U	0.40	U	0.40	U	0.40	U
Perfluoropentanoic acid (PFPeA)	100	0.22	U	0.22	U	0.22	U	0.22	U	0.22	U
Perfluorotetradecanoic acid (PFTA)	100	0.67	U	0.66	U	0.66	U	0.65	U	0.66	U
Perfluorotridecanoic acid (PFTrDA)	100	0.72	U	0.71	U	0.71	U	0.70	U	0.70	U
Perfluoroundecanoic acid (PFUnA)	100	1.10	U	1.08	U	1.09	U	1.07	U	1.07	U
Taurochenodeoxycholic Acid (TCDCA)	~	NT		NT		0.00	U	NT		0.00	U
Taurodeoxycholic Acid (TDCA)	~	NT		NT		0.00	U	NT		0.00	U
Tauroursodeoxycholic Acid (TUDCA)	~	NT		NT		0.00	U	NT		0.00	U

TABLE NOTES:

U : Not detected at the reported detection limit for the sample.
D: Result is from an analysis that required a dilution.
J : Estimated value.
E: Result is estimated and cannot be accurately reported due to levels encountered or interferences
ng/L: nanograms per liter
~ : No Standards or Guidance Value.
NT: Indicates the analyte was not a target for this sample.
Value exceeds the NYDEC Part 375 PFAS Remedial Program Water Oct 2020

Table 12A - Volatile Organic Compounds in Soil Vapor
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

SAMPLE ID	NYSDOH Soil Vapor Decision Matrices - Minimum Concentrations	SV-1 Clay Street		SV-2 Clay Street		SV-3 Clay Street	
LOCATION							
SAMPLING DATE							
SAMPLE TYPE		Soil Vapor		Soil Vapor		Soil Vapor	
		Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List (µg/m³)							
1,1,1,2-Tetrachloroethane	~	9.700	U	3.700	U	20	U
1,1,1-Trichloroethane	100	54	D	10	D	200	D
1,1,2,2-Tetrachloroethane	~	9.700	U	3.700	U	20	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	11	U	4.100	U	22	U
1,1,2-Trichloroethane	~	7.700	U	2.900	U	16	U
1,1-Dichloroethane	~	5.700	U	2.200	U	12	U
1,1-Dichloroethylene	6	1.400	U	0.540	U	2.900	U
1,2,4-Trichlorobenzene	~	10	U	4	U	22	U
1,2,4-Trimethylbenzene	60	6.900	U	2.700	U	14	U
1,2-Dibromoethane	~	11	U	4.200	U	22	U
1,2-Dichlorobenzene	~	8.500	U	3.200	U	18	U
1,2-Dichloroethane	~	5.700	U	2.200	U	12	U
1,2-Dichloropropane	~	6.500	U	2.500	U	13	U
1,2-Dichlorotetrafluoroethane	~	9.800	U	3.800	U	20	U
1,3,5-Trimethylbenzene	60	6.900	U	2.700	U	14	U
1,3-Butadiene	~	9.300	U	3.600	U	19	U
1,3-Dichlorobenzene	~	8.500	U	3.200	U	18	U
1,3-Dichloropropane	~	6.500	U	2.500	U	13	U
1,4-Dichlorobenzene	~	8.500	U	3.200	U	18	U
1,4-Dioxane	~	10	U	3.900	U	21	U
2-Butanone	~	4.100	U	1.900	D	8.600	U
2-Hexanone	~	12	U	4.400	U	24	U
3-Chloropropene	~	22	U	8.500	U	46	U
4-Methyl-2-pentanone	~	5.800	U	2.200	U	12	U
Acetone	~	42	D	36	D	330	D
Acrylonitrile	~	3.100	U	1.200	U	6.300	U
Benzene	60	4.500	U	1.700	U	9.300	U
Benzyl chloride	~	7.300	U	2.800	U	15	U
Bromodichloromethane	~	9.400	U	3.600	U	20	U
Bromoform	~	15	U	5.600	U	30	U
Bromomethane	~	5.500	U	2.100	U	11	U
Carbon disulfide	~	4.400	U	1.700	U	9.100	U
Carbon tetrachloride	6	2.200	U	0.850	U	9.200	D
Chlorobenzene	~	6.500	U	2.500	U	13	U
Chloroethane	~	3.700	U	1.400	U	7.700	U
Chloroform	~	38	D	5	D	300	D
Chloromethane	~	2.900	U	1.100	U	6	U
cis-1,2-Dichloroethylene	~	8.900	D	7.100	D	120	D
cis-1,3-Dichloropropylene	~	6.400	U	2.500	U	13	U
Cyclohexane	60	17	D	1.900	U	10	U
Dibromochloromethane	~	12	U	4.600	U	25	U
Dichlorodifluoromethane	~	7	U	2.700	U	14	U
Ethyl acetate	~	10	U	3.900	U	21	U
Ethyl Benzene	60	6.100	U	2.300	U	13	U
Hexachlorobutadiene	~	15	U	5.800	U	31	U
Isopropanol	~	19	D	2.700	U	14	U
Methyl Methacrylate	~	5.800	U	2.200	U	12	U
Methyl tert-butyl ether (MTBE)	~	5.100	U	1.900	U	11	U
Methylene chloride	100	9.800	U	3.800	U	20	U
n-Heptane	200	5.800	U	2.200	U	12	U
n-Hexane	200	5	D	1.900	U	10	U
o-Xylene	60	6.100	U	2.300	U	13	U
p- & m- Xylenes	200	12	U	4.700	U	25	U
p-Ethyltoluene	~	6.900	U	2.700	U	14	U
Propylene	~	2.400	U	1.200	D	7	D
Styrene	~	6	U	2.300	U	12	U
Tetrachloroethylene	100	56	D	3.700	D	4,500	D
Tetrahydrofuran	~	8.300	U	3.200	U	17	U
Toluene	300	8.500	D	18	D	46	D
trans-1,2-Dichloroethylene	~	5.600	U	2.100	U	31	D
trans-1,3-Dichloropropylene	~	6.400	U	2.500	U	13	U
Trichloroethylene	6	120,000	D	580	D	740,000	D
Trichlorofluoromethane (Freon 11)	~	7.900	U	3	U	16	U
Vinyl acetate	~	5	U	1.900	U	10	U
Vinyl bromide	~	6.200	U	2.400	U	13	U
Vinyl Chloride	6	1.800	U	0.690	U	3.700	U

TABLE NOTES:

Analyte exceeds the NYSDOH decision matrix minimum concentration level for soil vapor.

µg/m³: micrograms per cubic meter

~ : No Standards or Guidance Value.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution.

Table 12A - Volatile Organic Compounds in Soil Vapor
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

SAMPLE ID	NYSDOH Soil Vapor Decision Matrices - Minimum Concentrations	SV-4 Clay Street		SV-5 Clay Street		SV-6 Clay Street	
LOCATION							
SAMPLING DATE							
SAMPLE TYPE		Soil Vapor		Soil Vapor		Soil Vapor	
		Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List (µg/m³)							
1,1,1,2-Tetrachloroethane	~	11	U	11	U	0.990	U
1,1,1-Trichloroethane	100	9	D	9.800	D	3.900	D
1,1,2,2-Tetrachloroethane	~	11	U	11	U	0.990	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	13	U	12	U	1.100	U
1,1,2-Trichloroethane	~	9	U	8.900	U	0.790	U
1,1-Dichloroethane	~	6.600	U	6.600	U	0.590	U
1,1-Dichloroethylene	6	1.600	U	1.600	U	0.140	U
1,2,4-Trichlorobenzene	~	12	U	12	U	1.100	U
1,2,4-Trimethylbenzene	60	8.100	U	8	U	0.780	D
1,2-Dibromoethane	~	13	U	13	U	1.100	U
1,2-Dichlorobenzene	~	9.900	U	9.800	U	0.870	U
1,2-Dichloroethane	~	6.600	U	6.600	U	0.590	U
1,2-Dichloropropane	~	7.600	U	7.500	U	0.670	U
1,2-Dichlorotetrafluoroethane	~	11	U	11	U	1	U
1,3,5-Trimethylbenzene	60	8.100	U	8	U	0.710	U
1,3-Butadiene	~	11	U	11	U	0.960	U
1,3-Dichlorobenzene	~	9.900	U	9.800	U	0.870	U
1,3-Dichloropropane	~	7.600	U	7.500	U	0.670	U
1,4-Dichlorobenzene	~	9.900	U	9.800	U	0.870	U
1,4-Dioxane	~	12	U	12	U	1	U
2-Butanone	~	4.800	U	4.800	U	0.430	U
2-Hexanone	~	13	U	13	U	1.200	U
3-Chloropropene	~	26	U	25	U	2.300	U
4-Methyl-2-pentanone	~	6.700	U	6.700	U	0.590	U
Acetone	~	74	D	180	D	99	D
Acrylonitrile	~	3.600	U	3.500	U	0.310	U
Benzene	60	5.200	U	5.200	U	0.460	U
Benzyl chloride	~	8.500	U	8.400	U	0.750	U
Bromodichloromethane	~	11	U	11	U	0.970	U
Bromoform	~	17	U	17	U	1.500	U
Bromomethane	~	6.400	U	6.300	U	0.560	U
Carbon disulfide	~	5.100	U	5.100	U	0.450	U
Carbon tetrachloride	6	2.600	U	2.600	U	0.360	D
Chlorobenzene	~	7.600	U	7.500	U	0.670	U
Chloroethane	~	4.300	U	4.300	U	0.380	U
Chloroform	~	62	D	15	D	0.710	D
Chloromethane	~	3.400	U	3.400	U	0.300	U
cis-1,2-Dichloroethylene	~	7.800	D	4.500	D	0.140	U
cis-1,3-Dichloropropylene	~	7.400	U	7.400	U	0.660	U
Cyclohexane	60	5.600	U	5.600	U	0.500	U
Dibromochloromethane	~	14	U	14	U	1.200	U
Dichlorodifluoromethane	~	8.100	U	8.100	U	2.900	D
Ethyl acetate	~	12	U	12	U	1	U
Ethyl Benzene	60	7.100	U	7.100	U	0.630	D
Hexachlorobutadiene	~	18	U	17	U	1.500	U
Isopropanol	~	8.100	U	8	U	6.600	D
Methyl Methacrylate	~	6.700	U	6.700	U	0.590	U
Methyl tert-butyl ether (MTBE)	~	5.900	U	5.900	U	0.520	U
Methylene chloride	100	11	U	11	U	1	U
n-Heptane	200	6.700	U	6.700	U	0.590	U
n-Hexane	200	5.800	U	5.700	U	0.510	U
o-Xylene	60	7.100	U	7.100	U	0.630	U
p- & m- Xylenes	200	14	U	14	U	1.500	D
p-Ethyltoluene	~	8.100	U	8	U	0.710	U
Propylene	~	2.800	U	2.800	U	0.700	D
Styrene	~	7	U	6.900	U	0.620	U
Tetrachloroethylene	100	220	D	120	D	4.900	D
Tetrahydrofuran	~	9.700	U	9.600	U	0.850	U
Toluene	300	19	D	31	D	15	D
trans-1,2-Dichloroethylene	~	6.500	U	6.500	U	0.570	U
trans-1,3-Dichloropropylene	~	7.400	U	7.400	U	0.660	U
Trichloroethylene	6	29,000	D	15,000	D	73	D
Trichlorofluoromethane (Freon 11)	~	9.200	U	9.200	U	1.600	D
Vinyl acetate	~	5.800	U	5.700	U	0.510	U
Vinyl bromide	~	7.200	U	7.100	U	0.630	U
Vinyl Chloride	6	2.100	U	2.100	U	0.180	U

TABLE NOTES:

Analyte exceeds the NYSDOH decision matrix minimum concentration level for soil vapor.

µg/m³: micrograms per cubic meter

~ : No Standards or Guidance Value.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution.

Table 12A - Volatile Organic Compounds in Soil Vapor
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

SAMPLE ID	NYSDOH Soil Vapor Decision Matrices - Minimum Concentrations	SV-7 Commercial Street		SV-8 Commercial Street		SV-9 Commercial Street	
LOCATION							
SAMPLING DATE							
SAMPLE TYPE		Soil Vapor		Soil Vapor		Soil Vapor	
		Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List (µg/m³)							
1,1,1,2-Tetrachloroethane	~	4.800	U	11	U	4.200	U
1,1,1-Trichloroethane	100	3.900	U	8.500	U	3.300	U
1,1,2,2-Tetrachloroethane	~	4.800	U	11	U	4.200	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	5.400	U	12	U	4.600	U
1,1,2-Trichloroethane	~	3.900	U	8.500	U	3.300	U
1,1-Dichloroethane	~	2.900	U	6.300	U	2.500	U
1,1-Dichloroethylene	6	0.700	U	1.500	U	0.600	U
1,2,4-Trichlorobenzene	~	5.200	U	12	U	4.500	U
1,2,4-Trimethylbenzene	60	3.500	U	7.600	U	3	U
1,2-Dibromoethane	~	5.400	U	12	U	4.700	U
1,2-Dichlorobenzene	~	4.200	U	9.300	U	3.600	U
1,2-Dichloroethane	~	2.900	U	6.300	U	2.500	U
1,2-Dichloropropane	~	3.300	U	7.200	U	2.800	U
1,2-Dichlorotetrafluoroethane	~	4.900	U	11	U	4.200	U
1,3,5-Trimethylbenzene	60	3.500	U	7.600	U	3	U
1,3-Butadiene	~	4.700	U	10	U	7.800	D
1,3-Dichlorobenzene	~	4.200	U	9.300	U	3.600	U
1,3-Dichloropropane	~	3.300	U	7.200	U	2.800	U
1,4-Dichlorobenzene	~	4.200	U	9.300	U	3.600	U
1,4-Dioxane	~	5.100	U	11	U	4.400	U
2-Butanone	~	11	D	4.600	U	1.800	U
2-Hexanone	~	5.800	U	13	U	5	U
3-Chloropropene	~	11	U	24	U	9.500	U
4-Methyl-2-pentanone	~	2.900	U	6.400	U	2.500	U
Acetone	~	130	D	46	D	29	D
Acrylonitrile	~	1.500	U	3.400	U	1.300	U
Benzene	60	2.500	D	5	U	1.900	U
Benzyl chloride	~	3.700	U	8	U	3.100	U
Bromodichloromethane	~	4.700	U	10	U	4.100	U
Bromoform	~	7.300	U	16	U	6.300	U
Bromomethane	~	2.700	U	6	U	2.400	U
Carbon disulfide	~	30	D	4.800	U	13	D
Carbon tetrachloride	6	1.100	U	27	D	1.500	D
Chlorobenzene	~	3.300	U	7.200	U	2.800	U
Chloroethane	~	1.900	U	4.100	U	1.600	U
Chloroform	~	3.400	U	52	D	3.300	D
Chloromethane	~	1.500	U	3.200	U	1.300	U
cis-1,2-Dichloroethylene	~	0.700	U	2.500	D	0.600	U
cis-1,3-Dichloropropylene	~	3.200	U	7.100	U	2.800	U
Cyclohexane	60	8	D	8	D	23	D
Dibromochloromethane	~	6	U	13	U	5.200	U
Dichlorodifluoromethane	~	3.500	U	7.700	U	3	U
Ethyl acetate	~	5.100	U	11	U	4.400	U
Ethyl Benzene	60	10	D	6.700	U	6.100	D
Hexachlorobutadiene	~	7.500	U	17	U	6.500	U
Isopropanol	~	5.200	D	7.600	U	3	U
Methyl Methacrylate	~	2.900	U	6.400	U	2.500	U
Methyl tert-butyl ether (MTBE)	~	2.500	U	5.600	U	2.200	U
Methylene chloride	100	4.900	U	11	U	4.200	U
n-Heptane	200	9.800	D	6.400	U	2.500	U
n-Hexane	200	17	D	9.300	D	7.100	D
o-Xylene	60	5.500	D	6.700	U	3.700	D
p- & m- Xylenes	200	17	D	13	U	12	D
p-Ethyltoluene	~	3.500	U	7.600	U	3	U
Propylene	~	33	D	29	D	160	D
Styrene	~	3	U	6.600	U	2.600	U
Tetrachloroethylene	100	430	D	220	D	260	D
Tetrahydrofuran	~	4.200	U	9.200	U	3.600	U
Toluene	300	880	D	380	D	470	D
trans-1,2-Dichloroethylene	~	2.800	U	6.200	U	2.400	U
trans-1,3-Dichloropropylene	~	3.200	U	7.100	U	2.800	U
Trichloroethylene	6	11	D	5,500	D	60	D
Trichlorofluoromethane (Freon 11)	~	4	U	8.700	U	3.400	U
Vinyl acetate	~	2.500	U	5.500	U	2.100	U
Vinyl bromide	~	3.100	U	6.800	U	2.700	U
Vinyl Chloride	6	0.900	U	2	U	0.780	U

TABLE NOTES:

Analyte exceeds the NYSDOH decision matrix minimum concentration level for soil vapor.

µg/m³: micrograms per cubic meter

~ : No Standards or Guidance Value.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution.

Table 12A - Volatile Organic Compounds in Soil Vapor
Remedial Investigation Report - 2023 NYCOER RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

SAMPLE ID	NYSDOH Soil Vapor Decision Matrices - Minimum Concentrations	OA-1 Clay Street		OA-2 Commercial Street	
LOCATION					
SAMPLING DATE					
SAMPLE TYPE		Outdoor Ambient Air		Outdoor Ambient Air	
		Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List (µg/m³)					
1,1,1,2-Tetrachloroethane	~	0.560	U	0.500	U
1,1,1-Trichloroethane	100	0.440	U	0.390	U
1,1,2,2-Tetrachloroethane	~	0.560	U	0.500	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	0.620	U	0.550	U
1,1,2-Trichloroethane	~	0.440	U	0.390	U
1,1-Dichloroethane	~	0.330	U	0.290	U
1,1-Dichloroethylene	6	0.0810	U	0.0720	U
1,2,4-Trichlorobenzene	~	0.600	U	0.540	U
1,2,4-Trimethylbenzene	60	0.400	U	0.350	U
1,2-Dibromoethane	~	0.630	U	0.550	U
1,2-Dichlorobenzene	~	0.490	U	0.430	U
1,2-Dichloroethane	~	0.330	U	0.290	U
1,2-Dichloropropane	~	0.380	U	0.330	U
1,2-Dichlorotetrafluoroethane	~	0.570	U	0.500	U
1,3,5-Trimethylbenzene	60	0.400	U	0.350	U
1,3-Butadiene	~	0.540	U	0.480	U
1,3-Dichlorobenzene	~	0.490	U	0.430	U
1,3-Dichloropropane	~	0.380	U	0.330	U
1,4-Dichlorobenzene	~	0.490	U	0.430	U
1,4-Dioxane	~	0.590	U	0.520	U
2-Butanone	~	0.820	D	0.870	D
2-Hexanone	~	0.670	U	0.590	U
3-Chloropropene	~	1.300	U	1.100	U
4-Methyl-2-pentanone	~	0.330	U	0.300	U
Acetone	~	3.700	D	8.900	D
Acrylonitrile	~	0.180	U	0.160	U
Benzene	60	0.310	D	0.280	D
Benzyl chloride	~	0.420	U	0.370	U
Bromodichloromethane	~	0.550	U	0.480	U
Bromoform	~	0.840	U	0.750	U
Bromomethane	~	0.320	U	0.280	U
Carbon disulfide	~	0.250	U	0.220	U
Carbon tetrachloride	6	0.360	D	0.360	D
Chlorobenzene	~	0.370	U	0.330	U
Chloroethane	~	0.210	U	0.190	U
Chloroform	~	0.400	U	0.350	U
Chloromethane	~	1.300	D	1.100	D
cis-1,2-Dichloroethylene	~	0.0810	U	0.0720	U
cis-1,3-Dichloropropylene	~	0.370	U	0.330	U
Cyclohexane	60	0.280	U	0.250	U
Dibromochloromethane	~	0.690	U	0.620	U
Dichlorodifluoromethane	~	2.400	D	2.500	D
Ethyl acetate	~	0.590	U	0.520	U
Ethyl Benzene	60	0.350	U	0.310	U
Hexachlorobutadiene	~	0.870	U	0.770	U
Isopropanol	~	2	D	1.800	D
Methyl Methacrylate	~	0.330	U	0.300	U
Methyl tert-butyl ether (MTBE)	~	0.290	U	0.260	U
Methylene chloride	100	0.760	D	0.700	D
n-Heptane	200	0.330	U	0.300	U
n-Hexane	200	0.290	U	0.250	U
o-Xylene	60	0.350	U	0.310	U
p- & m- Xylenes	200	0.710	U	0.630	U
p-Ethyltoluene	~	0.400	U	0.350	U
Propylene	~	0.140	U	0.120	U
Styrene	~	0.350	U	0.310	U
Tetrachloroethylene	100	0.550	U	0.490	U
Tetrahydrofuran	~	0.480	U	0.430	U
Toluene	300	1.400	D	0.520	D
trans-1,2-Dichloroethylene	~	0.320	U	0.290	U
trans-1,3-Dichloropropylene	~	0.370	U	0.330	U
Trichloroethylene	6	0.520	D	0.0970	U
Trichlorofluoromethane (Freon 11)	~	1.100	D	1.600	D
Vinyl acetate	~	0.290	U	0.250	U
Vinyl bromide	~	0.360	U	0.320	U
Vinyl Chloride	6	0.100	U	0.0920	U

TABLE NOTES:

Analyte exceeds the NYSDOH decision matrix minimum concentration level for soil vapor.

µg/m³: micrograms per cubic meter

~ : No Standards or Guidance Value.

U : Not detected at the reported detection limit for the sample.

D: Result is from an analysis that required a dilution.

Table 12B - Volatile Organic Compounds in Soil Vapor
Remedial Investigation Report - 2024 NYSDEC RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDOH Soil Vapor Decision Matrices - Minimum Concentrations	SV-12		SV-13		SV-14		SV-15	
LAB SAMPLE ID		24H1369-01		24H1369-02		24H1369-03		24H1369-04	
SAMPLING DATE		8/20/2024 3:28:00 PM		8/20/2024 2:43:00 PM		8/20/2024 3:18:00 PM		8/20/2024 3:32:00 PM	
SAMPLE TYPE		Soil Vapor		Soil Vapor		Soil Vapor		Soil Vapor	
		Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List (µg/m³)									
1,1,1,2-Tetrachloroethane	~	12	U	11	U	11	U	6.900	U
1,1,1-Trichloroethane	100	**120**	D	**160**	D	**1,300**	D	**3,600**	D
1,1,2,2-Tetrachloroethane	~	12	U	11	U	11	U	6.900	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	14	U	12	U	240	D	250	D
1,1,2-Trichloroethane	~	9.6	U	8.5	U	8.9	U	5.5	U
1,1-Dichloroethane	~	7.1	U	6.3	U	6.6	U	71.0	D
1,1-Dichloroethylene	6	1.7	U	1.5	U	1.6	U	2.0	D
1,2,4-Trichlorobenzene	~	13	U	12	U	12	U	7.400	U
1,2,4-Trimethylbenzene	60	8.7	U	7.6	U	8.0	U	4.9	U
1,2-Dibromoethane	~	14.0	U	12.0	U	13.0	U	7.7	U
1,2-Dichlorobenzene	~	11.0	U	9.3	U	9.8	U	6.0	U
1,2-Dichloroethane	~	7.1	U	6.3	U	6.6	U	4.0	U
1,2-Dichloropropane	~	8.1	U	7.2	U	7.6	U	4.6	U
1,2-Dichlorotetrafluoroethane	~	12	U	11	U	11	U	7	U
1,3,5-Trimethylbenzene	60	8.7	U	7.6	U	8.0	U	4.9	U
1,3-Butadiene	~	12.0	U	10.0	U	11.0	U	6.6	U
1,3-Dichlorobenzene	~	11.0	U	9.3	U	9.8	U	6.0	U
1,3-Dichloropropane	~	8.1	U	7.2	U	7.6	U	4.6	U
1,4-Dichlorobenzene	~	11.0	U	9.3	U	9.8	U	6.0	U
1,4-Dioxane	~	13.0	U	11.0	U	12.0	U	7.2	U
2,2,4-Trimethylpentane	60	4.1	U	3.6	U	3.8	U	2.3	U
2-Butanone	~	5.2	U	4.6	D	4.8	U	2.9	U
2-Hexanone	~	14.0	U	13.0	U	13.0	U	8.2	U
3-Chloropropene	~	28.0	U	24.0	U	26.0	U	16.0	U
4-Methyl-2-pentanone	~	7.2	U	6.4	U	6.7	U	4.1	U
Acetone	~	15.0	D	220.0	D	8.2	D	13.0	D
Acrylonitrile	~	3.8	U	3.4	U	3.6	U	2.2	U
Benzene	60	5.6	U	5.0	U	5.2	U	3.2	U
Benzyl chloride	~	9.1	U	8.0	U	8.5	U	5.2	U
Bromodichloromethane	~	12.0	U	10.0	U	11.0	U	6.7	U
Bromoform	~	18.0	U	16.0	U	17.0	U	10.0	U
Bromomethane	~	6.8	U	6.0	U	6.4	U	3.9	U
Carbon disulfide	~	5.50	D	4.80	U	7.60	D	6.50	D
Carbon tetrachloride	6	**22**	D	**150**	D	**160**	D	**820**	D
Chlorobenzene	~	8.1	U	7.1	U	7.5	U	4.6	U
Chloroethane	~	4.7	U	4.1	U	4.3	U	2.6	U
Chloroform	~	45.0	D	83.0	D	170.0	D	420.0	D
Chloromethane	~	3.6	U	3.2	U	3.4	U	2.1	U
cis-1,2-Dichloroethylene	~	**160**	D	**21**	D	**7.8**	D	3.200	D
cis-1,3-Dichloropropylene	~	8	U	7	U	7.400	U	4.500	U
Cyclohexane	60	6.10	U	5.30	U	**160**	D	24	D
Dibromochloromethane	~	15.00	U	13.00	U	14.00	U	8.50	U
Dichlorodifluoromethane	~	8.70	U	7.70	U	8.10	U	5.40	D
Ethyl acetate	~	13.00	U	11.00	U	12.00	U	7.20	U
Ethyl Benzene	60	7.70	U	6.70	U	7.10	U	4.30	U
Hexachlorobutadiene	~	19.00	U	17.00	U	17.00	U	11.00	U
Isopropanol	~	110.00	BD	17.00	BD	11.00	BD	65.00	BD
Methyl Methacrylate	~	7.20	U	6.40	U	6.70	U	4.10	U
Methyl tert-butyl ether (MTBE)	~	6.40	U	5.60	U	5.90	U	3.60	U
Methylene chloride	100	12.00	U	11.00	U	11.00	U	6.90	U
Naphthalene	60	18.00	U	16.00	U	17.00	U	10.00	U
n-Heptane	200	7.20	U	6.40	U	6.70	U	4.10	U
n-Hexane	200	6.20	U	5.50	U	5.80	U	3.50	U
o-Xylene	60	7.70	U	6.70	U	7.10	U	4.30	U
p- & m- Xylenes	200	15.00	U	13.00	U	14.00	U	8.70	U
p-Ethyltoluene	~	8.70	U	7.60	U	8.00	U	4.90	U
Propylene	~	3.00	U	2.70	U	12.00	D	2.80	D
Styrene	~	7.50	U	6.60	U	7.00	U	4.30	U
Tetrachloroethylene	100	25.00	D	17.00	D	14.00	D	41.00	D
Tetrahydrofuran	~	10.00	U	9.20	U	9.70	U	5.90	U
Toluene	300	6.60	U	5.80	U	6.20	U	4.50	D
trans-1,2-Dichloroethylene	~	7.00	U	6.20	U	6.50	U	4.00	U
trans-1,3-Dichloropropylene	~	8.00	U	7.00	U	7.40	U	4.50	U
Trichloroethylene	6	**6,800**	D	**3,000**	D	**6,300**	D	**1,800**	D
Trichlorofluoromethane (Freon 11)	~	9.90	U	8.70	U	9.20	U	5.60	U
Vinyl acetate	~	6.20	U	5.50	U	5.80	U	3.50	U
Vinyl bromide	~	7.70	U	6.80	U	7.20	U	4.40	U
Vinyl Chloride	6	2.30	U	2.00	U	2.10	U	1.30	U

TABLE NOTES:

Analyte concentration deemed elevated based on the NYSDOH decision matrix minimum concentration level for soil vapor.

µg/m³: micrograms per cubic meter

~ : No Standards or Guidance Value.

U : Not detected at the reported detection limit for the sample.

B: Analyte found in the analysis batch blank.

D: Result is from an analysis that required a dilution.

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences.

Table 12B - Volatile Organic Compounds in Soil Vapor
Remedial Investigation Report - 2024 NYSDEC RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDOH Soil Vapor Decision Matrices - Minimum Concentrations	SV-16		SV-17		B.22.2024-SV-Duplicate		SV-18	
LAB SAMPLE ID		24H2109-01		24H1600-01		24H1600-02		24H1369-06	
SAMPLING DATE		8/28/2024 3:20:00 PM		8/22/2024 2:00:00 PM		8/22/2024 2:00:00 PM		8/20/2024 3:00:00 PM	
SAMPLE TYPE		Soil Vapor		Soil Vapor		Soil Vapor		Soil Vapor	
		Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List (µg/m³)						*SV-17 Duplicate			
1,1,1,2-Tetrachloroethane	~	12	U	11	U	12	U	12	U
1,1,1-Trichloroethane	100	**1,600**	D	68	D	52	D	**300**	D
1,1,2,2-Tetrachloroethane	~	12	U	11	U	12	U	12	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	61	D	12	U	13	U	13	U
1,1,2-Trichloroethane	~	9.9	U	8.6	U	9.400	U	9.2	U
1,1-Dichloroethane	~	40.0	D	6.3	U	6.900	U	24	D
1,1-Dichloroethylene	6	1.8	U	1.6	U	1.700	U	1.700	U
1,2,4-Trichlorobenzene	~	13	U	12	U	13	U	12	U
1,2,4-Trimethylbenzene	60	8.9	U	7.7	U	8.400	U	8.3	U
1,2-Dibromoethane	~	14.0	U	12.0	U	13	U	13	U
1,2-Dichlorobenzene	~	11.0	U	9.4	U	10	U	10	U
1,2-Dichloroethane	~	7.3	U	6.3	U	6.900	U	6.8	U
1,2-Dichloropropane	~	8.4	U	7.2	U	7.900	U	7.8	U
1,2-Dichlorotetrafluoroethane	~	13	U	11	U	12	U	12	U
1,3,5-Trimethylbenzene	60	8.9	U	7.7	U	8.400	U	8.3	U
1,3-Butadiene	~	12.0	U	10.0	U	11	U	11	U
1,3-Dichlorobenzene	~	11.0	U	9.4	U	10	U	10	U
1,3-Dichloropropane	~	8.4	U	7.2	U	7.900	U	7.8	U
1,4-Dichlorobenzene	~	11.0	U	9.4	U	10	U	10	U
1,4-Dioxane	~	13.0	U	11.0	U	12	U	12	U
2,2,4-Trimethylpentane	60	4.2	U	3.7	U	4	U	3.9	U
2-Butanone	~	5.3	U	4.6	U	5.100	U	5	U
2-Hexanone	~	15.0	U	13.0	U	14	U	14	U
3-Chloropropene	~	28.0	U	25.0	U	27	U	26	U
4-Methyl-2-pentanone	~	7.4	U	6.4	U	7	U	6.9	U
Acetone	~	8.6	U	47.0	BD	46	BD	8.4	D
Acrylonitrile	~	3.9	U	46.0	D	3.700	U	3.6	U
Benzene	60	5.8	U	5.0	U	5.500	U	5.4	U
Benzyl chloride	~	9.4	U	8.1	U	8.900	U	8.7	U
Bromodichloromethane	~	12.0	U	10.0	U	12	U	11	U
Bromoform	~	19.0	U	16.0	U	18	U	17	U
Bromomethane	~	7.0	U	6.1	U	6.700	U	6.5	U
Carbon disulfide	~	5.60	U	4.90	U	5.300	U	5.2	U
Carbon tetrachloride	6	**900**	D	2.500	U	2.700	U	**17**	D
Chlorobenzene	~	8.3	U	7.2	U	7.900	U	7.7	U
Chloroethane	~	4.8	U	4.1	U	4.500	U	4.4	U
Chloroform	~	310.0	D	240.0	D	200	D	100	D
Chloromethane	~	3.7	U	3.2	U	3.500	U	3.5	U
cis-1,2-Dichloroethylene	~	3.60	D	**6.2**	D	5.400	D	5.3	D
cis-1,3-Dichloropropylene	~	8.20	U	7.10	U	7.800	U	7.6	U
Cyclohexane	60	7.50	D	5.40	U	5.900	U	5.8	U
Dibromochloromethane	~	15.00	U	13.00	U	15	U	14	U
Dichlorodifluoromethane	~	15.00	D	7.70	U	8.500	U	8.3	U
Ethyl acetate	~	13.00	U	11.00	U	12	U	12	U
Ethyl Benzene	60	7.90	U	6.80	U	7.500	U	7.3	U
Hexachlorobutadiene	~	19.00	U	17.00	U	18	U	18	U
Isopropanol	~	8.90	U	17.00	BD	16	BD	12	BD
Methyl Methacrylate	~	7.40	U	6.40	U	7	U	6.9	U
Methyl tert-butyl ether (MTBE)	~	6.50	U	5.60	U	6.200	U	6.1	U
Methylene chloride	100	24.00	D	11.00	U	12	U	12	U
Naphthalene	60	19.00	U	16.00	U	18	U	18	U
n-Heptane	200	7.40	U	6.40	U	7	U	6.9	U
n-Hexane	200	6.40	U	5.50	U	6.100	U	5.9	U
o-Xylene	60	7.90	U	6.80	U	7.500	U	7.3	U
p- & m- Xylenes	200	16.00	U	14.00	U	15	U	15	U
p-Ethyltoluene	~	8.90	U	7.70	U	8.400	U	8.3	U
Propylene	~	3.10	U	2.70	U	3	U	2.9	U
Styrene	~	7.70	U	6.70	U	7.300	U	7.2	U
Tetrachloroethylene	100	49.00	D	**190**	D	**180**	D	**120**	D
Tetrahydrofuran	~	11.00	U	9.20	U	10	U	9.9	U
Toluene	300	6.80	U	5.90	U	6.500	U	6.3	U
trans-1,2-Dichloroethylene	~	7.20	U	6.20	U	6.800	U	6.7	U
trans-1,3-Dichloropropylene	~	8.20	U	7.10	U	7.800	U	7.6	U
Trichloroethylene	6	**2,200**	D	**3,400**	D	**3,000**	D	**3,600**	D
Trichlorofluoromethane (Freon 11)	~	10.00	U	8.80	U	9.600	U	9.4	U
Vinyl acetate	~	6.40	U	5.50	U	6	U	5.9	U
Vinyl bromide	~	7.90	U	6.90	U	7.500	U	7.4	U
Vinyl Chloride	6	2.30	U	2.00	U	2.200	U	2.1	U

TABLE NOTES:

Analyte concentration deemed elevated based on the NYSDOH decision matrix minimum concentration level for soil vapor.

µg/m³: micrograms per cubic meter

~ : No Standards or Guidance Value.

U : Not detected at the reported detection limit for the sample.

B: Analyte found in the analysis batch blank.

D: Result is from an analysis that required a dilution.

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences.

Table 12B - Volatile Organic Compounds in Soil Vapor
Remedial Investigation Report - 2024 NYSDEC RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDOH Soil Vapor Decision Matrices - Minimum Concentrations	SV-19		SV-20		SV-21		SV-22	
LAB SAMPLE ID		24H0775-01		24H0775-02		24H0775-03		24H0775-04	
SAMPLING DATE		8/12/2024 2:35:00 PM		8/12/2024 3:42:00 PM		8/12/2024 3:43:00 PM		8/12/2024 3:46:00 PM	
SAMPLE TYPE		Soil Vapor		Soil Vapor		Soil Vapor		Soil Vapor	
		Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List (µg/m³)									
1,1,1,2-Tetrachloroethane	~	12	U	12	U	14	D	11	U
1,1,1-Trichloroethane	100	74	D	100	D	**820**	D	**220**	D
1,1,2,2-Tetrachloroethane	~	12	U	12	U	12	U	11	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	13	U	13	U	15	D	13	U
1,1,2-Trichloroethane	~	9.3	U	9.5	U	41	D	9.1	U
1,1-Dichloroethane	~	6.9	U	7	U	7.1	U	6.8	U
1,1-Dichloroethylene	6	1.7	U	3.4	D	**45**	D	1.7	U
1,2,4-Trichlorobenzene	~	13	U	13	U	13	U	12	U
1,2,4-Trimethylbenzene	60	8.4	U	8.5	U	8.7	U	8.2	U
1,2-Dibromoethane	~	13	U	13	U	14	U	13	U
1,2-Dichlorobenzene	~	10	U	10	U	11	U	10	U
1,2-Dichloroethane	~	6.9	U	7	U	7.1	U	6.8	U
1,2-Dichloropropane	~	7.9	U	8	U	8.1	U	7.7	U
1,2-Dichlorotetrafluoroethane	~	12	U	12	U	12	U	12	U
1,3,5-Trimethylbenzene	60	8.4	U	8.5	U	8.7	U	8.2	U
1,3-Butadiene	~	11	U	12	U	12	U	11	U
1,3-Dichlorobenzene	~	10	U	10	U	11	U	10	U
1,3-Dichloropropane	~	7.9	U	8	U	8.1	U	7.7	U
1,4-Dichlorobenzene	~	10	U	10	U	11	U	10	U
1,4-Dioxane	~	12	U	13	U	13	U	12	U
2,2,4-Trimethylpentane	60	4	U	4.1	U	4.1	U	3.9	U
2-Butanone	~	11	D	18	D	52	D	28	D
2-Hexanone	~	14	U	14	U	14	U	14	U
3-Chloropropene	~	27	U	27	U	28	U	26	U
4-Methyl-2-pentanone	~	7	U	7.1	U	7.2	U	6.8	U
Acetone	~	69	D	160	D	240	D	340	D
Acrylonitrile	~	3.7	U	3.8	U	3.8	U	99	D
Benzene	60	5.4	U	7.2	D	**230**	D	5.3	U
Benzyl chloride	~	8.8	U	9	U	9.1	U	8.7	U
Bromodichloromethane	~	13	D	12	U	12	U	11	U
Bromoform	~	18	U	18	U	18	U	17	U
Bromomethane	~	6.6	U	6.7	U	6.8	U	6.5	U
Carbon disulfide	~	13	D	15	D	5.5	U	6.8	D
Carbon tetrachloride	6	3.2	D	3.3	D	**22**	D	2.6	U
Chlorobenzene	~	7.8	U	8	U	8.1	U	7.7	U
Chloroethane	~	4.5	U	4.6	U	4.6	U	4.4	U
Chloroform	~	610	D	270	D	1,100.0	D	60	D
Chloromethane	~	3.5	U	3.6	U	3.6	U	3.5	U
cis-1,2-Dichloroethylene	~	**16**	D	**190**	D	**1,300**	D	2.7	D
cis-1,3-Dichloropropylene	~	7.7	U	7.9	U	8	U	7.6	U
Cyclohexane	60	5.9	D	16	D	20	D	9.8	D
Dibromochloromethane	~	14	U	15	U	15	U	14	U
Dichlorodifluoromethane	~	8.4	U	8.6	U	8.7	U	8.3	U
Ethyl acetate	~	12	U	13	U	13	U	12	U
Ethyl Benzene	60	7.4	U	7.5	U	11	D	7.3	U
Hexachlorobutadiene	~	18	U	19	U	19	U	18	U
Isopropanol	~	9.2	D	8.5	U	12	D	12	D
Methyl Methacrylate	~	7	U	7.1	U	7.2	U	6.8	U
Methyl tert-butyl ether (MTBE)	~	6.1	U	6.3	U	6.3	U	6	U
Methylene chloride	100	12	U	12	U	12	U	12	U
Naphthalene	60	18	U	18	U	18	U	18	U
n-Heptane	200	7	U	14	D	**810**	D	6.8	U
n-Hexane	200	6	U	9.2	D	**1,600**	D	5.9	U
o-Xylene	60	7.4	U	7.5	U	7.6	D	7.3	U
p- & m- Xylenes	200	15	U	15	U	15	U	15	U
p-Ethyltoluene	~	8.4	U	8.5	U	8.7	U	8.2	U
Propylene	~	3.2	D	4.5	D	3	U	6	D
Styrene	~	7.2	U	7.4	U	7.5	U	7.1	U
Tetrachloroethylene	100	51	D	**1,600**	D	**55,000**	D	**150**	D
Tetrahydrofuran	~	10	U	10	U	10	U	9.9	U
Toluene	300	6.4	U	6.5	U	75	BD	6.3	U
trans-1,2-Dichloroethylene	~	6.7	U	11	D	180	D	6.6	U
trans-1,3-Dichloropropylene	~	7.7	U	7.9	U	8	U	7.6	U
Trichloroethylene	6	**7,000**	D	**180,000**	D	**3,900,000**	D	**50,000**	D
Trichlorofluoromethane (Freon 11)	~	9.6	U	9.8	U	9.9	U	9.4	U
Vinyl acetate	~	6	U	6.1	U	6.2	U	5.9	U
Vinyl bromide	~	7.4	U	7.6	U	7.7	U	7.3	U
Vinyl Chloride	6	2.2	U	2.2	U	2.2	U	2.1	U

TABLE NOTES:

Analyte concentration deemed elevated based on the NYSDOH decision matrix minimum concentration level for soil vapor.

µg/m³: micrograms per cubic meter

~ : No Standards or Guidance Value.

U : Not detected at the reported detection limit for the sample.

B: Analyte found in the analysis batch blank.

D: Result is from an analysis that required a dilution.

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences.

Table 12B - Volatile Organic Compounds in Soil Vapor
Remedial Investigation Report - 2024 NYSDEC RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDOH Soil Vapor Decision Matrices - Minimum Concentrations	SV-23		8.12.24 Duplicate	
LAB SAMPLE ID		24H0775-05		24H0775-06	
SAMPLING DATE		8/12/2024 2:33:00 PM		8/12/2024 2:35:00 PM	
SAMPLE TYPE		Soil Vapor		Soil Vapor	
		Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List (µg/m³)				*SV-23 Duplicate	
1,1,1,2-Tetrachloroethane	~	11	U	10.0	U
1,1,1-Trichloroethane	100	**1,400**	D	**1,700**	D
1,1,2,2-Tetrachloroethane	~	11	U	10.0	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	22	D	48.0	D
1,1,2-Trichloroethane	~	8.7	U	8.3	U
1,1-Dichloroethane	~	6.4	U	6.2	U
1,1-Dichloroethylene	6	1.6	U	1.5	U
1,2,4-Trichlorobenzene	~	12	U	11.0	U
1,2,4-Trimethylbenzene	60	7.8	U	7.5	U
1,2-Dibromoethane	~	12	U	12.0	U
1,2-Dichlorobenzene	~	9.6	U	9.2	U
1,2-Dichloroethane	~	6.4	U	6.2	U
1,2-Dichloropropane	~	7.4	U	7.0	U
1,2-Dichlorotetrafluoroethane	~	11	U	11.0	U
1,3,5-Trimethylbenzene	60	7.8	U	7.5	U
1,3-Butadiene	~	11	U	10.0	U
1,3-Dichlorobenzene	~	9.6	U	9.2	U
1,3-Dichloropropane	~	7.4	U	7.0	U
1,4-Dichlorobenzene	~	9.6	U	9.2	U
1,4-Dioxane	~	11	U	11.0	U
2,2,4-Trimethylpentane	60	3.7	U	3.6	U
2-Butanone	~	4.7	D	4.9	D
2-Hexanone	~	13	U	12.0	U
3-Chloropropene	~	25	U	24.0	U
4-Methyl-2-pentanone	~	6.5	U	6.2	U
Acetone	~	32	D	34.0	D
Acrylonitrile	~	3.5	U	3.3	U
Benzene	60	5.1	U	4.9	U
Benzyl chloride	~	8.2	U	7.9	U
Bromodichloromethane	~	11	U	10.0	U
Bromoform	~	16	U	16.0	U
Bromomethane	~	6.2	U	5.9	U
Carbon disulfide	~	11	D	15.0	D
Carbon tetrachloride	6	2.5	U	2.4	U
Chlorobenzene	~	7.3	U	7.0	U
Chloroethane	~	4.2	U	4.0	U
Chloroform	~	7.8	U	8.2	D
Chloromethane	~	3.3	U	3.1	U
cis-1,2-Dichloroethylene	~	1.6	U	1.5	U
cis-1,3-Dichloropropylene	~	7.2	U	6.9	U
Cyclohexane	60	5.5	U	5.2	U
Dibromochloromethane	~	14	U	13.0	U
Dichlorodifluoromethane	~	10	D	12.0	D
Ethyl acetate	~	11	U	11.0	U
Ethyl Benzene	60	6.9	U	6.6	U
Hexachlorobutadiene	~	17	U	16.0	U
Isopropanol	~	7.8	U	7.5	U
Methyl Methacrylate	~	6.5	U	6.2	U
Methyl tert-butyl ether (MTBE)	~	5.7	U	5.5	U
Methylene chloride	100	11	U	11.0	U
Naphthalene	60	17	U	16.0	U
n-Heptane	200	6.5	U	6.2	U
n-Hexane	200	5.6	U	5.4	U
o-Xylene	60	6.9	U	6.6	U
p- & m- Xylenes	200	14	U	13.0	U
p-Ethyltoluene	~	7.8	U	7.5	U
Propylene	~	3.3	D	3.9	D
Styrene	~	6.8	U	6.5	U
Tetrachloroethylene	100	11	U	10.0	U
Tetrahydrofuran	~	9.4	U	9.0	U
Toluene	300	6	U	5.7	U
trans-1,2-Dichloroethylene	~	6.3	U	6.0	U
trans-1,3-Dichloropropylene	~	7.2	U	6.9	U
Trichloroethylene	6	**160**	D	**200**	D
Trichlorofluoromethane (Freon 11)	~	38	D	46.0	D
Vinyl acetate	~	5.6	U	5.4	U
Vinyl bromide	~	7	U	6.7	U
Vinyl Chloride	6	2	U	1.9	U

TABLE NOTES:

Analyte concentration deemed elevated based on the NYSDOH decision matrix minimum concentration level for soil vapor.

µg/m³: micrograms per cubic meter

~ : No Standards or Guidance Value.

U : Not detected at the reported detection limit for the sample.

B: Analyte found in the analysis batch blank.

D: Result is from an analysis that required a dilution.

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences.

Table 13 - Volatile Organic Compounds in Indoor and Outdoor Air
Remedial Investigation Report - 2024 NYSDEC RI

19 Clay Street, 29 Clay Street, and 60-62 Commercial Avenue
Brooklyn, NY 11222

LOCATION	NYSDOH Indoor Air Decision Matrices - Minimum Concentrations	IA-01		IA-02		OA-03		OA-04	
LAB SAMPLE ID		24H1369-07		24H1369-08		24H1198-01		24H0775-07	
SAMPLING DATE		8/20/2024 3:35:00 PM		8/20/2024 3:23:00 PM		8/16/2024 3:40:00 PM		8/12/2024 4:00:00 PM	
SAMPLE TYPE		Indoor Ambient Air		Indoor Ambient Air		Outdoor Ambient Air		Outdoor Ambient Air	
		Result	Q	Result	Q	Result	Q	Result	Q
Volatile Organics, EPA TO15 Full List (µg/m³)									
1,1,1,2-Tetrachloroethane	~	0.66	U	0.59	U	0.64	U	0.69	U
1,1,1-Trichloroethane	3	0.52	U	0.47	U	0.51	U	0.55	U
1,1,2,2-Tetrachloroethane	~	0.66	U	0.59	U	0.64	U	0.69	U
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	~	0.73	U	0.66	U	0.93	D	0.77	U
1,1,2-Trichloroethane	~	0.52	U	0.47	U	0.51	U	0.55	U
1,1-Dichloroethane	~	0.39	U	0.35	U	0.38	U	0.41	U
1,1-Dichloroethylene	0.2	0.10	U	0.09	U	0.09	U	0.10	U
1,2,4-Trichlorobenzene	~	0.71	U	0.64	U	0.69	U	0.75	U
1,2,4-Trimethylbenzene	2	0.47	U	0.42	U	2.00	D	0.74	D
1,2-Dibromoethane	~	0.74	U	0.66	U	0.72	U	0.77	U
1,2-Dichlorobenzene	~	0.58	U	0.52	U	0.56	U	0.60	U
1,2-Dichloroethane	~	0.39	U	0.35	U	0.38	U	0.41	U
1,2-Dichloropropane	~	0.44	U	0.40	U	0.43	U	0.46	U
1,2-Dichlorotetrafluoroethane	~	0.67	U	0.60	U	0.65	U	0.70	U
1,3,5-Trimethylbenzene	2	0.47	U	0.42	U	0.55	D	0.49	U
1,3-Butadiene	~	0.64	U	0.57	U	0.62	U	0.67	U
1,3-Dichlorobenzene	~	0.58	U	0.52	U	0.56	U	0.60	U
1,3-Dichloropropane	~	0.44	U	0.40	U	0.43	U	0.46	U
1,4-Dichlorobenzene	~	0.58	U	0.52	U	0.56	U	0.60	U
1,4-Dioxane	~	0.69	U	0.62	U	0.67	U	0.72	U
2,2,4-Trimethylpentane	2	0.36	D	0.36	D	1.40	D	0.85	D
2-Butanone	~	1.00	D	0.86	D	2.30	D	2.50	D
2-Hexanone	~	0.78	U	0.70	U	0.76	U	0.82	U
3-Chloropropene	~	1.50	U	1.30	U	1.50	U	1.60	U
4-Methyl-2-pentanone	~	0.39	U	0.35	U	4.10	D	0.41	U
Acetone	~	32.00	BD	13.00	D	64.00	D	150.00	D
Acrylonitrile	~	0.23	D	1.80	D	0.20	U	0.41	D
Benzene	2	2.50	D	0.74	D	1.40	D	1.20	D
Benzyl chloride	~	0.50	U	0.45	U	0.48	U	0.52	U
Bromodichloromethane	~	0.64	U	0.58	U	0.63	U	0.67	U
Bromoform	~	0.99	U	0.89	U	0.96	U	1.00	U
Bromomethane	~	0.37	U	0.33	U	0.36	U	0.39	U
Carbon disulfide	~	0.30	U	0.27	U	0.29	U	0.31	U
Carbon tetrachloride	0.2	0.54	D	0.49	D	1.10	D	0.51	D
Chlorobenzene	~	0.44	U	0.40	U	0.43	U	0.46	U
Chloroethane	~	0.25	U	0.23	U	0.25	U	0.27	U
Chloroform	~	0.47	U	0.42	U	0.46	U	0.49	U
Chloromethane	~	3.30	D	0.91	D	1.60	D	1.30	D
cis-1,2-Dichloroethylene	~	0.11	D	0.27	D	0.09	U	0.10	U
cis-1,3-Dichloropropylene	~	0.43	U	0.39	U	0.42	U	0.46	U
Cyclohexane	2	0.33	U	0.30	U	3.30	D	0.59	D
Dibromochloromethane	~	0.82	U	0.73	U	0.79	U	0.86	U
Dichlorodifluoromethane	~	2.40	D	2.30	D	4.50	D	2.50	D
Ethyl acetate	~	0.69	U	0.62	U	3.40	D	0.72	U
Ethyl Benzene	2	0.42	D	0.41	D	1.60	D	0.57	D
Hexachlorobutadiene	~	1.00	U	0.92	U	1.00	U	1.10	U
Isopropanol	~	4.80	BD	3.30	BD	820.0	DE	5.70	D
Methyl Methacrylate	~	0.39	U	0.35	U	0.38	U	1.20	D
Methyl tert-butyl ether (MTBE)	~	0.35	U	0.31	U	0.34	U	0.36	U
Methylene chloride	3	0.77	D	0.72	D	1.80	D	0.77	D
Naphthalene	2	1.00	U	0.90	D	6.0	D	1.50	D
n-Heptane	6	0.39	U	0.35	D	13.0	D	0.74	D
n-Hexane	6	0.41	D	0.42	D	2.10	D	0.99	D
o-Xylene	2	0.50	D	0.49	D	2.20	D	0.74	D
p- & m- Xylenes	6	1.40	D	1.30	D	5.80	D	1.70	D
p-Ethyltoluene	~	0.47	U	0.42	U	1.50	D	0.64	D
Propylene	~	0.61	D	0.61	D	3.00	D	1.70	D
Styrene	~	0.41	U	0.37	U	0.87	D	0.43	U
Tetrachloroethylene	3	0.65	U	0.58	U	3.10	D	0.68	U
Tetrahydrofuran	~	0.57	U	0.51	U	0.55	U	0.59	U
Toluene	10	2.60	D	2.20	D	10.00	D	2.70	D
trans-1,2-Dichloroethylene	~	0.38	U	0.34	U	0.37	U	0.40	U
trans-1,3-Dichloropropylene	~	0.43	U	0.39	U	0.42	U	0.46	U
Trichloroethylene	0.2	3.10	D	2.40	D	0.25	D	4.20	D
Trichlorofluoromethane (Freon 11)	~	1.30	D	1.20	D	2.50	D	1.40	D
Vinyl acetate	~	0.34	U	0.30	U	0.33	U	0.35	U
Vinyl bromide	~	0.42	U	0.38	U	0.41	U	0.44	U
Vinyl Chloride	0.2	0.12	U	0.11	U	0.12	U	0.13	U

TABLE NOTES:

Analyte exceeds the NYSDOH decision matrix minimum concentration level for indoor air.

µg/m³: micrograms per cubic meter

~ : No Standards or Guidance Value.

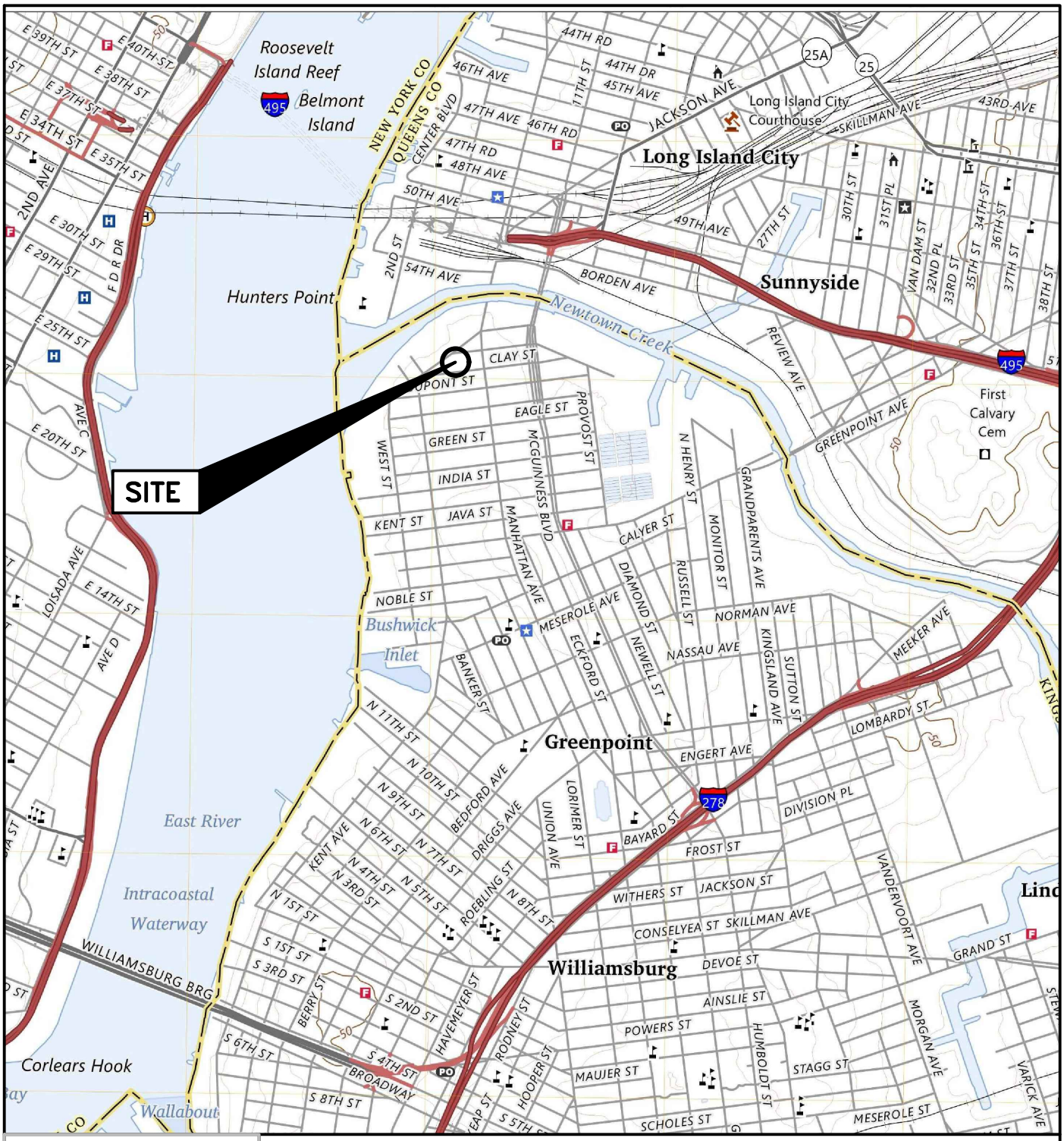
U : Not detected at the reported detection limit for the sample.

B: Analyte found in the analysis batch blank.

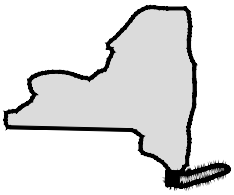
D: Result is from an analysis that required a dilution.

E: Result is estimated and cannot be accurately reported due to levels encountered or interferences.

FIGURES



NEW YORK



QUADRANGLE LOCATION

SOURCE:

USGS TOPOGRAPHIC MAPS: BROOKLYN, NY, NJ (2023). CONTOUR INTERVAL 10FT., NAVD-1988, ORIGINAL SCALE 1:24,000 (1IN.=2,000FT.).

N
W E
S

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL ST
BROOKLYN, NY 11222

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
CLAY PROPERTIES, LLC

SITE LOCATION MAP

PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 1
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1"=2000'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

© 2022 - GZA GeoEnvironmental of NY.
GZA-J:\Active 163200 to 163299\163279.00 - 19 Clay Street and 60-62 Commercial St\Drawings\GZA CAD\41.0163279.00 AUGUST 2024 RIR (SG).dwg [FIG 1 8.5x11] August 16, 2024 - 10:26am Selia.Gupta

GENERAL NOTES

1. AERIAL IMAGERY DEVELOPED FROM (C) MICROSOFT CORPORATION (C) 2023 MAXAR (C) CNES (2023) DISTRIBUTION AIRBUS DS.
2. BASE MAP ADAPTED FROM DRAWING TITLED "FIGURE 2 – AERIAL PHOTOGRAPH", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 50', DATED FEBRUARY 2024.

LEGEND

- APPROXIMATE SITE BOUNDARY
- BCP SITE NO. C224390
- BCP SITE NO. C224408

N

0 20 40 80

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

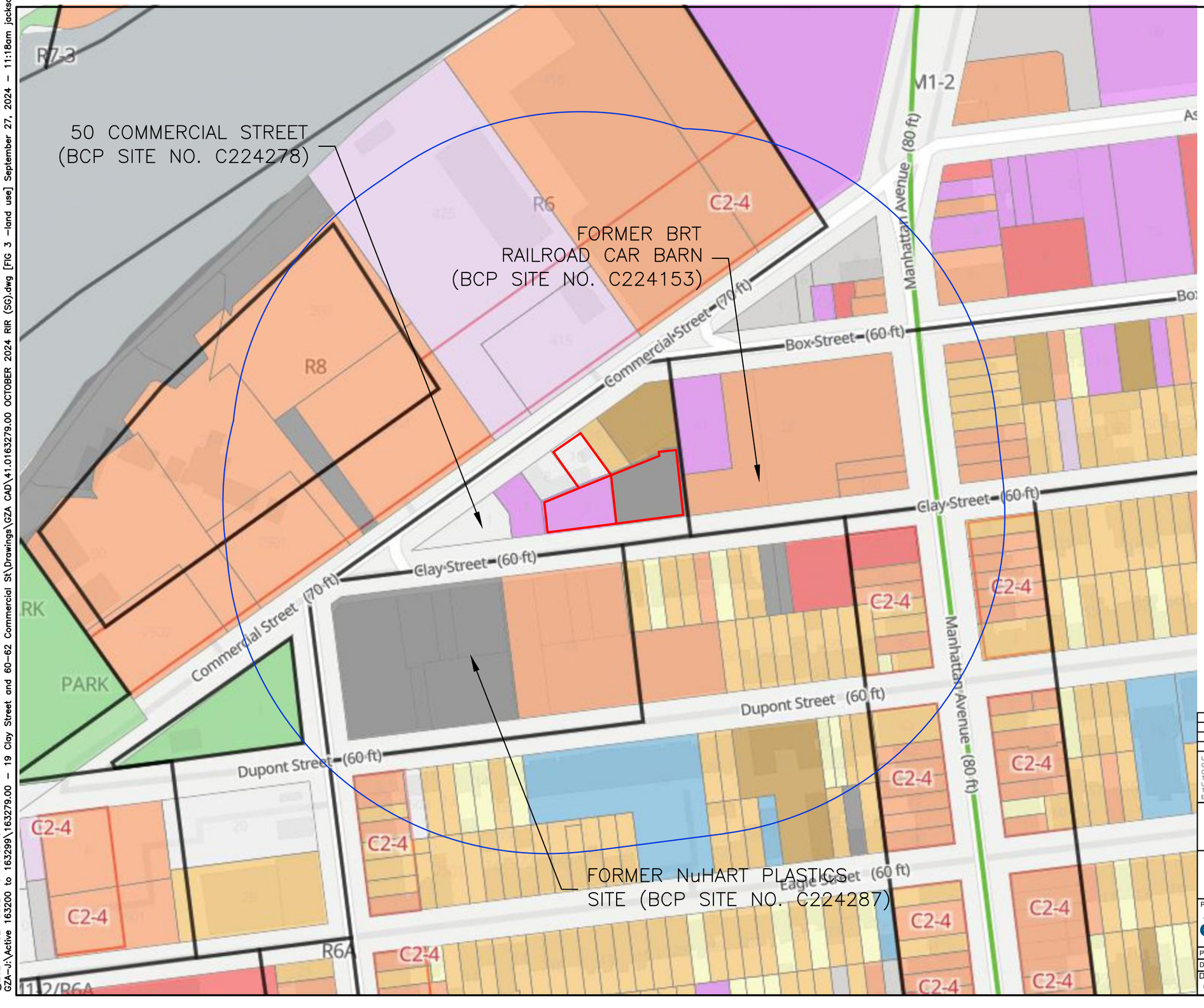
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL ST
BROOKLYN, NY 11222

AERIAL MAP

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		PREPARED FOR: CLAY PROPERTIES, LLC	
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIG 2
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1" = 40'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
G:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60-62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 2 – AERIAL] September 25, 2024 – 6:03pm jackson.bogach



GENERAL NOTES

1. BASE MAP DEVELOPED FROM NEW YORK CITY DEPARTMENT OF PLANNING ZONING & LAND USE MAP (ZOLA), ACCESSED ON SEPTEMBER 25, 2024.

LEGEND

- APPROXIMATE SITE BOUNDARY
- 500–FT BUFFER AROUND SITE BOUNDARY

- One & Two Family Buildings
- Multi-Family Walk-Up Buildings
- Multi-Family Elevator Buildings
- Mixed Residential & Commercial Buildings
- Commercial & Office Buildings
- Industrial & Manufacturing
- Transportation & Utility
- Public Facilities & Institutions
- Open Space & Outdoor Recreation
- Parking Facilities
- Vacant Land
- Other

N
W E
S

0 75 150 300
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL ST
BROOKLYN, NY 11222

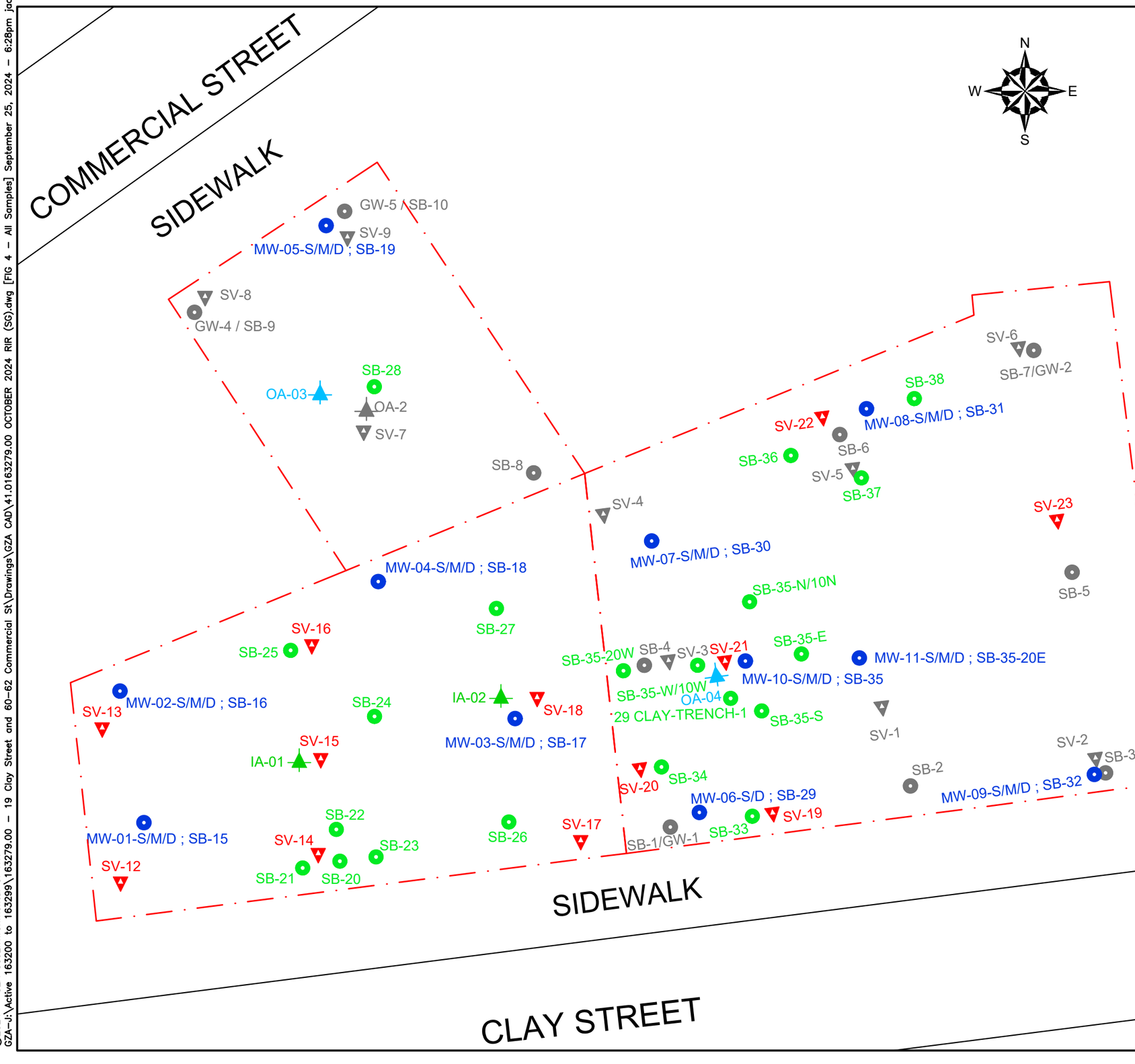
VICINITY PROPERTY LAND USE MAP

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
CLAY PROPERTIES, LLC

PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1"=150'	3
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 3 –land use] September 27, 2024 – 11:18am jackson.boga



GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.

LEGEND

- APPROXIMATE SITE BOUNDARY
- SV-12 — APPROXIMATE SOIL VAPOR SAMPLING LOCATION – 2024 NYSDEC RI
- SB-20 — APPROXIMATE SOIL SAMPLING LOCATION – 2024 NYSDEC RI
- MW-01-S/M/D SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI (S –SHALLOW, M – INTERMEDIATE, D – DEEP)
- OA-03 — OUTDOOR AIR SAMPLING LOCATION – 2024 NYSDEC RI
- IA-01 — INDOOR AIR SAMPLING LOCATION – 2024 NYSDEC RI
- SV-4 — APPROXIMATE REMEDIAL INVESTIGATION SOIL VAPOR SAMPLING LOCATION – 2023 NYCOER RI
- SB-3/GW-3 — APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION – 2023 NYCOER RI
- OA-2 — APPROXIMATE REMEDIAL INVESTIGATION OUTDOOR AIR SAMPLING LOCATION – 2023 NYCOER RI

0 10 20 40
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

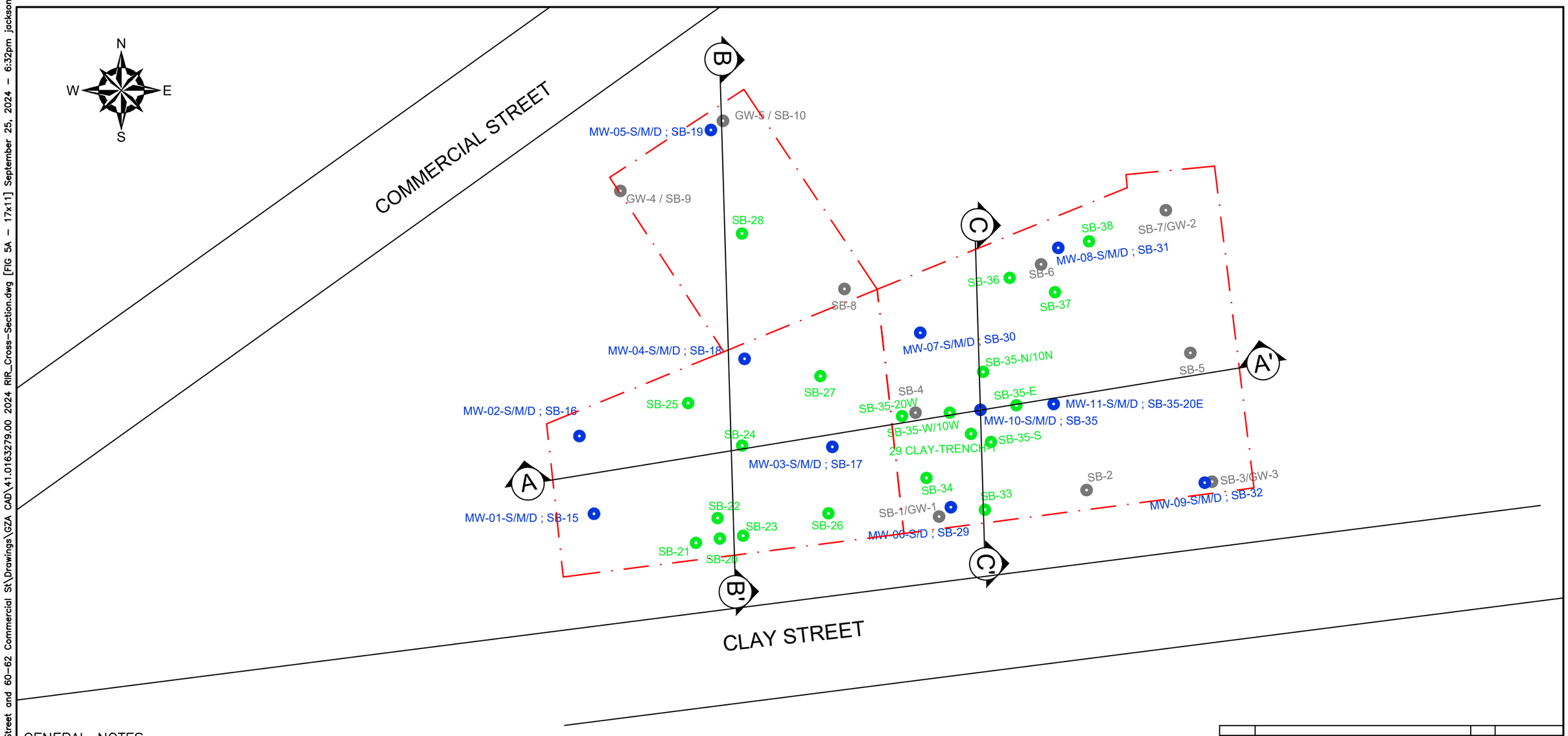
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

SAMPLING LOCATION MAP

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		PREPARED FOR: CLAY PROPERTIES, LLC	
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 4
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1" = 20'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 4 – All Samples] September 25, 2024 – 6:28pm jackson.bo



GENERAL NOTES

1. SEE FIGURE 5B, 5C, AND 5D FOR SUBSURFACE PROFILES.
2. REFER TO THE BORING LOGS FOR ADDITIONAL INFORMATION.
3. LOCATIONS OF THE MONITORING WELLS ARE BASED ON THE MONITORING WELL SURVEY CONDUCTED BY DPK LAND SURVEYING ON SEPTEMBER 9, 2024.
4. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
5. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 4.

LEGEND

- APPROXIMATE SITE BOUNDARY
- MW-01;SB-15 — APPROXIMATE LOCATION OF 2024 NYSDEC REMEDIAL INVESTIGATION GROUNDWATER MONITORING WELL/SOIL BORING LOCATION
- SB-20 — APPROXIMATE LOCATINO OF 2024 NYSDEC RI SOIL BORING LOCATION
- SB-2 — APPROXIMATE LOCATION OF 2023 NYCOER RI SOIL BORING LOCATION

0 15 30 60
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

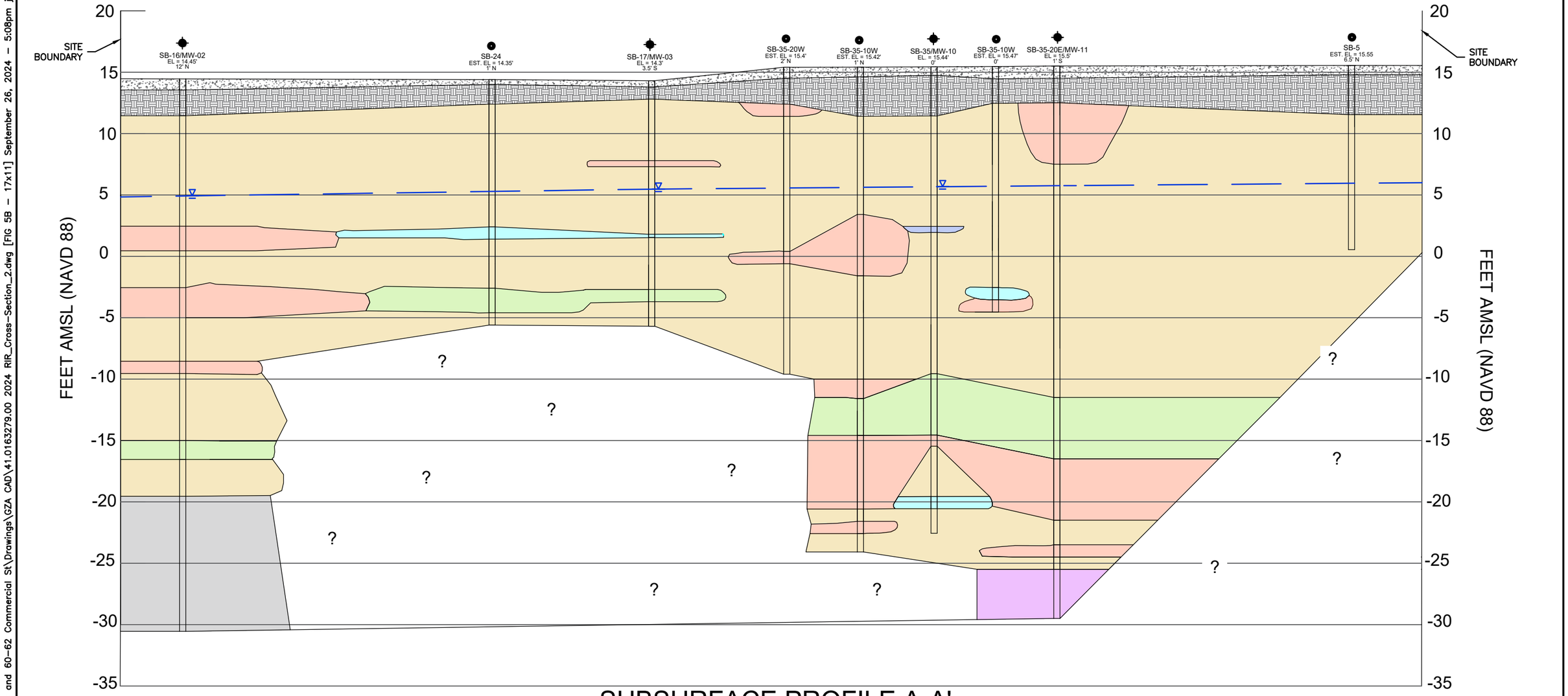
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA

19-27 CLAY STREET, 29 CLAY STREET,
AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

SUBSURFACE PROFILE LAYOUT MAP

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		PREPARED FOR: CLAY PROPERTIES, LLC	
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 5A
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1"=30'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO.	SHEET NO.

©2024 - GZA GeoEnvironmental of NY.
GZA-J:\Active 163200 to 163299\163279.00 - 19 Clay Street and 60-62 Commercial St\Drawings\GZA CAD\41.0163279.00 2024 RIR_Cross-Section.dwg [FIG 5A - 17x11] September 25, 2024 - 6:32pm jackson.bogach



SUBSURFACE PROFILE A-A'

GENERAL NOTES

1. SEE FIGURE 5A FOR THE BORING LOCATION PLAN.
2. VERTICAL DATUM REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. THE STRATIFICATION LINES BETWEEN BORINGS ARE INTERPOLATED BETWEEN WIDELY SPACED EXPLORATION LOCATIONS AND THUS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. ACTUAL TRANSITIONS MAY VARY FROM THOSE SHOWN.
4. REFER TO THE BORING LOGS FOR ADDITIONAL INFORMATION.
5. GROUND SURFACE ELEVATIONS ARE BASED ON THE MONITORING WELL SURVEY CONDUCTED BY DPK LAND SURVEYING ON SEPTEMBER 9, 2024.

SB-24
EST. EL = 14.35'
1' N
— INDICATES BOREHOLE DESIGNATION
— INDICATES ESTIMATED SURFACE ELEVATION OF BORING
— INDICATES DISTANCE AND OFFSET DIRECTION FROM PROFILE LINE

SB-17/MW-03
EL = 14.3'
3.5' S
— INDICATES BOREHOLE/WELL DESIGNATION
— INDICATES SURFACE ELEVATION OF BORING/WELL
— INDICATES DISTANCE AND OFFSET DIRECTION FROM PROFILE LINE

— INFERRED WATER TABLE BASED ON GROUNDWATER GAUGING PERFORMED IN SEPTEMBER 2024

? — UNKNOWN SUBSURFACE MATERIAL CLASSIFICATION DUE TO LIMITATIONS IN EXPLORATION

LEGEND

- INFERRED ELEVATION OF GROUNDWATER
- ASPHALT/CONCRETE
- FILL
- SAND – WITH VARYING AMOUNT OF SILT AND GRAVEL
- SILT – WITH VARYING AMOUNT OF SAND
- GRAVEL
- CLAYEY SILT
- CLAY
- SAND AND GRAVEL
- WEATHERED BEDROCK

VERTICAL SCALE IN FEET
0 4 8 16

0 8 16 32
HORIZONTAL SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

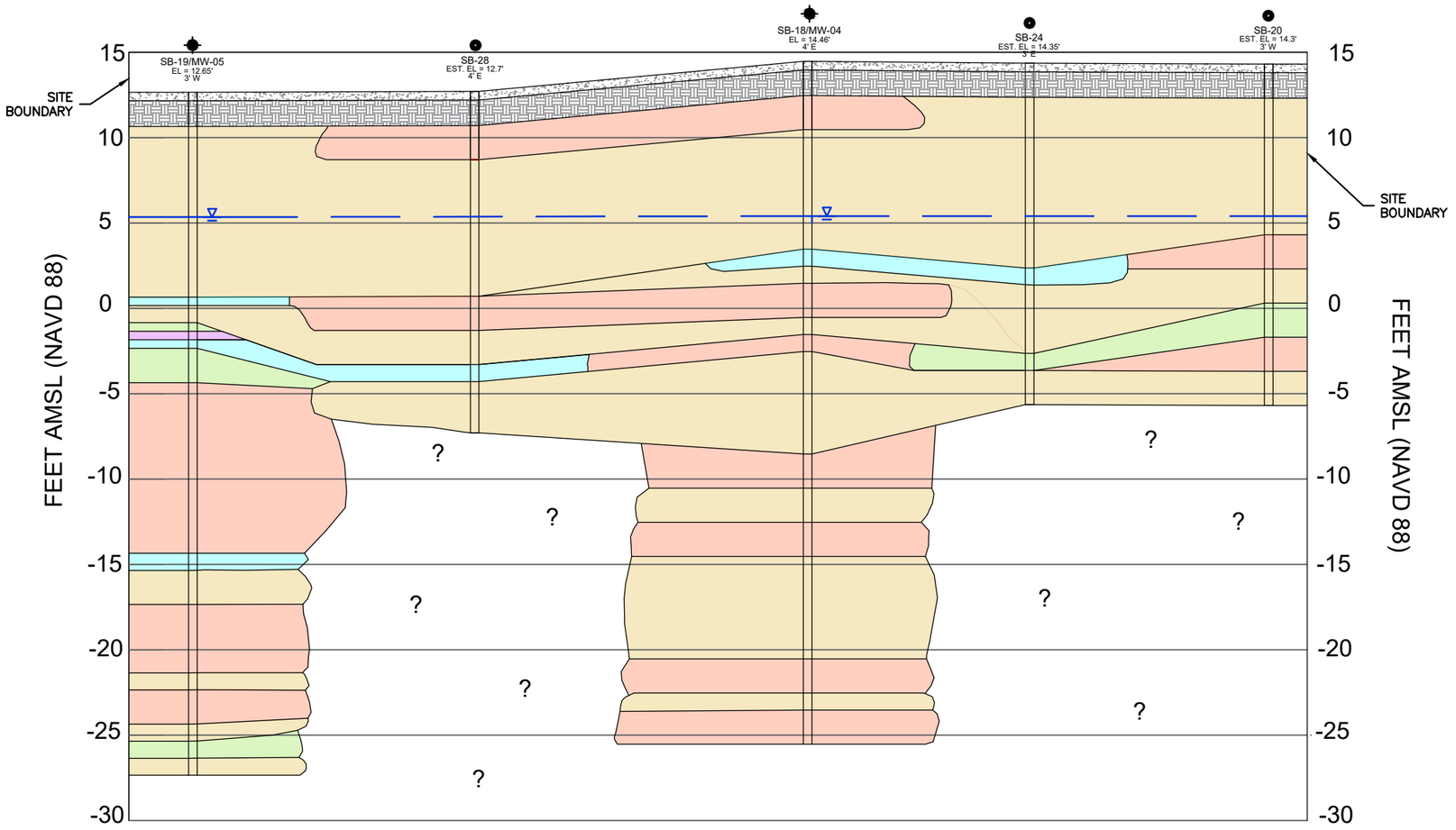
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY STREET, 29 CLAY STREET,
AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

SUBSURFACE PROFILE A-A'

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		PREPARED FOR: CLAY PROPERTIES, LLC	
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 5B
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: SEE SCALE	SHEET NO.
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO.	

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 2024 RIR_Cross–Section_2.dwg [FIG 5B – 17x11] September 26, 2024 – 5:08pm jackson.bog



SUBSURFACE PROFILE B-B'

GENERAL NOTES

1. SEE FIGURE 5A FOR THE PROFILE LAYOUT.
2. VERTICAL DATUM REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. THE STRATIFICATION LINES BETWEEN BORINGS ARE INTERPOLATED BETWEEN WIDELY SPACED EXPLORATION LOCATIONS AND THUS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. ACTUAL TRANSITIONS MAY VARY FROM THOSE SHOWN.
4. REFER TO THE BORING LOGS FOR ADDITIONAL INFORMATION.
5. GROUND SURFACE ELEVATIONS ARE BASED ON THE MONITORING WELL SURVEY CONDUCTED BY DPK LAND SURVEYING ON SEPTEMBER 9, 2024.

SB-28
EST. EL = 12.7'
4' E
— INDICATES BOREHOLE DESIGNATION
— INDICATES ESTIMATED SURFACE ELEVATION OF BORING
— INDICATES DISTANCE AND OFFSET DIRECTION FROM PROFILE LINE

SB-19/MW-05
EL = 12.65'
3' W
— INDICATES BOREHOLE/WELL DESIGNATION
— INDICATES SURFACE ELEVATION OF BORING/WELL
— INDICATES DISTANCE AND OFFSET DIRECTION FROM PROFILE LINE

— INFERRED WATER TABLE BASED ON GROUNDWATER GAUGING PERFORMED IN SEPTEMBER 2024

? — UNKNOWN SUBSURFACE MATERIAL CLASSIFICATION DUE TO LIMITATIONS IN EXPLORATION

LEGEND

- INFERRED ELEVATION OF GROUNDWATER
- ASPHALT/CONCRETE
- FILL
- SAND – WITH VARYING AMOUNT OF SILT AND GRAVEL
- SILT – WITH VARYING AMOUNT OF SAND
- CLAYEY SILT
- CLAY
- SAND AND GRAVEL

VERTICAL SCALE IN FEET
0 4 8 16

0 8 16 32
HORIZONTAL SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

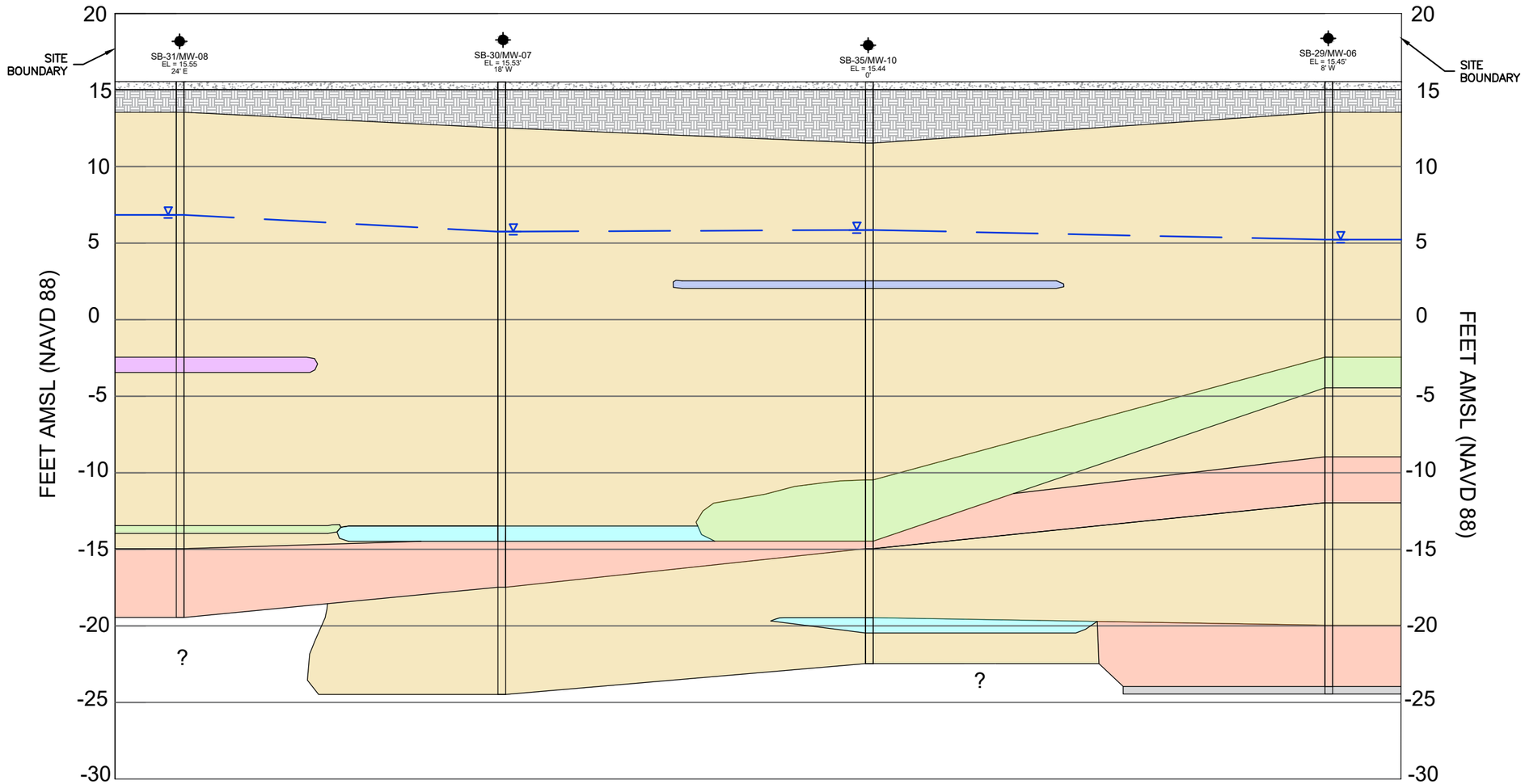
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY STREET, 29 CLAY STREET,
AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

SUBSURFACE PROFILE B-B'

PREPARED BY:	PREPARED FOR:		
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com	CLAY PROPERTIES, LLC		
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 5C
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: SEE SCALE	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO.	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 2024 RIR_Cross-Section_2.dwg [FIG 5C – 17x11] September 26, 2024 – 5:08pm jackson.bog



SUBSURFACE PROFILE C-C'

GENERAL NOTES

1. SEE FIGURE 5A FOR THE PROFILE LAYOUT.
2. VERTICAL DATUM REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
3. THE STRATIFICATION LINES BETWEEN BORINGS ARE INTERPOLATED BETWEEN WIDELY SPACED EXPLORATION LOCATIONS AND THUS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES. ACTUAL TRANSITIONS MAY VARY FROM THOSE SHOWN.
4. REFER TO THE BORING LOGS FOR ADDITIONAL INFORMATION.
5. GROUND SURFACE ELEVATIONS ARE BASED ON THE MONITORING WELL SURVEY CONDUCTED BY DPK LAND SURVEYING ON SEPTEMBER 9, 2024.

SB-31/MW-08
EL = 15.45'
24' E
— INDICATES BOREHOLE/WELL DESIGNATION
— INDICATES SURFACE ELEVATION OF BORING/WELL
— INDICATES DISTANCE AND OFFSET DIRECTION FROM PROFILE LINE

— INFERRED WATER TABLE BASED ON GROUNDWATER GAUGING PERFORMED IN SEPTEMBER 2024

? — UNKNOWN SUBSURFACE MATERIAL CLASSIFICATION DUE TO LIMITATIONS IN EXPLORATION

LEGEND

- INFERRED ELEVATION OF GROUNDWATER
- ASPHALT/CONCRETE
- FILL
- SAND – WITH VARYING AMOUNT OF SILT AND GRAVEL
- SILT – WITH VARYING AMOUNT OF SAND
- GRAVEL
- CLAYEY SILT
- CLAY
- SAND AND GRAVEL
- WEATHERED BEDROCK

VERTICAL SCALE IN FEET
0 4 8 16
0 4 8 16
HORIZONTAL SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY STREET, 29 CLAY STREET,
AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

SUBSURFACE PROFILE C-C'

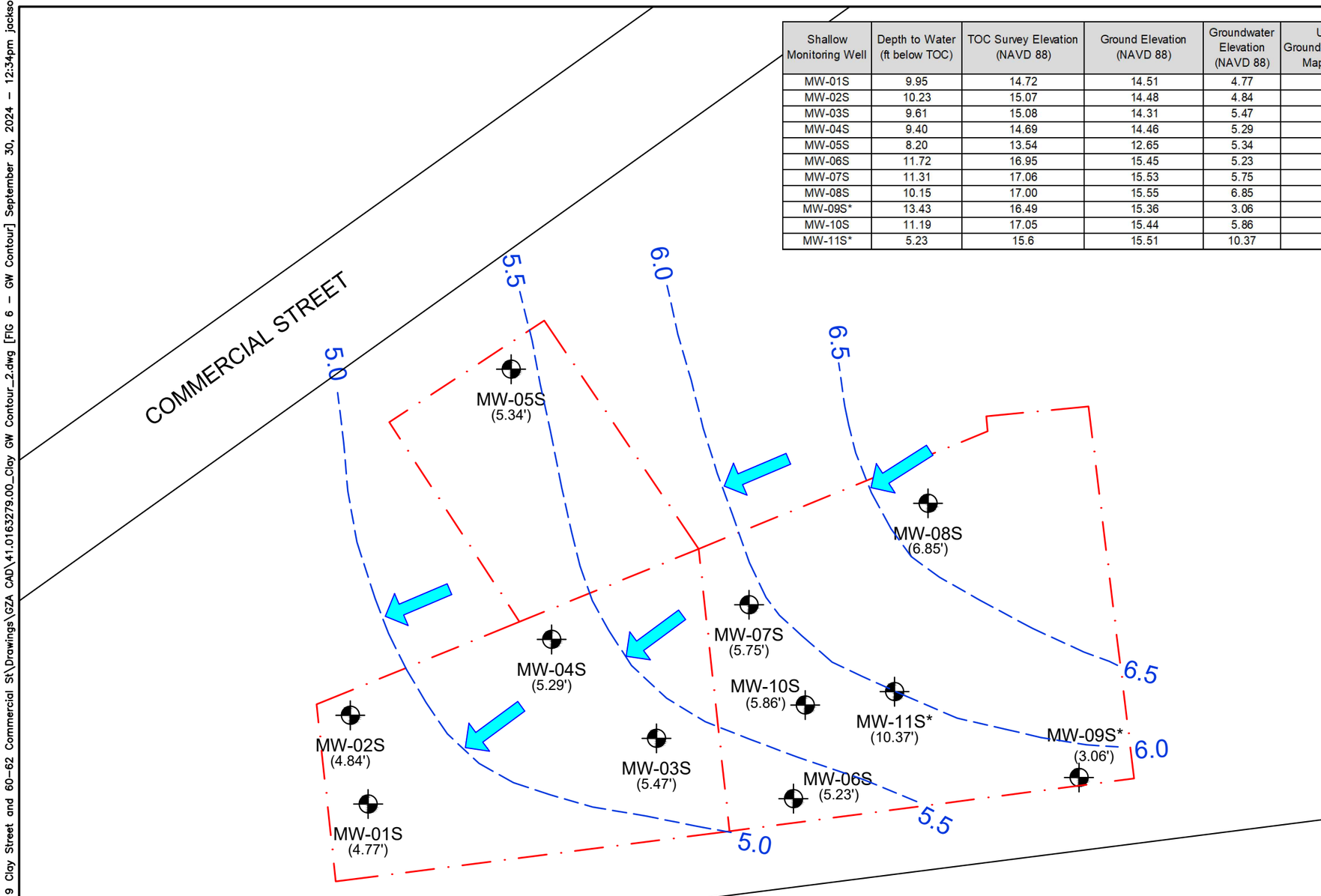
PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
CLAY PROPERTIES, LLC

PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: SEE SCALE	5D
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO.	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA-J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60-62 Commercial St\Drawings\GZA CAD\41.0163279.00 2024 RIR_Cross-Section_2.dwg [FIG 5D– 17x11] September 26, 2024 – 5:09pm jackson.boga

Shallow Monitoring Well	Depth to Water (ft below TOC)	TOC Survey Elevation (NAVD 88)	Ground Elevation (NAVD 88)	Groundwater Elevation (NAVD 88)	Used for Groundwater Contour Map? (Y or N)
MW-01S	9.95	14.72	14.51	4.77	Y
MW-02S	10.23	15.07	14.48	4.84	Y
MW-03S	9.61	15.08	14.31	5.47	Y
MW-04S	9.40	14.69	14.46	5.29	Y
MW-05S	8.20	13.54	12.65	5.34	Y
MW-06S	11.72	16.95	15.45	5.23	Y
MW-07S	11.31	17.06	15.53	5.75	Y
MW-08S	10.15	17.00	15.55	6.85	Y
MW-09S*	13.43	16.49	15.36	3.06	N*
MW-10S	11.19	17.05	15.44	5.86	Y
MW-11S*	5.23	15.6	15.51	10.37	N*



GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL", ORIGINAL SCALE 1"=25', DATED FEBRUARY 2024.
2. MONITORING WELL LOCATIONS ARE DETERMINED BY A SURVEY CONDUCTED BY DPK LAND SURVEYING ON SEPTEMBER 9, 2024.
3. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. THE GROUNDWATER ELEVATIONS WERE MEASURED BY GZA PERSONNEL ON SEPTEMBER 5, 2024. GROUNDWATER MEASUREMENTS WERE COLLECTED FROM THE SHALLOW GROUNDWATER MONITORING WELL FOR EACH WELL CLUSTER.
5. GROUNDWATER ELEVATIONS MAY BE INFLUENCED BY TIDAL INFLUENCES OR ACTIVE DEWATERING FROM NEARBY CONSTRUCTION SITES.
6. TOC – TOP OF PVC CASING

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE PERMANENT MONITORING WELL LOCATION
- MW-01 (5.34') GROUNDWATER ELEVATION USED TO DEVELOP GROUNDWATER CONTOUR (NAVD 88)
- * INDICATES NOT INCLUDED IN CONTOUR DEVELOPMENT
- INFERRED GROUNDWATER FLOW DIRECTION
- 5.0 INFERRED GROUNDWATER CONTOUR OF EQUAL ELEVATION (NAVD 88)

0 15 30 60
SCALE IN FEET

N
W E
S

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY STREET, 29 CLAY STREET,
AND 60-62 COMMERCIAL STREET

GROUNDWATER CONTOUR MAP
(SEPTEMBER 5, 2024)

PREPARED BY:	PREPARED FOR:		
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com	CLAY PROPERTIES, LLC		
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1"=30'	6
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00_Clay GW Contour_2.dwg [FIG 6 – GW Contour] September 30, 2024 – 12:34pm jackson.bogac

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 7 – 2023 SOIL] October 01, 2024 – 1:41pm jackson.bogac
J:\Active 163200 to 163299\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 7 – 2023 SOIL] October 01, 2024 – 1:41pm jackson.bogac
J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA

SB-9 (0-2) - 2/10/2023	
Total Metals	
Arsenic	23.2
Lead	982
Zinc	289
Mercury	0.847
Pesticides	
4,4'-DDT	0.00781 D
SB-9 (4-6) - 2/10/2023	
Total Metals	
Zinc	300

SB-10 (0-2) - 2/10/2023	
Total Metals	
Lead	436
Mercury	4.28
Pesticides	
4,4'-DDT	0.00565 D

SB-6 (0-2) - 2/10/2023	
Volatile Organic Compounds	
Trichloroethylene	21 D
Total Metals	
Lead	125
SB-6 (4-6) - 2/10/2023	
Total Metals	
Copper	50
Lead	392

SB-7 (0-2) - 2/10/2023	
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	15 D
Benzo(a)pyrene	13.1 D
Benzo(b)fluoranthene	12 D
Benzo(k)fluoranthene	10.9 D
Chrysene	13.9 D
Dibenzo(a,h)anthracene	1.59 D
Indeno(1,2,3-cd)pyrene	8.73 D
Total Metals	
Barium	513
Cadmium	6.14
Copper	303
Lead	6,870
Manganese	3,260
Nickel	30.7
Zinc	1,400
SB-7 (4-6) - 2/10/2023	
Total Metals	
Zinc	125

SB-8 (0-2') - 2/10/2023	
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	9.69 D
Benzo(a)pyrene	8.11 D
Benzo(b)fluoranthene	6.13 D
Benzo(k)fluoranthene	7.64 D
Chrysene	9.06 D
Dibenzo(a,h)anthracene	3.27 D
Indeno(1,2,3-cd)pyrene	3.48 D
Phenol	0.459 D
Total Metals	
Copper	365
Lead	1,180
Nickel	74.7
Zinc	476
Mercury	1.06
Pesticides	
4,4'-DDE	0.956 D
4,4'-DDT	0.307 DP
Dieldrin	0.369 DP
PCBs	
Total PCBs	7.93 D

SB-8 (4-6) 2/10/2023	
Pesticides	
4,4'-DDE	0.956 D
4,4'-DDT	0.307 DP
PCBs	
Total PCBs	0.438

SB-5 (0-2) - 2/10/2023	
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	4 D
Benzo(a)pyrene	3.02 D
Benzo(b)fluoranthene	2.67 D
Benzo(k)fluoranthene	2.8 D
Chrysene	3.9 D
Dibenzo(a,h)anthracene	0.672 D
Indeno(1,2,3-cd)pyrene	1.66 D
Total Metals	
Arsenic	15.1
Copper	311
Lead	1,980
Zinc	404
Mercury	0.193
SB-5 (4-6) - 2/10/2023	
Total Metals	
Nickel	32
Zinc	117

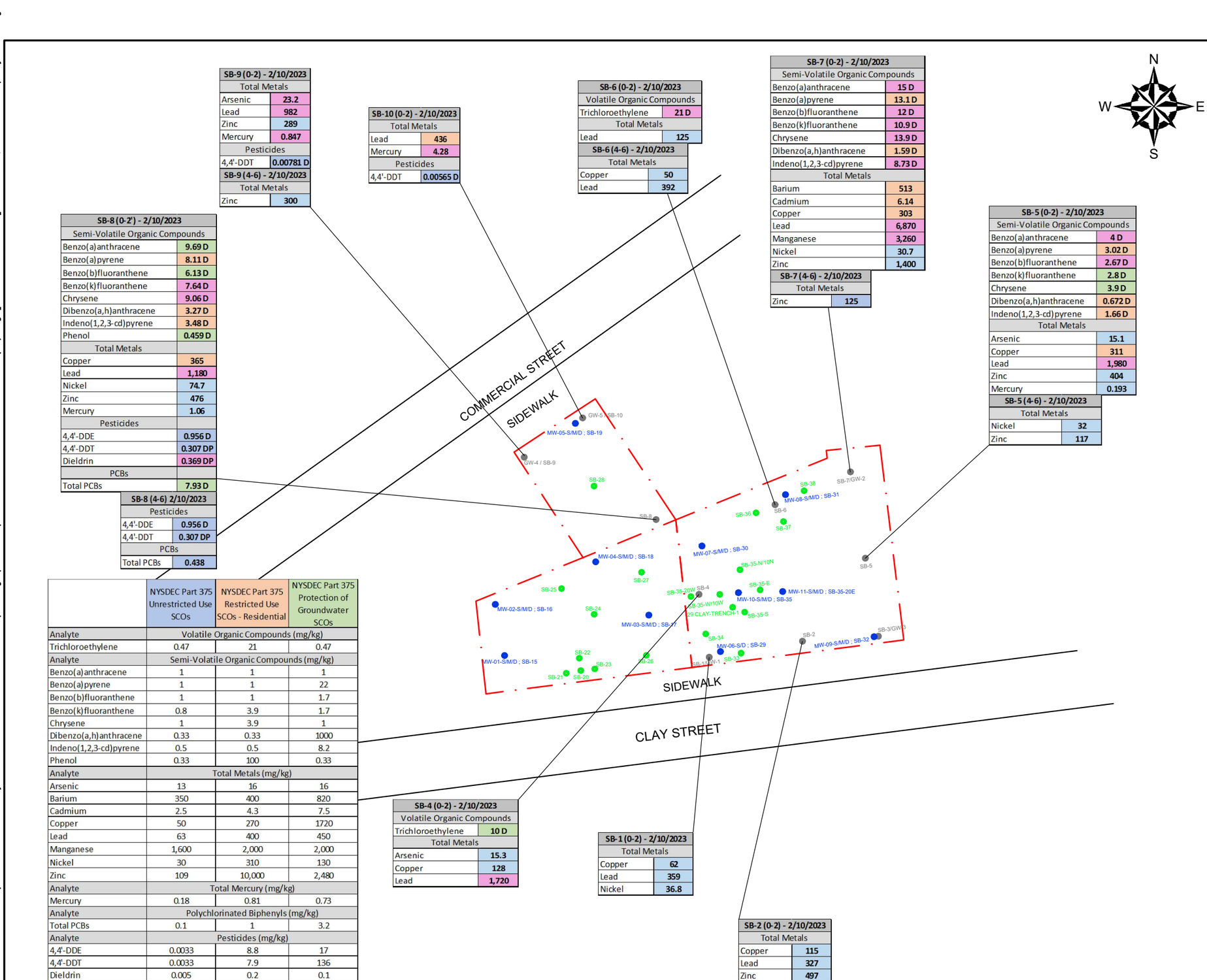
	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use SCOs - Residential	NYSDEC Part 375 Protection of Groundwater SCOs
Analyte	Volatile Organic Compounds (mg/kg)		
Trichloroethylene	0.47	21	0.47
Analyte	Semi-Volatile Organic Compounds (mg/kg)		
Benzo(a)anthracene	1	1	1
Benzo(a)pyrene	1	1	22
Benzo(b)fluoranthene	1	1	1.7
Benzo(k)fluoranthene	0.8	3.9	1.7
Chrysene	1	3.9	1
Dibenzo(a,h)anthracene	0.33	0.33	1000
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2
Phenol	0.33	100	0.33
Analyte	Total Metals (mg/kg)		
Arsenic	13	16	16
Barium	350	400	820
Cadmium	2.5	4.3	7.5
Copper	50	270	1720
Lead	63	400	450
Manganese	1,600	2,000	2,000
Nickel	30	310	130
Zinc	109	10,000	2,480
Analyte	Total Mercury (mg/kg)		
Mercury	0.18	0.81	0.73
Analyte	Polychlorinated Biphenyls (mg/kg)		
Total PCBs	0.1	1	3.2
Analyte	Pesticides (mg/kg)		
4,4'-DDE	0.0033	8.8	17
4,4'-DDT	0.0033	7.9	136
Dieldrin	0.005	0.2	0.1

	Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.

SB-4 (0-2) - 2/10/2023	
Volatile Organic Compounds	
Trichloroethylene	10 D
Total Metals	
Arsenic	15.3
Copper	128
Lead	1,720

SB-1 (0-2) - 2/10/2023	
Total Metals	
Copper	62
Lead	359
Nickel	36.8

SB-2 (0-2) - 2/10/2023	
Total Metals	
Copper	115
Lead	327
Zinc	497



GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. SEE LABORATORY REPORTS FOR ADDITIONAL INFORMATION, INCLUDING QUALIFIER DESCRIPTIONS.
5. ONLY EXCEEDANCES OF THE APPLICABLE NYSDEC PART 375 SOIL CLEANUP OBJECTIVES ARE SHOWN. FOR FULL ANALYTICAL RESULTS SEE THE TABLES LOCATED IN THE RIR.

LEGEND

- APPROXIMATE SITE BOUNDARY
- SB-20 — APPROXIMATE SOIL SAMPLING LOCATION – 2024 NYSDEC RI
- MW-01-S/M/D / SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI
- SB-3/GW-3 — APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION – 2023 NYCOER RI

0 25 50 100
SCALE IN FEET

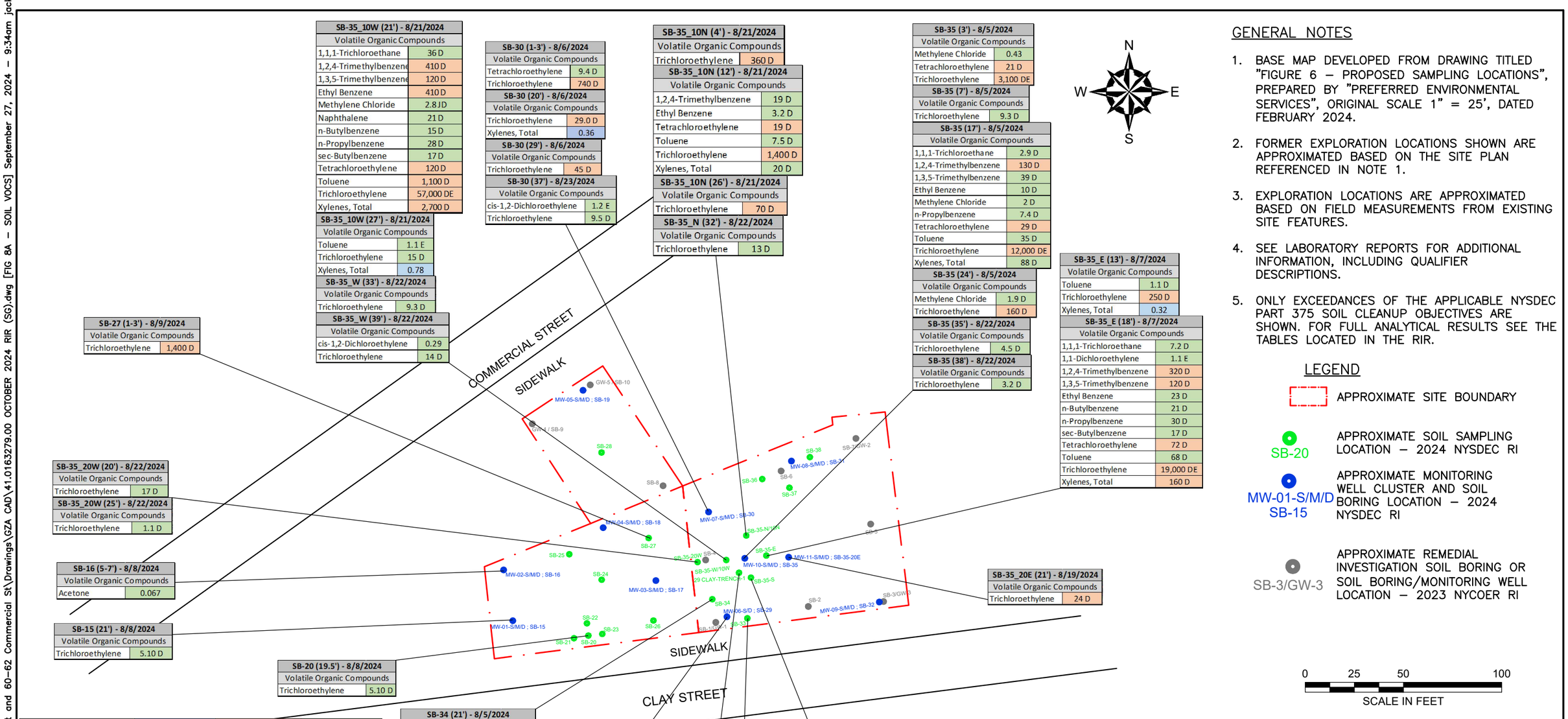
NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

2023 NYCOER REMEDIAL INVESTIGATION SOIL RESULTS

PREPARED BY:	PREPARED FOR:		
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com	CLAY PROPERTIES, LLC		
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 7
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1" = 50'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.



GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. SEE LABORATORY REPORTS FOR ADDITIONAL INFORMATION, INCLUDING QUALIFIER DESCRIPTIONS.
5. ONLY EXCEEDANCES OF THE APPLICABLE NYSDEC PART 375 SOIL CLEANUP OBJECTIVES ARE SHOWN. FOR FULL ANALYTICAL RESULTS SEE THE TABLES LOCATED IN THE RIR.

LEGEND

- APPROXIMATE SITE BOUNDARY
- SB-20 — APPROXIMATE SOIL SAMPLING LOCATION – 2024 NYSDEC RI
- MW-01-S/M/D SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI
- SB-3/GW-3 — APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION – 2023 NYCOER RI

	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use SCOs - Residential	NYSDEC Part 375 Protection of Groundwater SCOs
Analyte	Volatile Organic Compounds (mg/kg)		
1,1,1-Trichloroethane	0.68	100	0.68
1,1-Dichloroethylene	0.33	100	0.33
1,2,4-Trimethylbenzene	3.6	52	3.6
1,3,5-Trimethylbenzene	8.4	52	8.4
Acetone	0.05	100	0.05
cis-1,2-Dichloroethylene	0.25	100	0.25
Ethyl Benzene	1	41	1
Methylene chloride	0.05	100	0.05
Naphthalene	12	100	12
n-Butylbenzene	12	100	12
n-Propylbenzene	3.9	100	3.9
sec-Butylbenzene	11	100	11
Tetrachloroethylene	1.3	19	1.3
Toluene	0.7	100	0.7
Trichloroethylene	0.47	21	0.47
Vinyl Chloride	0.02	0.9	0.02
Xylenes, Total	0.26	100	1.6

	Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs.
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

2024 NYSDEC REMEDIAL INVESTIGATION SOIL RESULTS VOLATILE ORGANIC COMPOUNDS

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com

PREPARED FOR: CLAY PROPERTIES, LLC

PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 8A
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1" = 50'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 8A – SOIL VOCS] September 27, 2024 – 9:34am jackson.bo

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 7B – SOIL SVOCS] September 27, 2024 – 9:31am jackson.l

SB-19 (1-3') - 8/15/2024	
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	1.08 D
Benzo(b)fluoranthene	1.28 D
Chrysene	1.06 D
Indeno(1,2,3-cd)pyrene	0.639 D

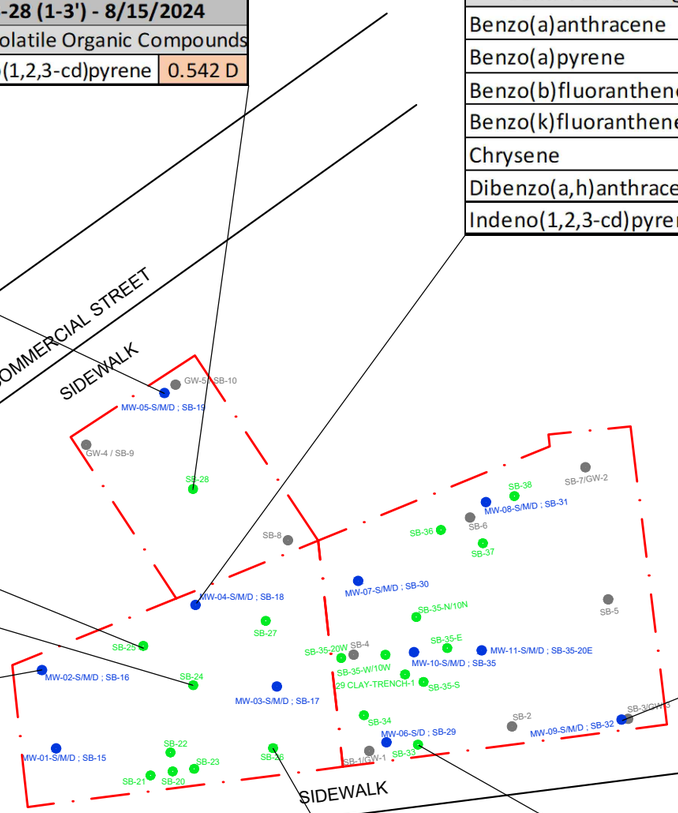
SB-28 (1-3') - 8/15/2024	
Semi-Volatile Organic Compounds	
Indeno(1,2,3-cd)pyrene	0.542 D

SB-18 (1-3') - 8/14/2024	
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	3.21 D
Benzo(a)pyrene	2.83 D
Benzo(b)fluoranthene	3.9 D
Benzo(k)fluoranthene	1.2 D
Chrysene	2.95 D
Dibenzo(a,h)anthracene	0.422 JD
Indeno(1,2,3-cd)pyrene	2.02 D

SB-25 (1-3') - 8/8/2024	
Semi-Volatile Organic Compounds	
Benzo(b)fluoranthene	1.08 D
Indeno(1,2,3-cd)pyrene	0.644 D

SB-24 (1-3') - 8/8/2024	
Semi-Volatile Organic Compounds	
Indeno(1,2,3-cd)pyrene	0.548 D

SB-16 (1-3') - 8/8/2024	
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	1.17 D
Benzo(a)pyrene	1.18 D
Benzo(b)fluoranthene	1.42 D
Chrysene	1.13 D
Indeno(1,2,3-cd)pyrene	0.782 D



SB-32 (1-3') - 8/7/2024	
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	4.2 D
Benzo(a)pyrene	2.98 D
Benzo(b)fluoranthene	2.61 D
Benzo(k)fluoranthene	2.56 D
Chrysene	4 D
Dibenzo(a,h)anthracene	0.685 D
Indeno(1,2,3-cd)pyrene	1.9 D

SB-26 (1-3') - 8/9/2024	
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	2.04 D
Benzo(a)pyrene	1.82 D
Benzo(b)fluoranthene	1.41 D
Benzo(k)fluoranthene	1.56 D
Chrysene	1.87 D
Dibenzo(a,h)anthracene	0.357 D
Indeno(1,2,3-cd)pyrene	1.03 D

SB-33 (1-3') - 8/5/2024	
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	6.63 D
Benzo(a)pyrene	7.36 D
Benzo(b)fluoranthene	5.7 D
Benzo(k)fluoranthene	6.29 D
Chrysene	6.83 D
Dibenzo(a,h)anthracene	0.88 D
Indeno(1,2,3-cd)pyrene	4.48 D

Analyte	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Residential Use SCO	NYSDEC Part 375 Protection of Groundwater SCOs
	Semi-Volatile Organic Compounds (mg/kg)		
Benzo(a)anthracene	1	1	1
Benzo(a)pyrene	1	1	22
Benzo(b)fluoranthene	1	1	1.7
Benzo(k)fluoranthene	0.8	3.9	1.7
Chrysene	1	3.9	1
Dibenzo(a,h)anthracene	0.33	0.33	1000
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2

	Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs

N
W E
S

GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. SEE LABORATORY REPORTS FOR ADDITIONAL INFORMATION, INCLUDING QUALIFIER DESCRIPTIONS.
5. ONLY EXCEEDANCES OF THE APPLICABLE NYSDEC PART 375 SOIL CLEANUP OBJECTIVES ARE SHOWN. FOR FULL ANALYTICAL RESULTS SEE THE TABLES LOCATED IN THE RIR.

LEGEND

APPROXIMATE SITE BOUNDARY

SB-20 — APPROXIMATE SOIL SAMPLING LOCATION – 2024 NYSDEC RI

MW-01-S/M/D SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI

SB-3/GW-3 — APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION – 2023 NYCOER RI

0 25 50 100
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

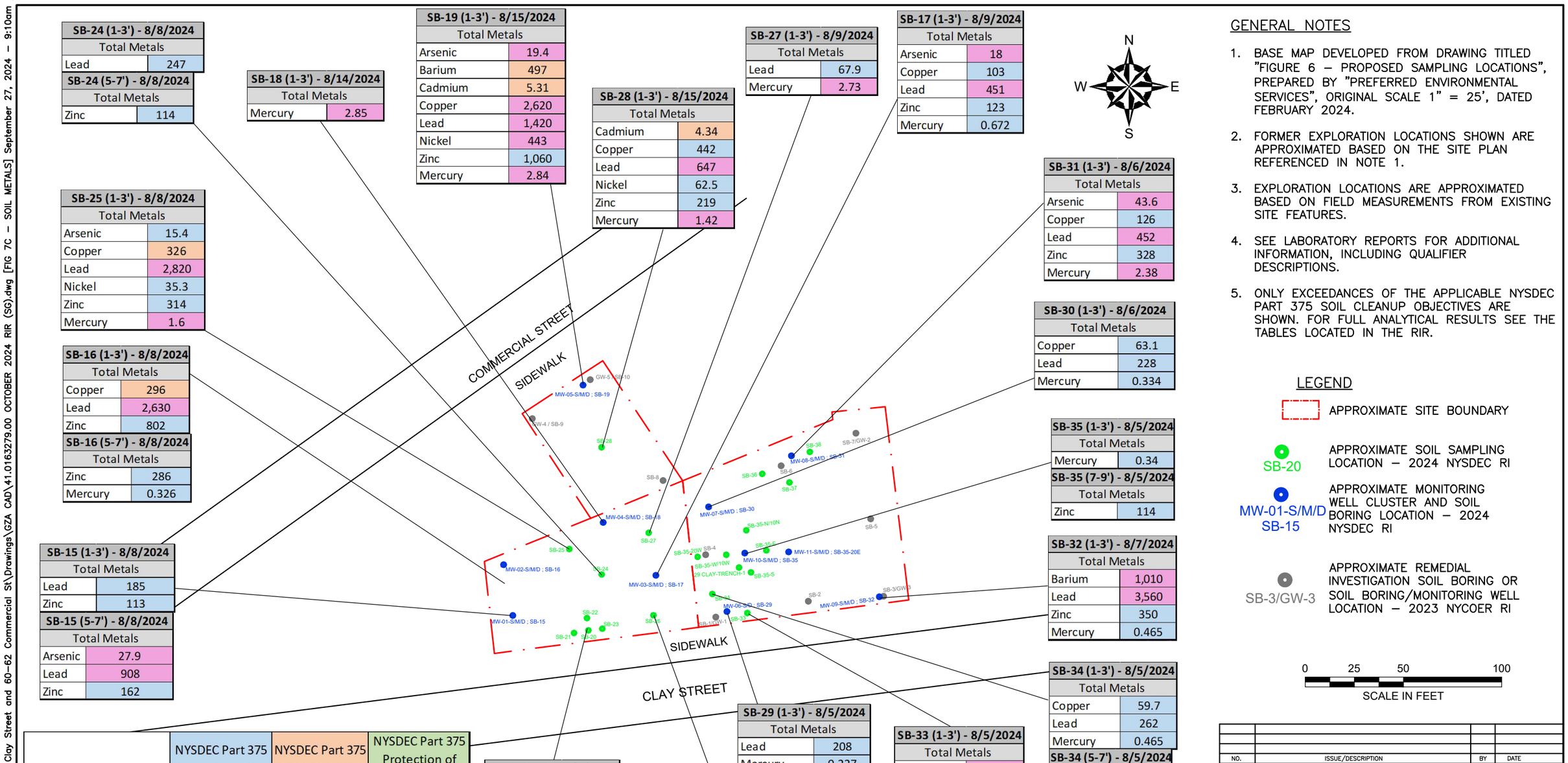
19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

2024 NYSDEC REMEDIAL INVESTIGATION SOIL RESULTS SEMI-VOLATILE ORGANIC COMPOUNDS

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
CLAY PROPERTIES, LLC

PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1" = 50'	8B
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.



	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Residential Use SCO	NYSDEC Part 375 Protection of Groundwater SCOs
Analyte	Total Metals (mg/kg)		
Arsenic	13	16	16
Barium	350	400	820
Cadmium	2.5	4.3	7.5
Copper	50	270	1,720
Lead	63	400	450
Nickel	30	310	130
Selenium	3.9	180	4
Zinc	109	10,000	2,480
Analyte	Total Mercury (mg/kg)		
Mercury	0.18	0.81	0.73

Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.
Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Restricted-Residential Use SCOs.
Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.
Analyte exceeds the NYSDEC Part 375 Unrestricted Use, Restricted-Residential Use, and Protection of Groundwater SCOs

GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. SEE LABORATORY REPORTS FOR ADDITIONAL INFORMATION, INCLUDING QUALIFIER DESCRIPTIONS.
5. ONLY EXCEEDANCES OF THE APPLICABLE NYSDEC PART 375 SOIL CLEANUP OBJECTIVES ARE SHOWN. FOR FULL ANALYTICAL RESULTS SEE THE TABLES LOCATED IN THE RIR.

LEGEND

- APPROXIMATE SITE BOUNDARY
- SB-20 — APPROXIMATE SOIL SAMPLING LOCATION – 2024 NYSDEC RI
- MW-01-S/M/D SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI
- SB-3/GW-3 — APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION – 2023 NYCOER RI

0 25 50 100
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

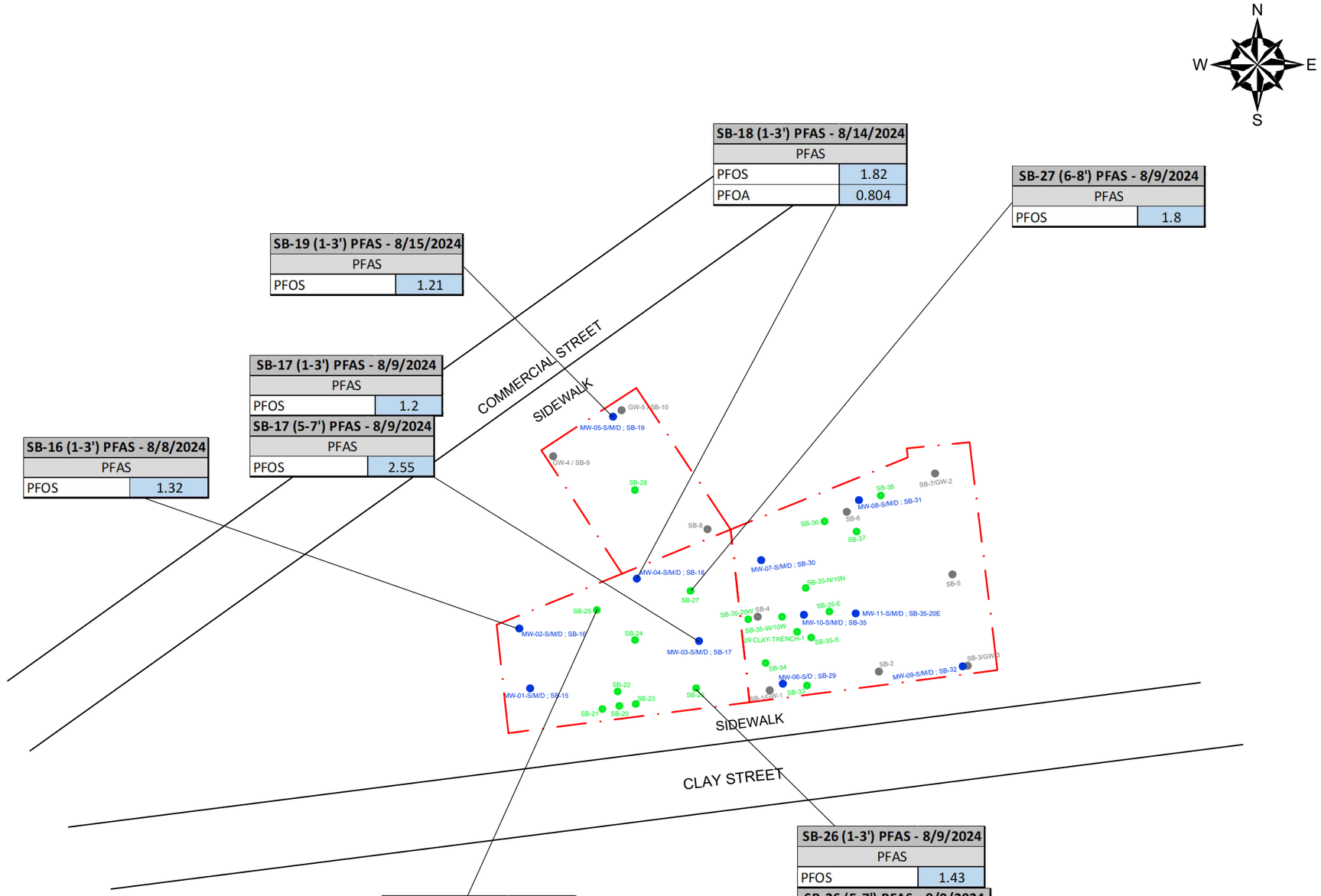
19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

2024 NYSDEC REMEDIAL INVESTIGATION
SOIL RESULTS
METALS

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com
PREPARED FOR: CLAY PROPERTIES, LLC

PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 8C
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1" = 50'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 7C – SOIL METALS] September 27, 2024 – 9:10am jackson.



GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. SEE LABORATORY REPORTS FOR ADDITIONAL INFORMATION, INCLUDING QUALIFIER DESCRIPTIONS.
5. ONLY EXCEEDANCES OF THE APPLICABLE NYSDEC PART 375 SOIL CLEANUP OBJECTIVES ARE SHOWN. FOR FULL ANALYTICAL RESULTS SEE THE TABLES LOCATED IN THE RIR.

LEGEND

- APPROXIMATE SITE BOUNDARY
- SB-20 — APPROXIMATE SOIL SAMPLING LOCATION – 2024 NYSDEC RI
- MW-01-S/M/D SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI
- SB-3/GW-3 — APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION – 2023 NYCOER RI

0 25 50 100
SCALE IN FEET

	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Residential Use SCO	NYSDEC Part 375 Protection of Groundwater SCOs
Analyte	PFAS, EPA 1633 (µg/kg)		
Perfluorooctanesulfonic acid (PFOS)	0.88	44	3.7
Perfluorooctanoic acid (PFOA)	0.66	33	1.1

	Analyte exceeds the NYSDEC Part 375 Unrestricted Use SCO.
	Analyte exceeds the NYSDEC Part 375 Unrestricted Use and Protection of Groundwater SCOs.

NO.	ISSUE/DESCRIPTION	BY	DATE

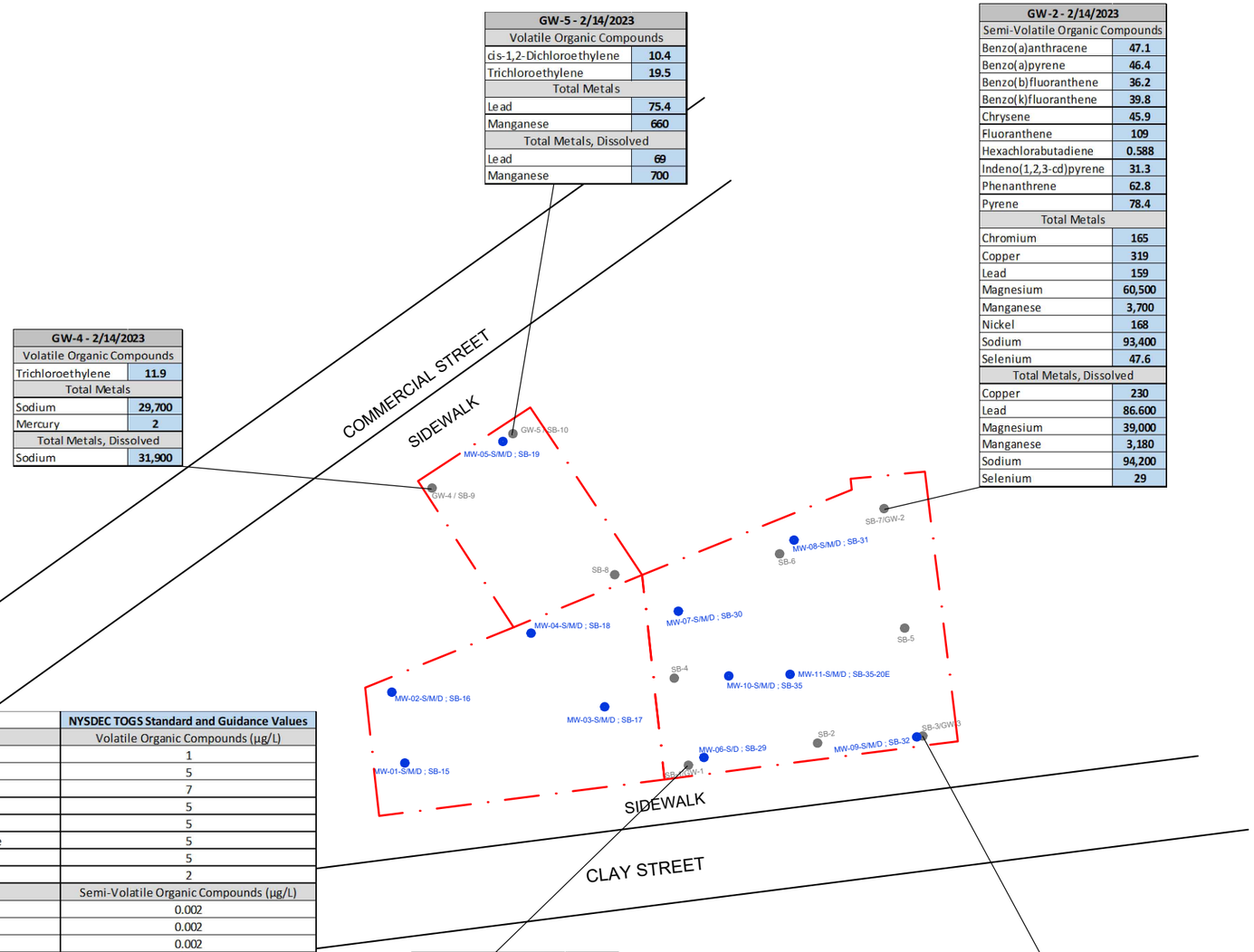
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

2024 NYSDEC
REMEDIAL INVESTIGATION SOIL RESULTS
PER- AND POLYFLUOROALKYL SUBSTANCES

PREPARED BY:	PREPARED FOR:		
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com	CLAY PROPERTIES, LLC		
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 8D
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1" = 50'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 8D – SOIL PFAS] September 27, 2024 – 9:35am jackson.bo



GW-5 - 2/14/2023	
Volatile Organic Compounds	
cis-1,2-Dichloroethylene	10.4
Trichloroethylene	19.5
Total Metals	
Lead	75.4
Manganese	660
Total Metals, Dissolved	
Lead	69
Manganese	700

GW-2 - 2/14/2023	
Semi-Volatile Organic Compounds	
Benzo(a)anthracene	47.1
Benzo(a)pyrene	46.4
Benzo(b)fluoranthene	36.2
Benzo(k)fluoranthene	39.8
Chrysene	45.9
Fluoranthene	109
Hexachlorabutadiene	0.588
Indeno(1,2,3-cd)pyrene	31.3
Phenanthrene	62.8
Pyrene	78.4
Total Metals	
Chromium	165
Copper	319
Lead	159
Magnesium	60,500
Manganese	3,700
Nickel	168
Sodium	93,400
Selenium	47.6
Total Metals, Dissolved	
Copper	230
Lead	86.600
Magnesium	39,000
Manganese	3,180
Sodium	94,200
Selenium	29

GW-4 - 2/14/2023	
Volatile Organic Compounds	
Trichloroethylene	11.9
Total Metals	
Sodium	29,700
Mercury	2
Total Metals, Dissolved	
Sodium	31,900

	NYSDEC TOGS Standard and Guidance Values
Analyte	Volatile Organic Compounds (µg/L)
1,1,2-Trichloroethane	1
1,1-Dichloroethylene	5
Chloroform	7
cis-1,2-Dichloroethylene	5
Tetrachloroethylene	5
trans-1,2-Dichloroethylene	5
Trichloroethylene	5
Vinyl Chloride	2
Analyte	Semi-Volatile Organic Compounds (µg/L)
Benzo(a)anthracene	0.002
Benzo(a)pyrene	0.002
Benzo(b)fluoranthene	0.002
Benzo(k)fluoranthene	0.002
Chrysene	0.002
Fluoranthene	50
Hexachlorabutadiene	0.5
Indeno(1,2,3-cd)pyrene	0.002
Phenanthrene	50
Pyrene	50
Analyte	Total and Dissolved Metals (µg/L)
Chromium	50
Copper	200
Lead	25
Magnesium	35,000
Manganese	300
Nickel	100
Sodium	20,000
Selenium	10
Mercury	0.7

GW-1 - 2/14/2023	
Volatile Organic Compounds	
1,1,2-Trichloroethane	1.38
1,1-Dichloroethylene	11.2
Chloroform	12
cis-1,2-Dichloroethylene	1,340 D
Tetrachloroethylene	6.28
trans-1,2-Dichloroethylene	42.6
Trichloroethylene	6,370 D
Vinyl Chloride	30.4
Total Metals	
Manganese	586
Sodium	124,000
Total Metals, Dissolved	
Manganese	638
Sodium	126,000

GW-3 - 2/14/2023	
Volatile Organic Compounds	
Trichloroethylene	15.2
Total Metals	
Magnesium	40,300
Manganese	1,080
Sodium	189,000
Selenium	17.3
Total Metals, Dissolved	
Magnesium	41,900
Manganese	1,150
Sodium	196,000
Selenium	16.1

	Analyte exceeds the NYSDEC Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Value.

GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. SEE LABORATORY REPORTS FOR ADDITIONAL INFORMATION, INCLUDING QUALIFIER DESCRIPTIONS.
5. ALL CONCENTRATIONS SHOWN ARE IN MICROGRAMS PER LITER.
6. ONLY EXCEEDANCES OF THE NYSDEC TOGS 1.1.1 AWQS ARE SHOWN. FOR FULL ANALYTICAL RESULTS SEE THE TABLES LOCATED IN THE RIR.

LEGEND

APPROXIMATE SITE BOUNDARY

MW-01-S/M/D SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI

SB-3/GW-3 — APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION – 2023 NYCOER RI

N W E S

0 25 50 100

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

2023 NYCOER RI
GROUNDWATER SAMPLING RESULTS

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		PREPARED FOR: CLAY PROPERTIES, LLC	
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 9
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1" = 50'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 9 – 2023 GW] September 26, 2024 – 7:20pm jackson.bogo

Well ID	Approximate Screened Interval (Feet Below Top of Casing)
MW-01S	5-15'
MW-01M	15-25'
MW-01D	25-35'
MW-02S	6-16'
MW-02M	15-25'
MW-02D	25-35'
MW-03S	6-16'
MW-03M	15-25'
MW-03D	25-35'
MW-04S	5.5-15.5'
MW-04M	15-25'
MW-04D	25-35'
MW-05S	5.5-15.5'
MW-05M	15-25'
MW-05D	25-35'
MW-06S	8-18'
MW-06D	30-40'
MW-07S	6-16'
MW-07M	15-25'
MW-07D	30-40'
MW-08S	8-18'
MW-08M	20-30'
MW-08D	30-40'
MW-09S	8-18'
MW-09M	17-27'
MW-09D	29-39'
MW-10S	5-15'
MW-10M *	15-25
MW-10D	32-42'
MW-11S	5-15'
MW-11M *	15-25'
MW-11D	30-40'

* Not sampled due to presence of NAPL

	NYSDEC TOGS Standard and Guidance Values
Analyte	Volatile Organic Compounds (µg/L)
1,1,1-Trichloroethane	5
1,1,2,2-Tetrachloroethane	5
1,1,2-Trichloroethane	1
1,1-Dichloroethane	5
1,1-Dichloroethylene	5
1,2,3-Trichloropropane	0.04
1,2,4-Trimethylbenzene	5
1,2-Dichloroethane	0.6
1,3,5-Trimethylbenzene	5
1,4-Dioxane	0.35
Benzene	1
Chloroform	7
cis-1,2-Dichloroethylene	5
Ethyl Benzene	5
Isopropylbenzene	5
Methyl tert-butyl ether (MTBE)	10
Methylene chloride	5
Naphthalene	10
n-Propylbenzene	5
o-Xylene	5
p-Isopropyltoluene	5
sec-Butylbenzene	5
Styrene	5
Tetrachloroethylene	5
Toluene	5
trans-1,2-Dichloroethylene	5
Trichloroethylene	5
Vinyl Chloride	2
Xylenes, Total	5

Analyte exceeds the NYSDEC Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Value.

MW-05S - 9/5/2024	
Volatile Organic Compounds	
Trichloroethylene	41

MW-05M - 9/5/2024	
Volatile Organic Compounds	
cis-1,2-Dichloroethylene	5.93
Trichloroethylene	74.3 BD

MW-05D - 9/5/2024	
Volatile Organic Compounds	
cis-1,2-Dichloroethylene	9.46
Trichloroethylene	16.5

MW-04S - 9/3/2024	
Volatile Organic Compounds	
Trichloroethylene	43

MW-04M - 9/3/2024	
Volatile Organic Compounds	
Trichloroethylene	251 BD

MW-04D - 9/4/2024	
Volatile Organic Compounds	
1,1-Dichloroethylene	12.3
cis-1,2-Dichloroethylene	89.2 D
Trichloroethylene	2,710 D

MW-08S - 9/6/2024	
Volatile Organic Compounds	
Chloroform	16
Trichloroethylene	19.4 BD

MW-08M - 9/6/2024	
Volatile Organic Compounds	
1,4-Dioxane	39.1 J
Trichloroethylene	380 D

MW-08D - 9/4/2024	
Volatile Organic Compounds	
Chloroform	8.13
Trichloroethylene	225 D

MW-07S - 9/5/2024	
Volatile Organic Compounds	
1,1,2-Trichloroethane	4.79
Chloroform	20.9
cis-1,2-Dichloroethylene	10.4
o-Xylene	8.64
Tetrachloroethylene	18.3
Trichloroethylene	8,640 D
Xylenes, Total	10.2

MW-07M - 9/5/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	72 D
1,1,2-Trichloroethane	60.5 D
1,1-Dichloroethylene	29.1
1,2,3-Trichloropropane	2.9
1,2,4-Trimethylbenzene	28
1,2-Dichloroethane	4.22
1,3,5-Trimethylbenzene	9.35
Benzene	1.02
Chloroform	68 D
cis-1,2-Dichloroethylene	23
Ethyl Benzene	151 D
Isopropylbenzene	7.96
Naphthalene	21.5
n-Propylbenzene	5.71
o-Xylene	674 D
Tetrachloroethylene	263 D
Toluene	416 D
Trichloroethylene	93,200 D
Xylenes, Total	892 D

MW-07D - 9/5/2024	
Volatile Organic Compounds	
1,2-Dichloroethane	2.31
Benzene	1.55
Chloroform	9.91
cis-1,2-Dichloroethylene	410 D
Methylene chloride	6.5
o-Xylene	6.33
Tetrachloroethylene	30.1
Toluene	25.8
trans-1,2-Dichloroethylene	33.1
Trichloroethylene	45,900 D
Vinyl Chloride	6.79
Xylenes, Total	10.2

MW-10S - 9/10/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	134 D
1,1,2-Trichloroethane	27.5 D
1,2,4-Trimethylbenzene	526 D
1,3,5-Trimethylbenzene	205 D
Chloroform	36.5 D
cis-1,2-Dichloroethylene	46 D
Ethyl Benzene	2,260 D
Isopropylbenzene	29.5 D
Methylene chloride	37 JD
Naphthalene	92.5 JBD
n-Propylbenzene	48 D
o-Xylene	2,850 D
Styrene	90.5 D
Tetrachloroethylene	532 D
Toluene	5,570 D
Trichloroethylene	175,000 D
Xylenes, Total	9,660 D

MW-10D - 9/10/2024	
Volatile Organic Compounds	
1,1,2-Trichloroethane	1.35 JD
1,1-Dichloroethylene	11.3 D
1,2,4-Trimethylbenzene	103 D
1,3,5-Trimethylbenzene	41.8 D
Benzene	2.5 D
cis-1,2-Dichloroethylene	430 D
Ethyl Benzene	130 D
Methylene chloride	6.15 JD
Naphthalene	21 D
n-Propylbenzene	9 D
o-Xylene	160 D
p-Isopropyltoluene	5.6 D
Tetrachloroethylene	72 D
Toluene	381 D
trans-1,2-Dichloroethylene	27 D
Trichloroethylene	11,300 D
Xylenes, Total	760 D

MW-11S - 9/10/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	7.69
1,1,2,2-Tetrachloroethane	9.01
1,1,2-Trichloroethane	8.78
1,2,4-Trimethylbenzene	132 E
1,2-Dichloroethane	0.69
1,3,5-Trimethylbenzene	39.6
Ethyl Benzene	17.3
Naphthalene	58.1
n-Propylbenzene	7.53
o-Xylene	40.3
Tetrachloroethylene	25.5
Toluene	118 E
Trichloroethylene	16,600 D
Xylenes, Total	148

MW-11D - 9/9/2024	
Volatile Organic Compounds	
Trichloroethylene	7.78 B

MW-09S - 9/4/2024	
Volatile Organic Compounds	
Methyl tert-butyl ether (MTBE)	27.4
Trichloroethylene	14.4

MW-09M - 9/6/2024	
Volatile Organic Compounds	
Methyl tert-butyl ether (MTBE)	32
Trichloroethylene	18.5 B

MW-09D - 9/6/2024	
Volatile Organic Compounds	
Methyl tert-butyl ether (MTBE)	25.8
Trichloroethylene	13.4 B

MW-02S - 9/3/2024	
Volatile Organic Compounds	
Trichloroethylene	27.6

MW-02M - 9/3/2024	
Volatile Organic Compounds	
Trichloroethylene	23.7

MW-02D - 9/4/2024	
Volatile Organic Compounds	
Trichloroethylene	251 D

MW-01S - 9/3/2024	
Volatile Organic Compounds	
cis-1,2-Dichloroethylene	29.5
Trichloroethylene	740 BD

MW-01M - 9/6/2024	
Volatile Organic Compounds	
1,1,2-Trichloroethane	7.92
1,1-Dichloroethane	11.7
1,1-Dichloroethylene	42.6 D
1,2-Dichloroethane	8.3
Benzene	2.92
Chloroform	24.1
cis-1,2-Dichloroethylene	2,100 D
Tetrachloroethylene	51.3
trans-1,2-Dichloroethylene	24.1 D
Trichloroethylene	53,700 D
Vinyl Chloride	42

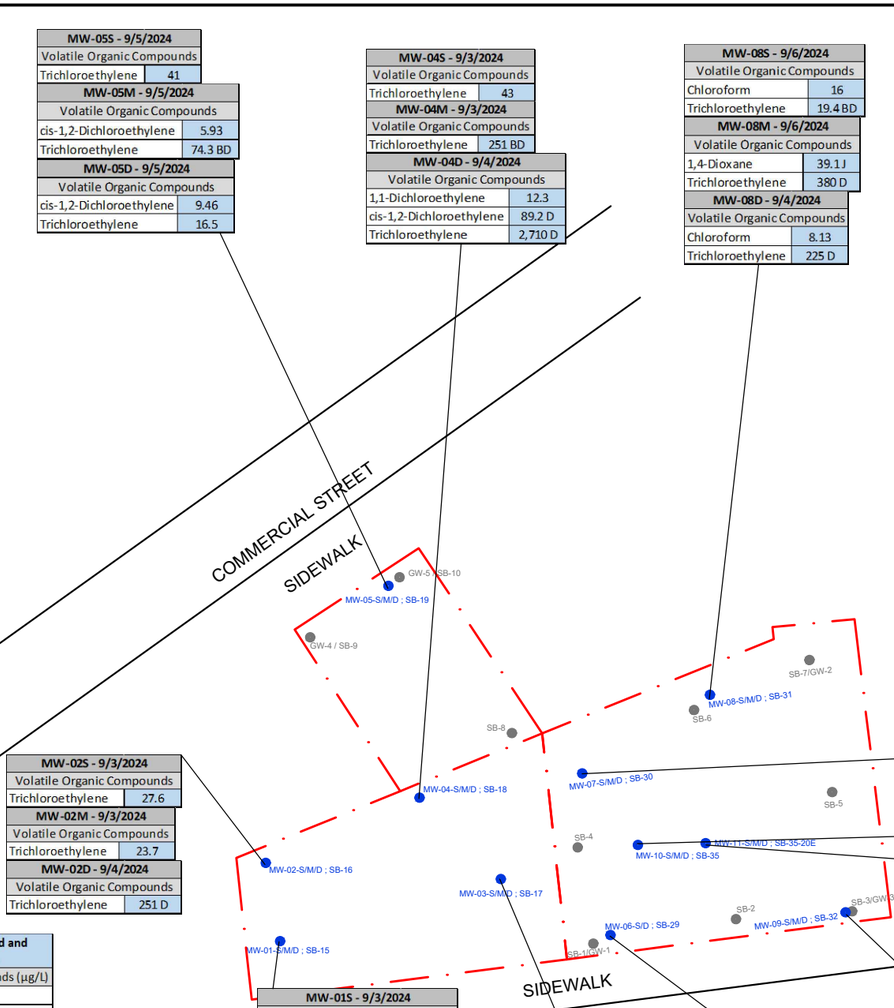
MW-01D - 9/6/2024	
Volatile Organic Compounds	
1,1,2-Trichloroethane	8.29
1,1-Dichloroethane	11.8
1,1-Dichloroethylene	104 E
1,2,3-Trichloropropane	0.54
1,2-Dichloroethane	6.69
Benzene	2.48
Chloroform	7.33
cis-1,2-Dichloroethylene	4,650 D
Tetrachloroethylene	59.2 E
trans-1,2-Dichloroethylene	74.1 E
Trichloroethylene	208,000 D
Vinyl Chloride	46.8 E

MW-03M - 9/3/2024	
Volatile Organic Compounds	
cis-1,2-Dichloroethylene	11.4
Tetrachloroethylene	11.5
Trichloroethylene	558 D

MW-03D - 9/6/2024	
Volatile Organic Compounds	
1,1,2-Trichloroethane	3.26
1,1-Dichloroethylene	64.6 E
1,2-Dichloroethane	2.42
Benzene	1.18
cis-1,2-Dichloroethylene	2,420 D
Ethyl Benzene	19.8
o-Xylene	29.1
Tetrachloroethylene	32.4
Toluene	40
trans-1,2-Dichloroethylene	53.7 E
Trichloroethylene	37,500 D
Vinyl Chloride	25.7
Xylenes, Total	99.3

MW-06S - 9/10/2024	
Volatile Organic Compounds	
cis-1,2-Dichloroethylene	116 D
Trichloroethylene	610 D

MW-06D - 9/5/2024	
Volatile Organic Compounds	
1,1-Dichloroethane	16.5
1,1-Dichloroethylene	106 D
1,2,4-Trimethylbenzene	51 D
1,3,5-Trimethylbenzene	16.5
cis-1,2-Dichloroethylene	48,000 D
Ethyl Benzene	24
Isopropylbenzene	11.6
Naphthalene	12.3
n-Propylbenzene	10.7
o-Xylene	5.45
Tetrachloroethylene	26 JD
Toluene	19.2
trans-1,2-Dichloroethylene	179 D
Trichloroethylene	206,000 D
Vinyl Chloride	385 D
Xylenes, Total	22.5



GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. SEE LABORATORY REPORTS FOR ADDITIONAL INFORMATION, INCLUDING QUALIFIER DESCRIPTIONS.
5. ALL CONCENTRATIONS SHOWN ARE IN MICROGRAMS PER LITER.
6. ONLY EXCEEDANCES OF THE NYSDEC TOGS 1.1.1 AWQS ARE SHOWN. FOR FULL ANALYTICAL RESULTS SEE THE TABLES LOCATED IN THE RIR.

LEGEND

- APPROXIMATE SITE BOUNDARY
- MW-01-S/M/D SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI
- SB-3/GW-3 — APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION – 2023 NYCOER RI

N W E S

0 25 50 100

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

2024 NYSDEC RI GROUNDWATER SAMPLING RESULTS VOLATILE ORGANIC COMPOUNDS

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
CLAY PROPERTIES, LLC

PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1" = 50'	10A
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 8A – GW] September 26, 2024 – 7:22pm jackson.bogach

Well ID	Approximate Screened Interval (Feet Below Top of Casing)
MW-01S	5-15'
MW-01M	15-25'
MW-01D	25-35'
MW-02S	6-16'
MW-02M	15-25'
MW-02D	25-35'
MW-03S	6-16'
MW-03M	15-25'
MW-03D	25-35'
MW-04S	5.5-15.5'
MW-04M	15-25'
MW-04D	25-35'
MW-05S	5.5-15.5'
MW-05M	15-25'
MW-05D	25-35'
MW-06S	8-18'
MW-06D	30-40'
MW-07S	6-16'
MW-07M	15-25'
MW-07D	30-40'
MW-08S	8-18'
MW-08M	20-30'
MW-08D	30-40'
MW-09S	8-18'
MW-09M	17-27'
MW-09D	29-39'
MW-10S	5-15'
MW-10M *	15-25
MW-10D	32-42'
MW-11S	5-15'
MW-11M *	15-25'
MW-11D	30-40'

* Not sampled due to presence of NAPL

	NYSDEC TOGS Standard and Guidance Values
Analyte	Semi-Volatile Organic Compounds (µg/L)
Phenol	1
Benzo(b)fluoranthene	0.002
Chrysene	0.002
Naphthalene	10
1,4-Dioxane	0.35
Analyte	Total Metals (µg/L)
Chromium	50
Copper	200
Lead	25
Magnesium	35,000
Manganese	300
Nickel	100
Sodium	20000
Zinc	2000
Cadmium	5
Selenium	10
Analyte	Total Metal, Dissolved (µg/L)
Chromium	50
Magnesium	35000
Manganese	300
Sodium	20,000
Zinc	2,000
Cadmium	5
Selenium	10
Analyte	Total Mercury (µg/L)
Mercury	0.7
	NYSDEC Part 375 PFAS Remedial Program
Analyte	PFAS (ng/L)
Perfluoroheptanoic acid (PFHpA)	100
Perfluorohexanesulfonic acid (PFHxS)	100
Perfluorooctanesulfonic acid (PFOS)	10
Perfluorooctanoic acid (PFOA)	10

Analyte exceeds its respective guidance value, as shown.

MW-02S - 9/3/2024

Semi-Volatile Organic Compounds	
1,4-Dioxane	0.656
Total Metals	
Lead	46.2
Manganese	6,210
Sodium	179,000
Total Metals, Dissolved	
Manganese	1,170
Sodium	220,000
PFAS (ng/L)	
PFHxS	182
PFOS	35.9
PFOA	624 D

MW-02M - 9/3/2024

Semi-Volatile Organic Compounds	
1,4-Dioxane	0.784
Total Metals	
Manganese	8,360
Sodium	77,600
Total Metals, Dissolved	
Manganese	6,280
Sodium	104,000
PFAS (ng/L)	
PFHpA	113
PFHxS	166
PFOS	55.7
PFOA	447

MW-05S - 9/5/2024

Total Metals	
Manganese	3,230
Nickel	119
Sodium	41,100
Cadmium	10.2
Total Metals, Dissolved	
Manganese	3,150
Sodium	39,800 B
Cadmium	8.88
PFAS (ng/L)	
PFOA	11.1

MW-05M - 9/5/2024

Total Metals	
Chromium	94.3
Copper	334
Lead	373
Magnesium	165,000
Manganese	7,360
Sodium	45,800
Cadmium	19
Total Metals, Dissolved	
Magnesium	128,000
Manganese	2,390
Sodium	44,300 B
Total Mercury	
Mercury	2.5
PFAS (ng/L)	
PFOS	10.4
PFOA	57.1

MW-04S - 9/3/2024

Semi-Volatile Organic Compounds	
1,4-Dioxane	0.432
Total Metals	
Manganese	1,030
Total Metals, Dissolved	
Manganese	1,040
PFAS (ng/L)	
PFOS	59.6
PFOA	164

MW-04M - 9/3/2024

Total Metals	
Manganese	4,920
Nickel	105
Sodium	29,000
Zinc	2,510
Cadmium	12.6
Total Metals, Dissolved	
Manganese	5,050
Sodium	30,000
Zinc	2,410
Cadmium	12.3
PFAS (ng/L)	
PFOS	447
PFOA	361

MW-08S - 9/6/2024

Semi-Volatile Organic Compounds	
1,4-Dioxane	1.58
Total Metals	
Lead	45.8
Manganese	869
Sodium	143,000
Total Metals, Dissolved	
Sodium	139,000
PFAS (ng/L)	
PFOA	20.8

MW-08M - 9/6/2024

Semi-Volatile Organic Compounds	
1,4-Dioxane	39.5
Total Metals	
Magnesium	57,100
Manganese	1,470
Sodium	111,000
Total Metals, Dissolved	
Magnesium	57,200
Manganese	1,500
Sodium	110,000
Selenium	14.1
PFAS (ng/L)	
PFOA	10.9

MW-07S - 9/5/2024

Total Metals	
Manganese	2,130
Sodium	196,000
Selenium	98.3
Total Metals, Dissolved	
Manganese	2,150
Sodium	212,000
Selenium	111
PFAS (ng/L)	
PFOS	65.6
PFOA	31.1

MW-07M - 9/5/2024

Semi-Volatile Organic Compounds	
Napthalene	19.5 D
Total Metals	
Magnesium	37,100
Manganese	11,400
Sodium	160,000
Selenium	33.9
Total Metals, Dissolved	
Magnesium	36,600
Manganese	11,500
Sodium	157,000 B
Selenium	34.3
PFAS (ng/L)	
PFOS	543 DE
PFOA	180

MW-10S - 9/10/2024

Semi-Volatile Organic Compounds	
Phenol	7.22
Naphthalene	45 BD
Total Metals	
Lead	123
Manganese	2,220
Nickel	282
Sodium	71,500
Total Metals, Dissolved	
Manganese	537
Sodium	76,500
PFAS (ng/L)	
PFOS	17
PFOA	21.3

MW-11S - 9/10/2024

Semi-Volatile Organic Compounds	
Benzo(b)fluoranthene	0.05
Chrysene	0.05
1,4-Dioxane	0.544
Total Metals	
Lead	127
Magnesium	37,700
Manganese	2,040
Sodium	150,000
Selenium	29.4
Total Metals, Dissolved	
Manganese	303
Sodium	151,000
Selenium	28.1

MW-01S - 9/3/2024

Semi-Volatile Organic Compounds	
1,4-Dioxane	1.23
Total Metals	
Chromium	104
Lead	87.9
Manganese	772
Sodium	136,000
Total Metals, Dissolved	
Chromium	110
Sodium	189,000
PFAS (ng/L)	
PFOS	58.1
PFOA	230

MW-01M - 9/6/2024

Semi-Volatile Organic Compounds	
1,4-Dioxane	18.3
Total Metals	
Magnesium	44,600
Manganese	3,900
Sodium	134,000
Total Metals, Dissolved	
Magnesium	44,100
Manganese	4,060
Sodium	178,000
PFAS (ng/L)	
PFOS	23.1
PFOA	128

MW-03S - 9/4/2024

Total Metals	
Manganese	500
PFAS (ng/L)	
PFOS	91.3

MW-03M - 9/3/2024

Semi-Volatile Organic Compounds	
1,4-Dioxane	0.944
Total Metals	
Manganese	6,030
Sodium	82,100
Total Metals, Dissolved	
Manganese	5,970
Sodium	109,000
PFAS (ng/L)	
PFOS	333
PFOA	149

MW-06S - 9/10/2024

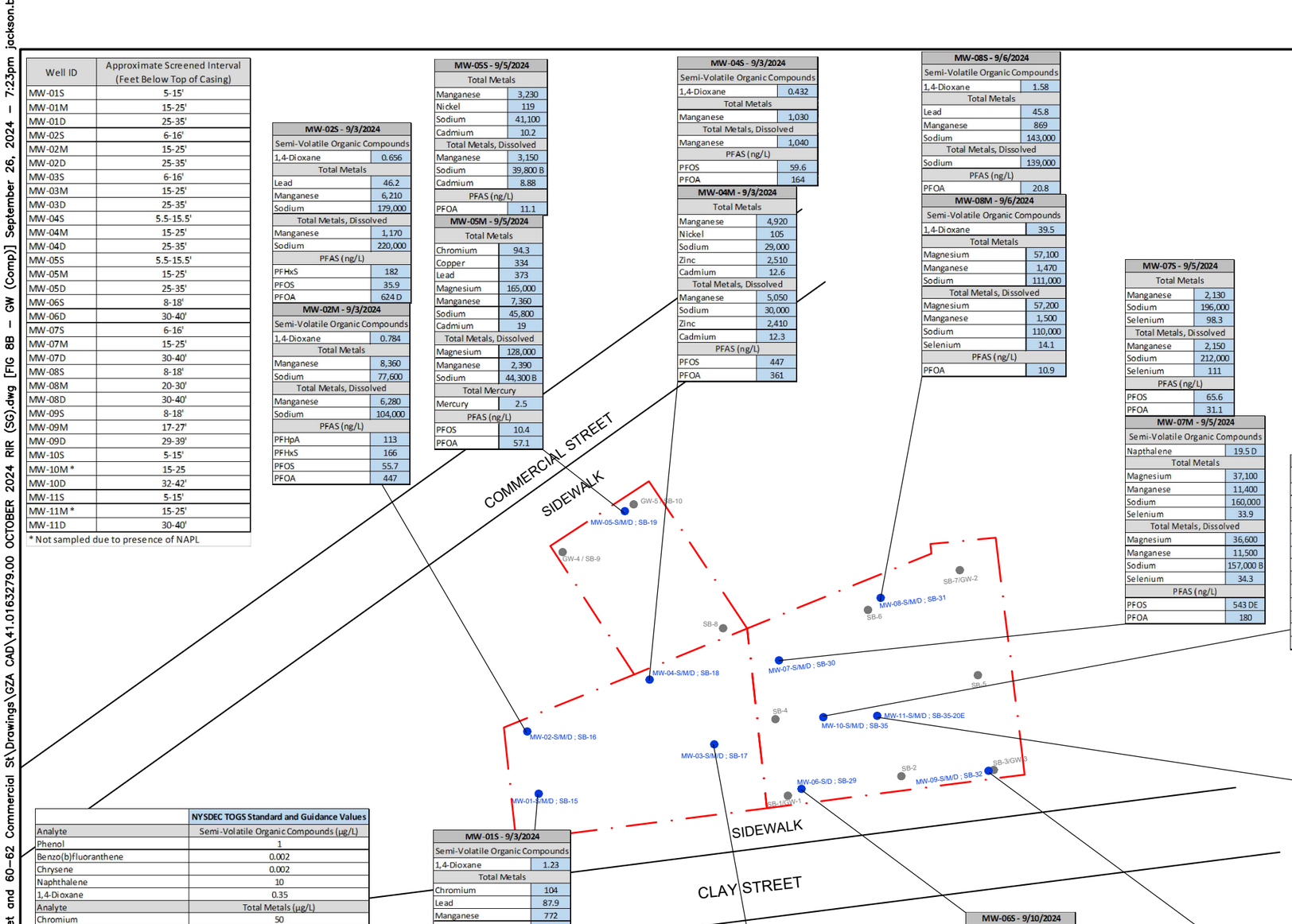
Total Metals	
Lead	5,310
Manganese	3,360
Sodium	62,800
Total Metals, Dissolved	
Sodium	63,600
Total Mercury	
Mercury	1.1
PFAS (ng/L)	
PFOA	24.5

MW-09S - 9/4/2024

Semi-Volatile Organic Compounds	
1,4-Dioxane	4.69
Total Metals	
Lead	210
Magnesium	86,700
Manganese	2,840
Sodium	149,000
Selenium	23.7
Total Metals, Dissolved	
Magnesium	69,800
Manganese	1,370
Sodium	162,000
Selenium	17.3
PFAS (ng/L)	
PFOS	124
PFOA	48.3

MW-09M - 9/6/2024

Semi-Volatile Organic Compounds	
1,4-Dioxane	7.22
Total Metals	
Magnesium	75,600
Manganese	1,700
Sodium	160,000
Total Metals, Dissolved	
Magnesium	74,800
Manganese	1,660
Sodium	156,000
Selenium	15.4
PFAS (ng/L)	
PFOA	39.4



GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. SEE LABORATORY REPORTS FOR ADDITIONAL INFORMATION, INCLUDING QUALIFIER DESCRIPTIONS.
5. CONCENTRATIONS FOR SEMI–VOLATILE ORGANIC COMPOUNDS AND METALS ARE SHOWN IN MICROGAMS PER LITER, CONCENTRATIONS FOR PFAS ARE SHOWN IN NANOGRAMS PER LITER.
6. ONLY EXCEEDANCES OF THE NYSDEC TOGS 1.1.1 AWQS ARE SHOWN. FOR FULL ANALYTICAL RESULTS SEE THE TABLES LOCATED IN THE RIR.

LEGEND

APPROXIMATE SITE BOUNDARY

MW-01-S/M/D SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI

SB-3/GW-3 — APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION – 2023 NYCOER RI

N W E S

0 25 50 100

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

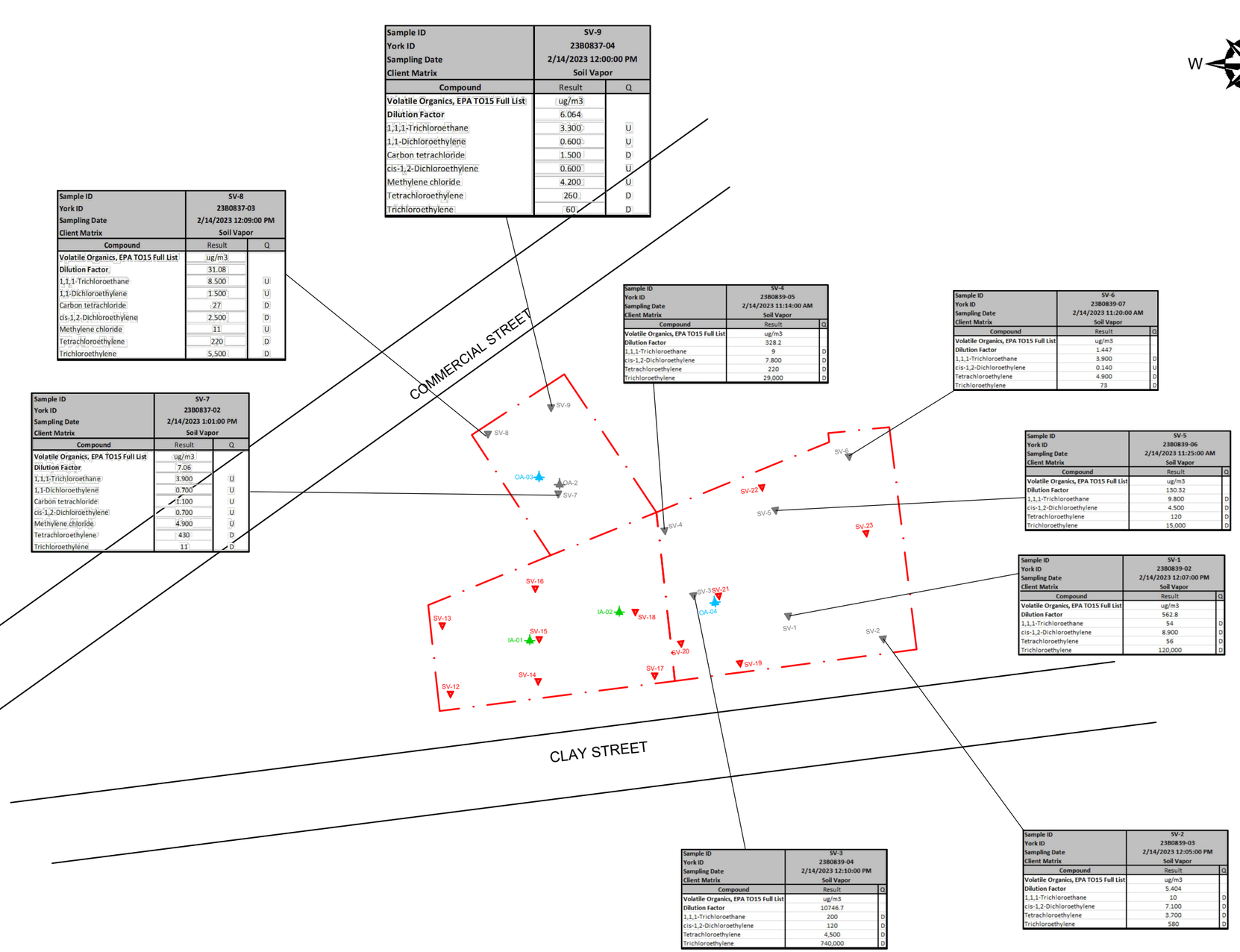
2024 NYSDEC RI GROUNDWATER SAMPLING RESULTS SVOCs, METALS, AND PFAS

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
CLAY PROPERTIES, LLC

PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 10B
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1" = 50'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 8B – GW (Comp)] September 26, 2024 – 7:23pm jackson.b



Sample ID	SV-8
York ID	23B0837-03
Sampling Date	2/14/2023 12:09:00 PM
Client Matrix	Soil Vapor

Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	31.08	
1,1,1-Trichloroethane	8.500	U
1,1-Dichloroethylene	1.500	U
Carbon tetrachloride	27	D
cis-1,2-Dichloroethylene	2.500	D
Methylene chloride	11	U
Tetrachloroethylene	220	D
Trichloroethylene	5,500	D

Sample ID	SV-9
York ID	23B0837-04
Sampling Date	2/14/2023 12:00:00 PM
Client Matrix	Soil Vapor

Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	6.064	
1,1,1-Trichloroethane	3.300	U
1,1-Dichloroethylene	0.600	U
Carbon tetrachloride	1.500	D
cis-1,2-Dichloroethylene	0.600	U
Methylene chloride	4.200	U
Tetrachloroethylene	260	D
Trichloroethylene	60	D

Sample ID	SV-7
York ID	23B0837-02
Sampling Date	2/14/2023 1:01:00 PM
Client Matrix	Soil Vapor

Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	7.06	
1,1,1-Trichloroethane	3.900	U
1,1-Dichloroethylene	0.700	U
Carbon tetrachloride	1.100	U
cis-1,2-Dichloroethylene	0.700	U
Methylene chloride	4.900	U
Tetrachloroethylene	430	D
Trichloroethylene	11	D

Sample ID	SV-4
York ID	23B0839-05
Sampling Date	2/14/2023 11:14:00 AM
Client Matrix	Soil Vapor

Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	328.2	
1,1,1-Trichloroethane	9	D
cis-1,2-Dichloroethylene	7.800	D
Tetrachloroethylene	220	D
Trichloroethylene	29,000	D

Sample ID	SV-6
York ID	23B0839-07
Sampling Date	2/14/2023 11:20:00 AM
Client Matrix	Soil Vapor

Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	1.447	
1,1,1-Trichloroethane	3.900	D
cis-1,2-Dichloroethylene	0.140	U
Tetrachloroethylene	4.900	D
Trichloroethylene	73	D

Sample ID	SV-5
York ID	23B0839-06
Sampling Date	2/14/2023 11:25:00 AM
Client Matrix	Soil Vapor

Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	130.32	
1,1,1-Trichloroethane	9.800	D
cis-1,2-Dichloroethylene	4.500	D
Tetrachloroethylene	120	D
Trichloroethylene	15,000	D

Sample ID	SV-1
York ID	2380839-02
Sampling Date	2/14/2023 12:07:00 PM
Client Matrix	Soil Vapor

Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	562.8	
1,1,1-Trichloroethane	54	D
cis-1,2-Dichloroethylene	8.900	D
Tetrachloroethylene	56	D
Trichloroethylene	120,000	D

Sample ID	SV-3
York ID	2380839-04
Sampling Date	2/14/2023 12:10:00 PM
Client Matrix	Soil Vapor

Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	10746.7	
1,1,1-Trichloroethane	200	D
cis-1,2-Dichloroethylene	120	D
Tetrachloroethylene	4,500	D
Trichloroethylene	740,000	D

Sample ID	SV-2
York ID	2380839-03
Sampling Date	2/14/2023 12:05:00 PM
Client Matrix	Soil Vapor

Compound	Result	Q
Volatile Organics, EPA TO15 Full List	ug/m3	
Dilution Factor	5.404	
1,1,1-Trichloroethane	10	D
cis-1,2-Dichloroethylene	7.100	D
Tetrachloroethylene	3.700	D
Trichloroethylene	580	D

N
W E
S

GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.

LEGEND

- APPROXIMATE SITE BOUNDARY
- SV-12 — APPROXIMATE SOIL VAPOR SAMPLING LOCATION – 2024 NYSDEC RI
- OA-03 — OUTDOOR AIR SAMPLING LOCATION – 2024 NYSDEC RI
- IA-01 — INDOOR AIR SAMPLING LOCATION – 2024 NYSDEC RI
- SV-4 — APPROXIMATE REMEDIAL INVESTIGATION SOIL VAPOR SAMPLING LOCATION – 2023 NYCOER RI
- OA-2 — APPROXIMATE REMEDIAL INVESTIGATION OUTDOOR AIR SAMPLING LOCATION – 2023 NYCOER RI

0 25 50 100
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

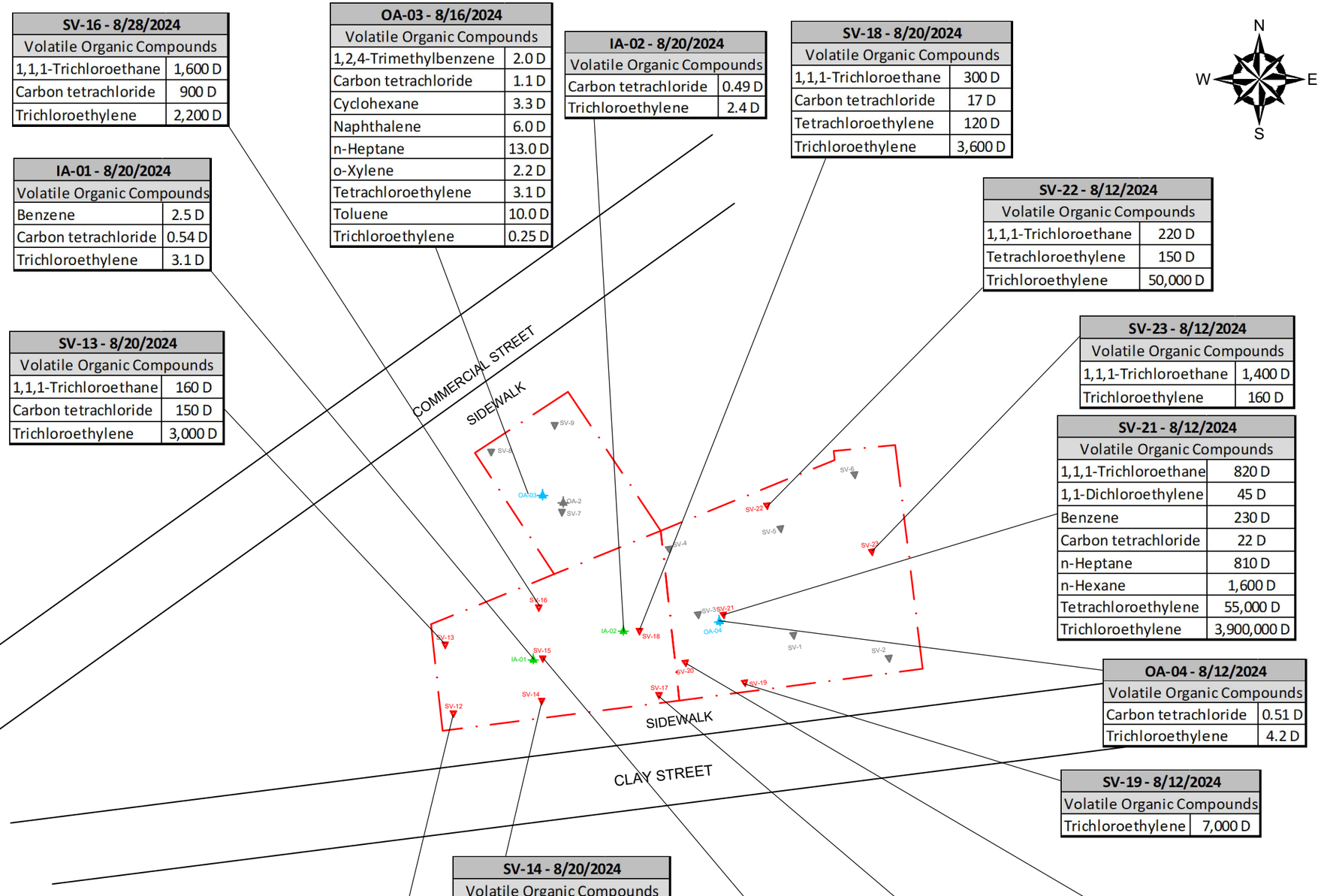
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

2023 NYCOER REMEDIAL INVESTIGATION SOIL VAPOR AND AMBIENT AIR RESULTS

PREPARED BY:	PREPARED FOR:		
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com	CLAY PROPERTIES, LLC		
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 11
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1" = 50'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 8 – SV 2023] September 19, 2024 – 3:15pm jackson.boga



SV-16 - 8/28/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	1,600 D
Carbon tetrachloride	900 D
Trichloroethylene	2,200 D

IA-01 - 8/20/2024	
Volatile Organic Compounds	
Benzene	2.5 D
Carbon tetrachloride	0.54 D
Trichloroethylene	3.1 D

SV-13 - 8/20/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	160 D
Carbon tetrachloride	150 D
Trichloroethylene	3,000 D

OA-03 - 8/16/2024	
Volatile Organic Compounds	
1,2,4-Trimethylbenzene	2.0 D
Carbon tetrachloride	1.1 D
Cyclohexane	3.3 D
Naphthalene	6.0 D
n-Heptane	13.0 D
o-Xylene	2.2 D
Tetrachloroethylene	3.1 D
Toluene	10.0 D
Trichloroethylene	0.25 D

IA-02 - 8/20/2024	
Volatile Organic Compounds	
Carbon tetrachloride	0.49 D
Trichloroethylene	2.4 D

SV-18 - 8/20/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	300 D
Carbon tetrachloride	17 D
Tetrachloroethylene	120 D
Trichloroethylene	3,600 D

SV-22 - 8/12/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	220 D
Tetrachloroethylene	150 D
Trichloroethylene	50,000 D

SV-23 - 8/12/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	1,400 D
Trichloroethylene	160 D

SV-21 - 8/12/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	820 D
1,1-Dichloroethylene	45 D
Benzene	230 D
Carbon tetrachloride	22 D
n-Heptane	810 D
n-Hexane	1,600 D
Tetrachloroethylene	55,000 D
Trichloroethylene	3,900,000 D

OA-04 - 8/12/2024	
Volatile Organic Compounds	
Carbon tetrachloride	0.51 D
Trichloroethylene	4.2 D

SV-19 - 8/12/2024	
Volatile Organic Compounds	
Trichloroethylene	7,000 D

SV-14 - 8/20/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	1,300 D
Carbon tetrachloride	160 D
Cyclohexane	160 D
Trichloroethylene	6,300 D

SV-15 - 8/20/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	3,600 D
Carbon tetrachloride	820 D
Trichloroethylene	1,800 D

SV-20 - 8/12/2024	
Volatile Organic Compounds	
Tetrachloroethylene	1,600 D
Trichloroethylene	180,000 D

SV-12 - 8/20/2024	
Volatile Organic Compounds	
1,1,1-Trichloroethane	120 D
Carbon tetrachloride	22 D
Trichloroethylene	6,800 D

SV-17 - 8/22/2024	
Volatile Organic Compounds	
Tetrachloroethylene	190 D
Trichloroethylene	3,400 D

N
W E
S

GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. SEE LABORATORY REPORTS FOR ADDITIONAL INFORMATION, INCLUDING QUALIFIER DESCRIPTIONS.
5. ONLY EXCEEDANCES OF THE RESPECTIVE NYSDOH SOIL VAPOR DECISION MATRICES MINIMUM CONCENTRATIONS ARE SHOWN. FOR FULL ANALYTICAL RESULTS SEE THE TABLES LOCATED WITHIN THE RI.

LEGEND

- APPROXIMATE SITE BOUNDARY
- SV-12 — APPROXIMATE SOIL VAPOR SAMPLING LOCATION – 2024 NYSDEC RI
- OA-03 — OUTDOOR AIR SAMPLING LOCATION – 2024 NYSDEC RI
- IA-01 — INDOOR AIR SAMPLING LOCATION – 2024 NYSDEC RI
- SV-4 — APPROXIMATE REMEDIAL INVESTIGATION SOIL VAPOR SAMPLING LOCATION – 2023 NYCOER RI
- OA-2 — APPROXIMATE REMEDIAL INVESTIGATION OUTDOOR AIR SAMPLING LOCATION – 2023 NYCOER RI

0 25 50 100
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

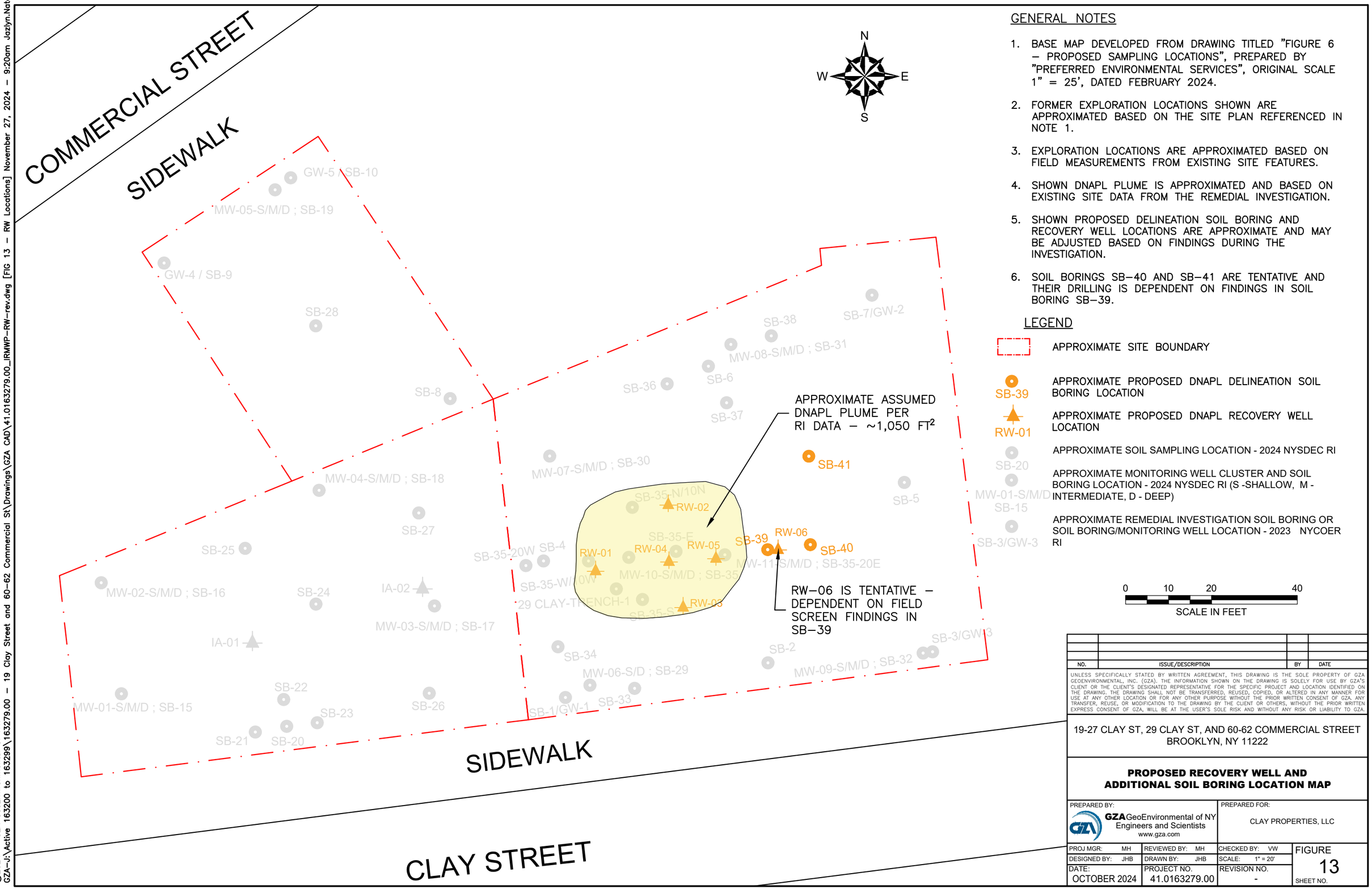
19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

2024 NYSDEC REMEDIAL INVESTIGATION SOIL VAPOR AND AMBIENT AIR RESULTS

PREPARED BY:	PREPARED FOR:		
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com	CLAY PROPERTIES, LLC		
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 12
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1" = 50'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00 OCTOBER 2024 RIR (SG).dwg [FIG 12 – SV] September 27, 2024 – 9:08am jackson.bogach

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00_IRMWP–RW–rev.dwg [FIG 13 – RW Locations] November 27, 2024 – 9:20am Jazlyn.Natalie



GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. SHOWN DNAPL PLUME IS APPROXIMATED AND BASED ON EXISTING SITE DATA FROM THE REMEDIAL INVESTIGATION.
5. SHOWN PROPOSED DELINEATION SOIL BORING AND RECOVERY WELL LOCATIONS ARE APPROXIMATE AND MAY BE ADJUSTED BASED ON FINDINGS DURING THE INVESTIGATION.
6. SOIL BORINGS SB–40 AND SB–41 ARE TENTATIVE AND THEIR DRILLING IS DEPENDENT ON FINDINGS IN SOIL BORING SB–39.

LEGEND

- APPROXIMATE SITE BOUNDARY
- SB-39 — APPROXIMATE PROPOSED DNAPL DELINEATION SOIL BORING LOCATION
- RW-01 — APPROXIMATE PROPOSED DNAPL RECOVERY WELL LOCATION
- APPROXIMATE SOIL SAMPLING LOCATION - 2024 NYSDEC RI
- APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION - 2024 NYSDEC RI (S -SHALLOW, M - INTERMEDIATE, D - DEEP)
- APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION - 2023 NYCOER RI

0 10 20 40
SCALE IN FEET

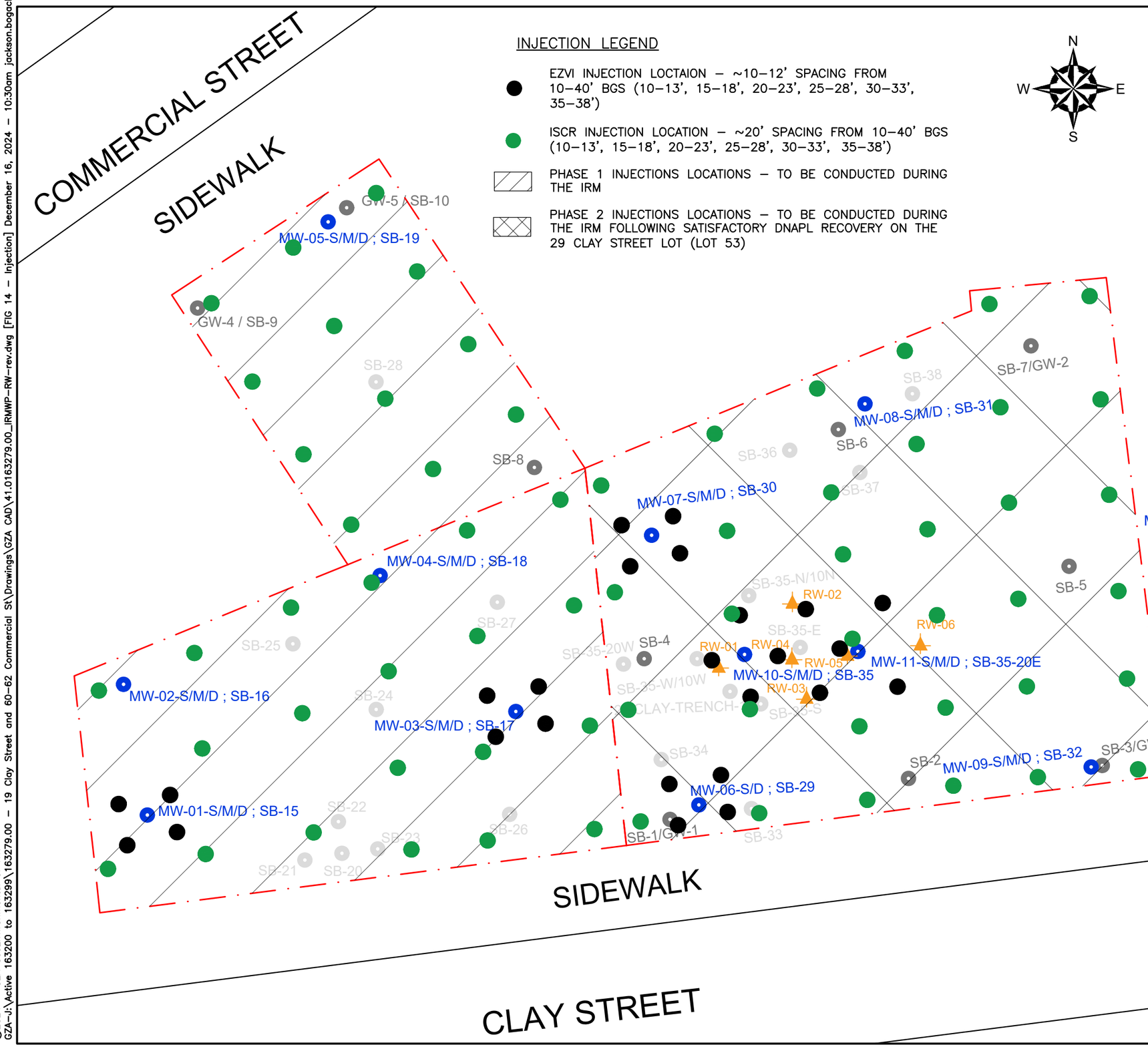
NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

PROPOSED RECOVERY WELL AND ADDITIONAL SOIL BORING LOCATION MAP

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		PREPARED FOR: CLAY PROPERTIES, LLC	
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 13
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1" = 20'	SHEET NO.
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	



INJECTION LEGEND

- EZVI INJECTION LOCTAION – ~10–12' SPACING FROM 10–40' BGS (10–13', 15–18', 20–23', 25–28', 30–33', 35–38')
- ISCR INJECTION LOCATION – ~20' SPACING FROM 10–40' BGS (10–13', 15–18', 20–23', 25–28', 30–33', 35–38')
- PHASE 1 INJECTIONS LOCATIONS – TO BE CONDUCTED DURING THE IRM
- PHASE 2 INJECTIONS LOCATIONS – TO BE CONDUCTED DURING THE IRM FOLLOWING SATISFACTORY DNAPL RECOVERY ON THE 29 CLAY STREET LOT (LOT 53)

GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.
4. INJECTION LOCATIONS MAY BE ADJUSTED BASED ON FINDINGS DURING THE RECOVERY WELL AND DNAPL DELINEATION BORING DRILLING. INJECTIONS LOCATIONS ARE BASED ON PROVECTUS INJECTION PLAN DATED DECEMBER 11, 2024
5. EZVI – EMULSIFIED ZERO VALENT IRON TO MANAGE SOURCE AND DISSOLVED PHASE CONTAMINANTS OF INTEREST; ISCR – IN–SITU CHEMICAL REDUCTION WITH PROVECT–IR® TO ADDRESS ELEVATE CHLORINATED VOLATILE ORGANIC CONCENTRATIONS IN GROUNDWATER

LEGEND

- APPROXIMATE SITE BOUNDARY
- SB-20 — APPROXIMATE SOIL SAMPLING LOCATION – 2024 NYSDEC RI
- MW-01-S/M/D SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI (S –SHALLOW, M – INTERMEDIATE, D – DEEP)
- APPROXIMATE REMEDIAL INVESTIGATION SOIL BORING OR SOIL BORING/MONITORING WELL LOCATION – 2023 NYCOER RI
- PROPOSED DNAPL RECOVERY WELL LOCATION

0 10 20 40
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

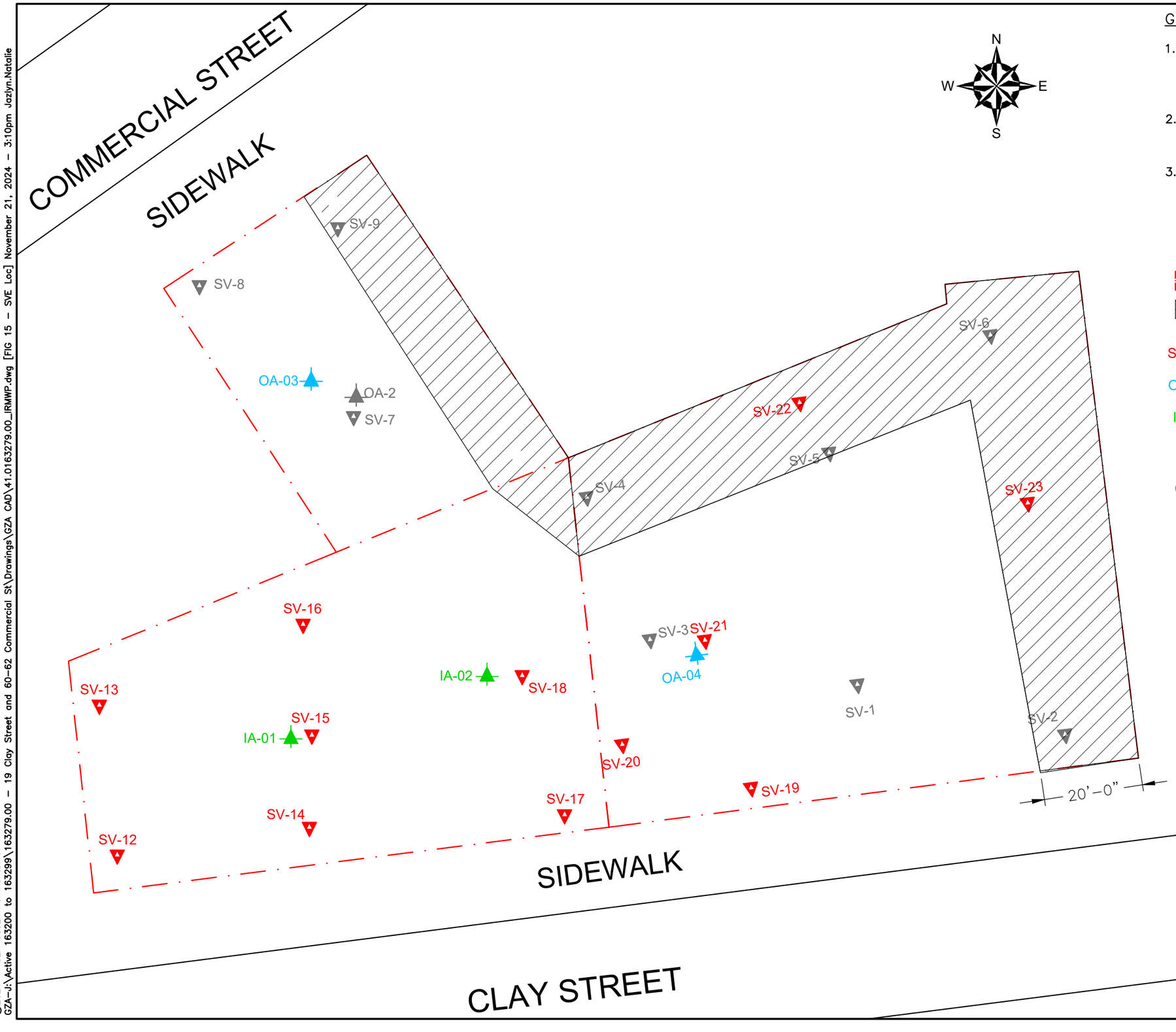
UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

PROPOSED IN-SITU INJECTION LOCATION PLAN

PREPARED BY:			PREPARED FOR:
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com			CLAY PROPERTIES, LLC
PROJ MGR: JB	REVIEWED BY: VW	CHECKED BY: SK	FIGURE 14
DESIGNED BY: JB	DRAWN BY: JB	SCALE: 1" = 20'	
DATE: DECEMBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00_IRMWP–RW–rev.dwg [FIG 14 – Injection] December 16, 2024 – 10:30am jackson.bogach



GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE PROPOSED SVE TREATMENT AREA
- SV-12 — APPROXIMATE SOIL VAPOR SAMPLING LOCATION – 2024 NYSDEC RI
- OA-03 — OUTDOOR AIR SAMPLING LOCATION – 2024 NYSDEC RI
- IA-01 — INDOOR AIR SAMPLING LOCATION – 2024 NYSDEC RI
- SV-4 — APPROXIMATE REMEDIAL INVESTIGATION SOIL VAPOR SAMPLING LOCATION – 2023 NYCOER RI
- OA-2 — APPROXIMATE REMEDIAL INVESTIGATION OUTDOOR AIR SAMPLING LOCATION – 2023 NYCOER RI

0 10 20 40
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

PROPOSED SOIL VAPOR EXTRACTION TREATMENT AREA MAP

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		PREPARED FOR: CLAY PROPERTIES, LLC	
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE 15
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1" = 20'	
DATE: OCTOBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00_IRMWP.dwg [FIG 15 – SVE Loc] November 21, 2024 – 3:10pm Jazlyn.Natalie

APPENDIX A

COMMUNITY AIR MONITORING PLAN

Known for excellence.
Built on trust.

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

GZA GeoEnvironmental of NY
104 West 29th Street
10th Floor
New York, NY 10001
T: 212.594.8140
F: 212.279.8180
www.gza.com

COMMUNITY AIR MONITORING PLAN

19-29 Clay Street and
60-62 Commercial Street
Brooklyn, New York
Block 2482, Lots 9, 10 and 53

November 2024
File No. 41.0163279.00 & 41.0163305.00

PREPARED FOR:
NYSDEC – Division of Environmental Remediation
625 Broadway | Albany, NY 12233

PREPARED BY:
GZA GeoEnvironmental of New York
104 West 29th Street | 10th Floor | New York, NY 10001
212-594-8140

www.gza.com

Copyright© 2024 GZA GeoEnvironmental of New York.

1.0 INTRODUCTION 1

1.1 SITE DESCRIPTION 1

1.2 OBJECTIVES 1

1.3 EXCAVATION AND DISPOSAL PROJECT TEAM 2

2.0 EXCAVATION AND DEMOLITION 2

2.1 ANTICIPATED SOIL CONDITIONS 2

2.2 ANTICIPATED SOIL VAPOR CONDITIONS 3

3.0 COMMUNITY AIR MONITORING PLAN 3

3.1 AIR MONITORING EQUIPMENT 4

3.2 VOLATILE ORGANIC COMPOUND MONITORING 4

3.3 PARTICULATE MONITORING 5

3.4 VOC AND PARTICULATE MONITORING AND REPONSE ACTIONS 6

3.5 AIR MONITORING PROCEDURES AND RECORDS 7

ATTACHMENTS

FIGURE A-1 COMMUNITY AIR MONITORING STATION PLAN

ATTACHMENT A-1 AIR MONITORING EQUIPMENT

ATTACHMENT A-2 AIR MONITORING FORMS

1.0 INTRODUCTION

GZA GeoEnvironmental of New York (GZA) was retained by Clay Properties, LLC (Client) to develop this Community Air Monitoring Plan (CAMP). The CAMP contains details for the design, implementation, and reporting of the air monitoring program for during remedial action activities for the renovation of the existing 10,200 square foot (s.f.) warehouse building and the construction of a new mixed-use building at the Site located at 19-29 Clay Street and 60-62 Commercial Street, Brooklyn, New York (the Site). The Interim Remedial Measure Workplan (IRMWP) includes the excavation the demolition of the existing warehouse building on Lot 9, NAPL gauging and recovery, groundwater injections for remediation of chlorinated solvents in soil and groundwater, and soil sampling for contained-in determination.

1.1 SITE DESCRIPTION

The Site is located at 19- 29 Clay Street and 60-62 Commercial Street, in the Greenpoint neighborhood of Brooklyn, New York. The Site is comprised of two New York City Tax Lots (Brooklyn: Block 2482 – Lots 9 and 10 (formerly Lot 9). The total area of the Site is 10,260 square feet (approximately 0.24 acre) in size. The Site is bounded by a one-story transportation facility to the north, two five-story residential multi-family buildings to the south along Clay Street, a site currently undergoing construction to the west, and a residential building to the east.

The Site is currently improved with one two-story unoccupied warehouse at 19 Clay Street, a vacant lot with a concrete foundation slab at 29 Clay Street, and a storage yard area located at 60-62 Commercial Street. The Site is gated to avoid any trespassers entering the premises. The storage yard area contains storage trailers located within the Site.

The proposed redevelopment plan includes the construction of a three-story residential development with frontage on both Clay Street and Commercial Street. The plans do not include a cellar, the construction will be a slab-on-grade structure.

1.2 OBJECTIVES

The principal purpose of the CAMP is to monitor air quality in the vicinity of work area during activities involving excavation and handling of soil. The CAMP consists of real-time air monitoring for particulate matter/dust and volatile organic compounds (VOCs), observations for visible emissions and odors, inspection and monitoring of the contractor's work practices, and associated recordkeeping. Continuous monitoring will be performed during all ground intrusive activities and loading out of excavated material conducted by a subcontractor as directed by the project General Contractor (GC).

Exceedances of action levels observed during performance of the CAMP included in the Daily Field Report.

Principal objectives of the program are as follows:

- Monitor dust as PM10 on a real-time or continuous basis such that dust associated with the soil excavation/handling is maintained below action levels.
- Monitor VOC vapors on a real-time or continuous basis such that vapors associated with the soil excavation/handling are maintained below action levels.

- Monitor for odors and visible emissions so that vapors and dust from the work area do not migrate beyond the Site perimeter.
- Notification of construction personnel in the event that dust, or VOC levels exceed action levels, so that all necessary corrective actions can be taken.

Any exceedances of CAMP action levels and corrective measures taken must be reported to New York State Department on Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) project managers, within 24 hours of occurring.

1.3 EXCAVATION AND DISPOSAL PROJECT TEAM

The GC will be the responsible party for transportation and disposal of contaminated soil. GZA will provide an environmental technician on site to perform the Community Air Monitoring during the remedial action activities. Contact information is summarized below:

Name	**Project Title/Assigned Role**	**Phone Numbers**
TBD	Site Supervisor	Work: Mobile:
TBD	General Contractor Project Manager	Work: Mobile:
Mark Hutson (GZA)	GZA Project Manager	Work: 646-929-8955 Mobile: 332-208-2260

2.0 EXCAVATION AND DEMOLITION

The CAMP addresses the proposed IRM excavation and demolition locations as shown in **Figure A-1**. In general, the GC will use standard excavation equipment such as a rubber-tired backhoe and/or a track-mounted excavator to remove soil from designated areas.

2.1 ANTICIPATED SOIL CONDITIONS

Soil conditions are summarized using information from a New York City Office of Environmental Remediation (NYCOER) Remedial Investigation (RI) conducted in February 2023 by Preferred Environmental Services (Preferred) and a New York State Department of Environmental Conservation (NYSDEC) RI conducted between August-September 2024 by GZA. The Site investigations indicated that a fill layer composed of sand and gravel, and construction and demolition debris (e.g., bricks, glass, concrete) to approximately 10-inches below ground surface. A native sand layer with varying levels of silt and gravel, in general, is below the historic fill layer. Beneath the native sand later is a silty sand stratum and a silty clay/clayey silt stratum that varies in thickness across the Site. Groundwater is approximately 8 to 12 feet below ground surface (ft bgs) across the Site. This CAMP only applies to IRM activities that include excavation and disposal of the historic fill and shallow native sand layer and demolition of the existing site building.

The VOCs TCE, PCE, acetone, 1,1,1-Trichloroethane, cis-1,2-dichloroethylene, ethyl benzene, methylene chloride, n-butylbenzene, n-proylbenzene, naphthalene, sec-butylbenzene, toluene, vinyl chloride, and xylenes exceeded the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectices (UUSCOs), Restricted-Residential Use Soil Cleanup Objectives (RRSCOs), and/or the Protection of Groundwater Soil Cleanup Objectives (PGWSCOs) in soil samples at the Site. Only TCE, PCE, methylene chloride, and acetone exceeded the respective SCOs in the shallow soil layer above the groundwater table. The shallow soil layer will be the only material encountered during this IRM.

The SVOCs benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo (a,h) anthracene, chrysene, indeno(1,2,3-cd)pyrene, and phenol were detected above the respective UUSCO, RRSCO, and/or PGWSCOs in shallow soil. The metals arsenic, barium, cadmium, copper, lead, manganese, nickel, selenium, zinc, and mercury were detected in shallow soils above the respective UUSCO, RRSCO, and/or PGWSCOs. Three pesticides, 4,4'-DDE, 4,4'-DDT, and dieldrin were detected in three samples, all on the Commercial Street property, at concentrations greater than the UUSCO, RRSCO, and/or PGWSCOs. Polychlorinated Biphenyls (PCBs) were detected in one sample location with the shallow sample exceeding the UUSCO, RRSCO, and PGWSCOs and deeper sample location exceeding the UUSCO only. Per- and Polyfluoroalkyl Substances (PFAS) were detected in shallow soil samples above the UUSCOs and PGWSCOs, primarily on the 19-27 Clay Street lot and in one location on the Commercial Street Lot.

2.2 ANTICIPATED SOIL VAPOR CONDITIONS

Several VOCs were detected in the soil vapor samples taken at the Site that exceeded the New York State Department of Health Air Guidance Values. The VOCs that exceeded the NYSDOH AGVs are as follows: trichloroethene (TCE), tetrachloroethene (PCE), 1,1,1-trichloroethane, 1,1-cis-dichloroethene, carbon tetrachloride, vinyl chloride, benzene, cyclohexane, n-heptane, and n-hexane.

3.0 COMMUNITY AIR MONITORING PLAN

This enhanced CAMP requires real-time monitoring for VOCs and particulates (i.e., dust) at the upwind, downwind, and an additional station within 20 feet of the occupied structure(s) perimeter of each designated work area when certain activities are in progress at the Site. 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 downwind receptors and residential receptors residing in the adjacent building(s)a from airborne contaminant releases as a direct result of excavation and related construction work. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shut down. Additionally, the CAMP helps to confirm that work activities do not spread contamination off-Site through the air. This CAMP program is designed for monitoring during work activities during a normal 8-hour construction day unless otherwise directed.

Ambient air monitoring shall be conducted at one upwind station,one downwind station, and one additional station within 20 feet of the occupied structure(s)of the excavation area at the property perimeter for fugitive dust emissions and organic vapors during all intrusive activities including, but not limited to, periods of excavation, placement of excavated materials in the storage piles, loading of the transporting vehicles, remediation system alterations, and any activities that generate dust. Each station will consist of air monitoring instrumentation mounted to a fixed tripod. In addition to the CAMP stations, there will be one GZA Technician performing as a

roving monitor utilizing hand-held instruments similar to the instruments used in the fixed station. The roving monitor will observe and monitor CAMP parameters along the perimeter of the Site and in the work zone, as well as monitor the real-time readings from the fixed stations. Continuous monitoring will be required during all ground intrusive activities and during the loading of non-hazardous excavated materials into trucks for off-Site disposal.

3.1 AIR MONITORING EQUIPMENT

Fixed air monitoring stations will be established in three locations (one upwind, one downwind, and an additional location) utilizing tripod-mounted, dedicated sampling instruments to monitor the air at the downwind Site property boundary and at an additional location monitoring the offsite mitigation near the adjacent residential building. **Figure A-1** is an air monitoring station plan showing typical wind direction and fixed air monitoring station locations. In addition to the fixed locations the roving monitor will move throughout the excavation areas.

The air monitoring equipment will be operated by trained and qualified personnel. Personnel who perform air-monitoring functions described in this section shall be experienced in the use of field air monitoring equipment, as well as the air monitoring procedures described below. There must also be appropriate staff for assessing the results of air monitoring and advising field personnel and the construction manager of air quality considerations.

All the monitoring equipment shall be calibrated on a daily basis in accordance with the manufacturer's operating instructions. A dedicated logbook for each monitoring unit will be maintained that details the date, time, pump rates, or other standard, and name of person performing calibration. **Attachment A-1** includes manufacturer's information regarding the air monitoring equipment.

3.2 VOLATILE ORGANIC COMPOUND MONITORING

Prior to the start of excavation, baseline air monitoring will be performed and recorded by dataloggers integrated with the MiniRae photoionization detector (PID) by hand-held PID by the roving air monitoring technician at 15-minute intervals. The air monitoring technician will also record the measurements in the field notebook.

Continuous monitoring during ground intrusive activities will be performed and recorded by dataloggers integrated with the MiniRae PID at the fixed stations, and by hand-held PID by the roving air monitoring technician. If the action levels are reached, text message and email alerts will automatically be sent to the GZA air monitoring technician. The GZA air monitoring technician will review any alert conditions and recommend the appropriate responses based on the decision matrix presented below.

The air monitoring technician will obtain discrete measurements from the instrument displays at fifteen-minute intervals (in the case of the PID, these will be instantaneous readings, and in the case of the particulate meter, these will be 15-minute, time-weighted average readings) and will record these measurements in the project field book. Using these measurements, average PID and airborne particle readings will be calculated at 15-minute intervals (by the machines datalogging) at the fixed air monitoring points located downwind of the ground intrusive activities while these activities are taking place. The 15-minute average readings will be recorded in the Air Monitoring Summary Sheet. Background/upwind measurements will also be obtained continuously during all ground-intrusive activities.

The air monitoring technician will review the discrete measurements collected by the instrument's datalogger at five-minute intervals (in the case of the PID, these will be instantaneous readings, and in the case of the particulate

meter, these will be 5-minute, time-weighted average readings). The air monitoring technician will download these measurements, tabulate the data, and present the data in daily field reports. The air monitoring work will be conducted using a PID calibrated daily. The PID values recorded will be compared to the action levels specified below:

- If the ambient air concentration of total VOCs at the downwind and additional station areas exceeds 5 parts per million (ppm) above the background for the 5-minute average, work activities must be temporarily halted and monitoring continued. If the total VOC level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total VOC levels at the downwind and additional station areas 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 the vapor identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total VOC level downwind and additional station areas of the work zone is below 5 ppm over background for the 5-minute average.

- If the VOC level is above 25 ppm at the perimeter of the work area, activities must be shut down and alternate suppression techniques may be used.

All 5-minute readings must be recorded and be available for review. Instantaneous readings, if any, used for decision purposes should also are recorded. Should readings be above 25 ppm, the Client will be notified of such conditions and a controlled investigation, excavation and disposal of such soils would be implemented as a contingency measure.

3.3 PARTICULATE MONITORING

Prior to the start of excavation, baseline particulate monitoring will be performed simultaneously with VOC monitoring and recorded by dataloggers integrated with the hand-held dust meter by the roving air monitoring technician at 15-minute intervals. The air monitoring technician will also record the measurements in the field notebook.

During ground intrusive activities, particulate levels will be monitored simultaneously with VOC monitoring and readings will be collected on a datalogger at the fixed stations, and instantaneously on the hand-held equipment used by the roving air monitoring technician. Upwind VOC and particulate concentrations will be measured before the initiation of ground intrusive activities, and in between periods when ground intrusive activities take place. The particulate air monitoring work will be conducted using an omni directional inlet airborne particulate monitor calibrated daily.

The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers (µm) 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 excess of the action level.

- Dust migration will be visually assessed during all work activities and may only continue/resume if no visible dust is migrating from the work area.

- If the downwind and additional station PM-10 particulate level is 100 micrograms per cubic meter (µg/m3) greater than the background (upwind perimeter) for a 15-minute period, or if airborne dust is observed leaving the work area, then spraying of water will be used as a dust suppression measure. Therefore, this equipment and materials for this measure will be available on Site at all times. Work may continue with dust suppression measures provided the downwind and additional station PM-10 particulate levels do not exceed 150 µg/m3 above the upwind level and no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind and additional station PM-10 particulate levels are greater than 150 µg/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 concentrations to within 150 µg/m3 of the upwind level and in preventing visible dust migration.

3.4 VOC AND PARTICULATE MONITORING AND REPONSE ACTIONS

The following table summarizes the CAMP and response action levels.

Parameter	**Monitoring Instrument**	**Response Levels (above background levels)**	**Actions**	**Conditions for Continuing Work Activities**
Total VOCs	PID	>5ppm but <25ppm	1. temporarily halt activity 2. continue monitoring	levels readily decrease below 5ppm above background levels
		Persistent levels between 5 and 25ppm	1. temporarily halt activity 2. identify vapor source 3. vapor abatement action 4. continue monitoring	levels exist below 5ppm above background levels in areas 200 ft from exclusion zone or half the distance to the nearest receptor (but no less than 20 ft)
		>25ppm	1. shut down activity 2. vapor mitigation and control action	to be determined
Particulates < 10 µm (PM-10)	Dust Meter	Fugitive dust migration	1. implement dust suppression techniques	dust suppression techniques are in place
		>100µg/m3 but <150µg/m3	1. implement dust suppression techniques	levels must not exceed 150 µg/m3 with dust suppression techniques in place
		>150 µg/m3	1. halt activity 2. re-evaluate activities	levels decrease below 150 µg/m3 and fugitive dust migration is prevented

The Client will be responsible for implementing dust and VOC controls based on the air monitoring results and required Action Levels described above. Control of dust and VOCs during excavation work or other soil disturbance activities will consist of the Client implementing one or more of the following methods or measures:

- Wetting equipment, excavation areas, and soil stockpiles (when not covered by tarps);
- Spraying water on buckets during excavation and dumping;
- Restricting vehicle speeds on unpaved areas; and
- Covering or backfilling excavated areas and materials after excavation activity ceases

3.5 AIR MONITORING PROCEDURES AND RECORDS

All records and forms associated with air monitoring for this project will be maintained on site until all ground-intrusive activities are complete to allow audit of the project by the NYCDEC and the GC. **Attachment A-2** includes typical air monitoring forms that GZA personnel will utilize (or their equivalent) during the CAMP. These include:

- Daily Instrument Calibration Log;
- Daily excel spreadsheets of the downloaded datalogger files; and
- Air Monitoring Summary Sheet of alerts and corrective actions.

These forms, when completed, will become part of the project file. The qualified safety officer or technician will ensure that all air-monitoring data is logged in a dedicated project binder. Documentation shall be made clear, concise and provide the data, time of entry, location, personnel, weather conditions, and background concentrations for each morning station. Documentation will also include all observational data that has potential for impacting results such as potential off-site interferences, damage to instruments, site equipment problems or weather-related interferences.

All pages will be numbered and recorded in ink. The last entry page for the shift or day that has blank space left at the bottom shall have a line drawn diagonally across it and signed at the bottom of the page. All corrections must be made with a single line, initialed, and dated. The weather data shall be recorded on a daily basis while work is progressing and documented in the dedicated field log.

Real time data (e.g., PM10) will be downloaded from the data loggers at the end of each day. The downloaded data will be electronically transmitted to the Client on a daily basis. Fifteen-minute averages from each station and instantaneous readings, if any, used for decision purposes will be recorded. Daily plots of real-time data can be generated, if requested.

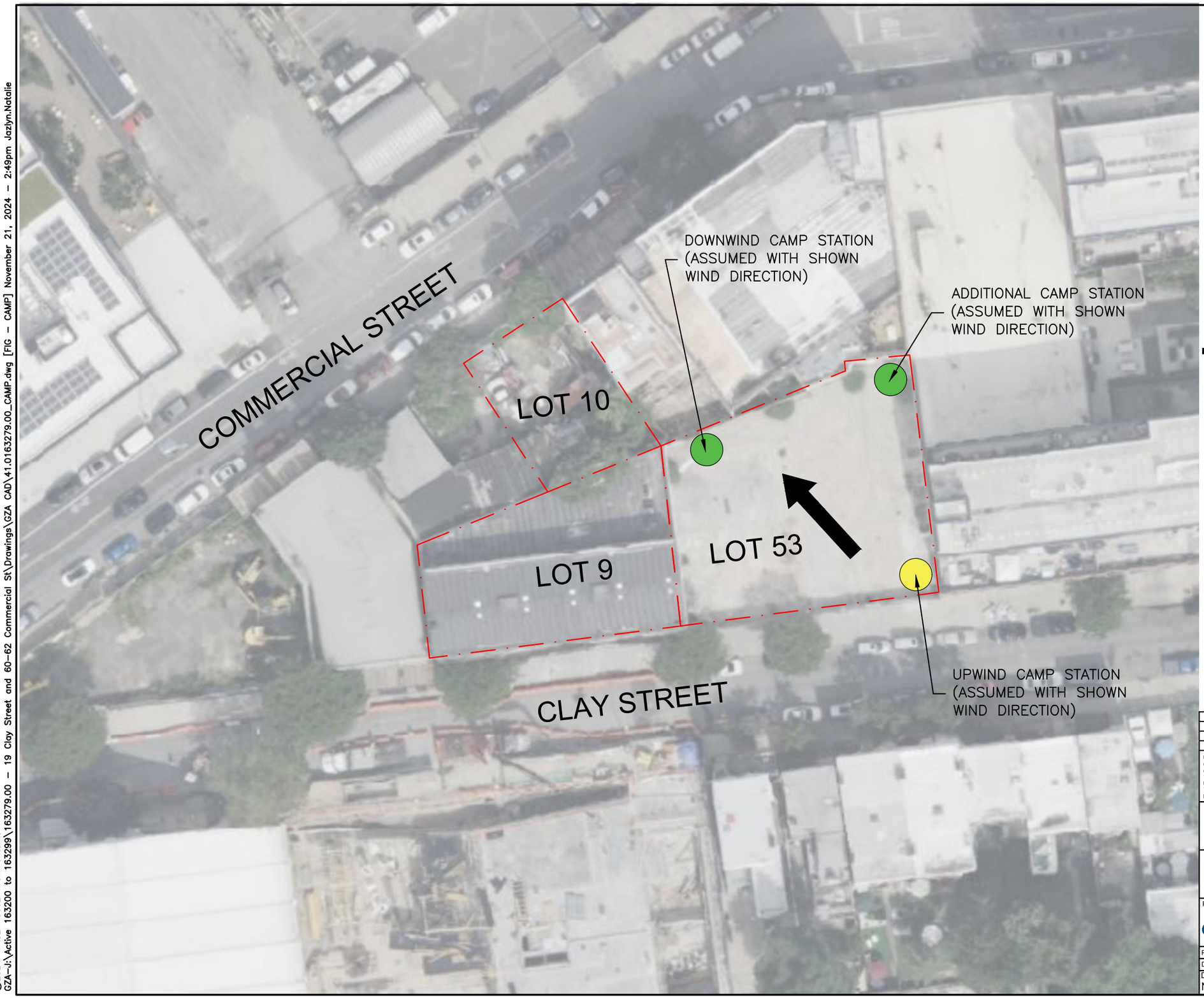
The on-site representatives from the Client will be notified promptly of any exceedance of an Action Level and of the corrective actions taken in connection with the exceedance.

In addition, CAMP exceedances will be included Daily Reports with CAMP data summary tables, to be sent daily to NYSDEC.

Any exceedances of CAMP action levels and corrective measures taken must be reported to New York State Department on Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) project managers, within 24 hours of occurring.

CAMP air monitoring results and records will be maintained by the contractor for a minimum period of 5 years following completion of the project and made available to the officials of the NYCDEP, upon request.

FIGURES



GENERAL NOTES

1. AERIAL IMAGERY DEVELOPED FROM (C) MICROSOFT CORPORATION (C) 2023 MAXAR (C) CNES (2023) DISTRIBUTION AIRBUS DS.
2. BASE MAP ADAPTED FROM DRAWING TITLED "FIGURE 2 – AERIAL PHOTOGRAPH", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 50', DATED FEBRUARY 2024.

LEGEND

- APPROXIMATE SITE BOUNDARY
- DOWNWIND CAMP STATION
- UPWIND CAMP STATION
- ASSUMED WIND DIRECTION

N

0 20 40 80

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL ST
BROOKLYN, NY 11222

COMMUNITY AIR MONITORING PLAN

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		CLAY PROPERTIES, LLC	
PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIG
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1" = 40'	A-1
DATE: NOVEMBER 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00_CAMP.dwg [FIG – CAMP] November 21, 2024 – 2:49pm Jazlyn.Natalie

ATTACHMENT A-1

MiniRAE 3000
User's Guide

RAE SYSTEMS by Honeywell

Rev. F
February 2016
P/N 059-4020-000

FCC Information

Contains FCC ID: PI4411B or SU3RM900

The enclosed device complies with part 15 of the FCC rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Wireless Approval For UAE In Middle East

TRA REGISTERED No: ER36153/14 or ER36153/15
DEALER No.: HONEYWELL INTERNATIONAL MIDDLE EAST – LTD – DUBAI BR

Wireless Approval For QATAR In Middle East

ictQATAR
Type Approval Reg. No.: R-4466 or R-4635

© Copyright 2016 RAE Systems by Honeywell

Contents

Read Before Operating 6
Special Notes 7
Warnings 8
Standard Contents 10
General Information 10
Physical Description 12
Specifications 12
Charging The Battery 16
Charging A Spare Rechargeable Battery 17
Low Voltage Warning 18
Clock Battery 18
Data Protection While Power Is Off 18
User Interface 19
Display 21
Operating The Instrument 22
Turning The Instrument On 22
Turning The Instrument Off 23
Operating The Built-In Flashlight 23
Pump Status 23
Calibration Status 24
Operating Modes 29
Basic User Level/Hygiene Mode (Default Settings) 30
Alarm Signals 32
Alarm Signal Summary 33
Preset Alarm Limits & Calibration 34
Testing The Alarm 34
Integrated Sampling Pump 34
Backlight 35
Datalogging 35
Datalogging event 35
Datalogging sample 35
Auto/Manual/Snapshot Datalogging 36
Standard Kit & Accessories 37
AC Adapter (Battery Charger) 37
Alkaline Battery Adapter 38
External Filter 39

Optional Accessories 40
Calibration Adapter 40
Calibration Regulator 40
Organic Vapor Zeroing Kit 40
Standard Two-Point Calibration (Zero & Span) 41
Entering Calibration 42
Zero (Fresh Air) Calibration 44
Span Calibration 46
Exiting Two-Point Calibration In Basic User Level 48
Three-Point Calibration 49
Span 2 Calibration 50
Exiting Three-Point Calibration 53
Bump Test 48
Programming Mode 53
Entering Programming Mode 54
Programming Mode Menus 56
Zero Calibration 57
Meas. Gas 57
High Alarm 57
Clear Datalog 57
Radio 57
Power 57
Span Calibration 57
Meas. Unit 57
Low Alarm 57
Interval 57
Op Mode 57
Bump 57
STEL Alarm 57
Data Selection 57
Site ID 57
TWA Alarm 57
Datalog Type 57
User ID 57
Alarm Mode 57
User Mode 57
Buzzer & Light 57
Date 57
Time 57

Pump Duty Cycle 57
Pump Speed 57
Temperature Unit 57
Language 57
Real Time Protocol 57
Power On Zero 57
Unit ID 57
LCD Contrast 57
Lamp ID 57
PAN ID 57
Mesh Channel 57
Mesh Interval 57
Exiting Programming Mode 58
Navigating Programming Mode Menus 58
Calibration 59
  Zero Calibration 59
  Span Calibration 59
  Bump 59
Measurement 60
  Meas. Gas 60
  Meas. Unit 61
Alarm Setting 62
  High Alarm 63
  Low Alarm 63
  STEL Alarm 64
  TWA Alarm 65
  Alarm Type 66
  Buzzer & Light 67
Datalog 67
  Interval 68
  Data Selection 69
  Datalog Type 70
  Manual Datalog 70
  Snapshot Datalog 71
Monitor Setup 72
  Radio Power 72
  Op Mode 73
Hygiene 73
Search 73

Site ID 73
User ID 74
User Mode 74
Date 75
Time 76
Pump Duty Cycle 76
Pump Speed 77
Temperature Unit 77
Language 78
Real Time Protocol 78
Power On Zero 79
Unit ID 79
LCD Contrast 80
Lamp ID 80
PAN ID 80
Mesh Channel 81
Mesh Interval 81
Hygiene Mode 82
Advanced User Level (Hygiene Mode Or Search Mode) 86
Advanced User Level & Hygiene Mode 86
Basic User Level & Search Mode 88
Advanced User Level & Search Mode 89
Diagnostic Mode 90
Entering Diagnostic Mode 91
Adjusting The Pump Stall Threshold 92
Pump High 92
Pump Low 92
Exiting Diagnostic Mode 93
Transferring Data To & From A Computer 94
Downloading The Datalog To A PC 94
Connection. 94
Uploading Firmware To The instrument From A PC 95
Maintenance 96
Battery Charging & Replacement 96
Replacing The Li-ion Battery 97
Replacing The Alkaline Battery Adapter 97
PID Sensor & Lamp Cleaning/Replacement 99
Sensor Components 99
Cleaning The Lamp Housing Or Changing The Lamp 100

Determining The Lamp Type 101
Sampling Pump 102
Cleaning The Instrument 102
Ordering Replacement Parts 102
Special Servicing Note 103
Troubleshooting 104
Technical Support 105
RAE Systems Contacts 106
Controlled Part of Manual 107
Basic Operation 107
Turning The Instrument On 107
Turning The Instrument Off 107
Alarm Signals 108
Alarm Signal Summary 108
Preset Alarm Limits & Calibration 109
Charging The Battery 110
Low Voltage Warning 111
Clock Battery 111
Replacing Rechargeable Li-Ion or NiMH Battery 112
Alkaline Battery Adapter 112
Troubleshooting 113

Read Before Operating

This manual must be carefully read by all individuals who have or will have the responsibility of using, maintaining, or servicing this product. The product will perform as designed only if it is used, maintained, and serviced in accordance with the manufacturer's instructions. The user should understand how to set the correct parameters and interpret the obtained results.

CAUTION!

To reduce the risk of electric shock, turn the power off before removing the instrument cover. Disconnect the battery before removing sensor module for service. Never operate the instrument when the cover is removed. Remove instrument cover and sensor module only in an area known to be non-hazardous.

Special Notes

When the instrument is taken out of the transport case and turned on for the first time, there may be some residual organic or inorganic vapor trapped inside the detector chamber. The initial PID sensor reading may indicate a few ppm. Enter an area known to be free of any organic vapor and turn on the instrument. After running for several minutes, the residual vapor in the detector chamber will be cleared and the reading should return to zero.

The battery of the instrument discharges slowly even if it is turned off. If the instrument has not been charged for 5 to 7 days, the battery voltage will be low. Therefore, it is a good practice to always charge the instrument before using it. It is also recommended to fully charge the instrument for *at least 10 hours* before first use. Refer to this User Guide's section on battery charging for more information on battery charging and replacement.

WARNINGS

STATIC HAZARD: Clean only with damp cloth.

For safety reasons, this equipment must be operated and serviced by qualified personnel only. Read and understand instruction manual completely before operating or servicing.

Use only RAE Systems battery packs, part numbers 059-3051-000, 059-3052-000, and 059-3054-000. This instrument has not been tested in an explosive gas/air atmosphere having an oxygen concentration greater than 21%. Substitution of components may impair intrinsic safety. Recharge batteries only in non-hazardous locations.

Do not mix old and new batteries or batteries from different manufacturers.

The calibration of all newly purchased RAE Systems instruments should be tested by exposing the sensor(s) to known concentration calibration gas before the instrument is put into service.

For maximum safety, the accuracy of the instrument should be checked by exposing it to a known concentration calibration gas before each day's use.

Do not use USB/PC communication in hazardous locations.

AVERTISSEMENT

DANGER RISQUE D'ORIGINE ELECTROSTATIQUE: Nettoyer uniquement avec un chiffon humide.

Pour des raisons de sécurité, cet équipment doit être utilisé, entretenu et réparé uniquement par un personnel qualifié. Étudier le manuel d'instructions en entier avant d'utiliser, d'entretenir ou de réparer l'équipement.

Utiliser seulement l'ensemble de batterie RAE Systems, la reference 059-3051-000 au 059-3052-000 au 059-3054-000. Cet instrument n'a pas été essayé dans une atmosphère de gaz/air explosive ayant une concentration d'oxygène plus élevée que 21%. La substitution de composants peut compromettre la sécurité intrinsique. Ne charger les batteries que dans emplacements désignés non-dangereuse.

Ne pas melanger les anciennes et les nouvelles batteries, ou bien encore les batteries de differents fabriquants.

La calibration de toute instruments de RAE Systems doivent être testé en exposant l'instrument a une concentration de gaz connue par une procédure diétalonnage avant de mettre en service l'instrument pour la première fois.

Pour une securite maximale, la sensibilité du l'instrument doit être verifier en exposant l'instrument a une concentration de gaz connue par une procédure diétalonnage avant chaque utilisation journalière.

Ne pas utiliser de connection USB/PC en zone dangereuse.

Standard Contents

Instrument
Calibration Kit
Charging Cradle
AC/DC Adapter
Alkaline Battery Adapter
Data Cable
CD-ROM With User's Guide, Quick Start Guide, and related materials

General Information

The compact instrument is designed as a broadband VOC gas monitor and datalogger for work in hazardous environments. It monitors Volatile Organic Compounds (VOC) using a photoionization detector (PID) with a 9.8 eV, 10.6 eV, or 11.7 eV gas-discharge lamp. Features are:

Lightweight and Compact

- Compact, lightweight, rugged design
- Built-in sample draw pump

Dependable and Accurate

- Up to 16 hours of continuous monitoring with rechargeable battery pack
- Designed to continuously monitor VOC vapor at parts-per-million (ppm) levels

User-friendly

- Preset alarm thresholds for STEL, TWA, low- and high-level peak values.
- Audio buzzer and flashing LED display are activated when the limits are exceeded.

Datalogging Capabilities

- 260,000-point datalogging storage capacity for data download to PC

The instrument consists of a PID with associated microcomputer and electronic circuit. The unit is housed in a rugged case with a backlit LCD and 3 keys to provide easy user interface. It also has a built-in flashlight for operational ease in dark locations.

Physical Description

The main components of the portable VOC monitoring instrument include:

- Three keys for user to interact with the instrument: 3 operation/programming keys for normal operation or programming
- LCD display with back light for direct readout and calculated measurements
- Built-in flashlight for illuminating testing points in dark environments
- Buzzer and red LEDs for alarm signaling whenever exposures exceed preset limits
- Charge contacts for plugging directly to its charging station
- Gas entry and exit ports
- USB communication port for PC interface
- Protective rubber cover

Specifications

Size:	9.25" L x 3.6" W x 2.9" H
Weight:	28 oz with battery pack
Detector:	Photoionization sensor with 9.8, 10.6, or 11.7 eV UV lamp
Battery:	A 3.7V rechargeable Lithium-Ion battery pack (snap in, field replaceable, at non-hazardous location only)
	Alkaline battery holder (for 4 AA batteries)
Battery Charging:	Less than 8 hours to full charge
Operating Hours:	Up to16 hours continuous operation
Display:	Large dot matrix screen with backlight

Measurement range & resolution

Lamp	Range	Resolution
10.6 eV	0.1 ppm to 15,000 ppm	0.1 ppm
9.8 eV	0.1 ppm to 5,000 ppm	0.1 ppm
11.7 eV	0.1 ppm to 2,000 ppm	0.1 ppm

Response time (T_{90}): 2 seconds

Accuracy (Isobutylene): 10 to 2000 ppm: ±3% at calibration point.

PID Detector: Easy access to lamp and sensor for cleaning and replacement

Correction Factors: Over 200 VOC gases built in (based on RAE Systems Technical Note TN-106)

Calibration: Two-point field calibration of zero and standard reference gases

Calibration Reference: Store up to 8 sets of calibration data, alarm limits and span values

Inlet Probe: Flexible 5" tubing

Radio module: Bluetooth (2.4GHz) or RF module (433MHz, 868MHz , 915MHz, or 2.4GHz)

Keypad: 1 operation key and 2 programming keys; 1 flashlight switch

Direct Readout: Instantaneous, average, STEL, TWA and peak value, and battery voltage

Intrinsic Safety: US and Canada: Class I, Division 1, Groups A, B, C, D

Europe: ATEX (0575 Ex II 2G Ex ia IIC/IIB T4 Gb)
KEMA 07 ATEX 0127
Complies with EN60079-0:2009, EN60079-11:2007

	IECEx CSA 10.0005 Ex ia IIC/IIB T4 Gb Complies with IEC 60079-0:2007, IEC 60079-11:2006 (IIC: 059-3051-000 Li-ion bat pack or 059-3054-000 NiMH bat pack; IIB: 059-3052-000 alkaline bat pack)
EM Interference:	Highly resistant to EMI/RFI. Compliant with EMC R&TTE (RF Modules)
Alarm Setting:	Separate alarm limit settings for Low, High, STEL and TWA alarm
Operating Mode:	Hygiene or Search mode
Alarm:	Buzzer 95dB at 30cm and flashing red LEDs to indicate exceeded preset limits, low battery voltage, or sensor failure
Alarm Type:	Latching or automatic reset
Real-time Clock:	Automatic date and time stamps on datalogged information
Datalogging:	260,000 points with time stamp, serial number, user ID, site ID, etc.
Communication:	Upload data to PC and download instrument setup from PC via USB on charging station.
Sampling Pump:	Internally integrated. Flow rate: 450 to 550 cc/min.
Wireless Network:	Mesh RAE Systems Dedicated Wireless Network (or WiFi network for WiFi-equipped instruments)
Wireless Frequency:	ISM license-free band, 902 to 907.5 MHz and 915 to 928 MHz, FCC Part 15, CE R&TTE, IEEE 802.11 b/g bands (2.4 GHz)
Modulation:	802.15.4 DSSS BPSK
RF Power (Tx):	10dBm
Temperature:	-20º C to 50º C (-4º to 122º F)

Humidity:	0% to 95% relative humidity (non-condensing)
Housing (including rubber boot):	Polycarbonate, splashproof and dustproof Battery can be changed without removing rubber boot.

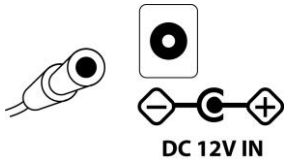
Charging The Battery

Always fully charge the battery before using the instrument. The instrument's Li-ion battery is charged by placing the instrument in its cradle. (The battery can also be charged by placing the instrument in an AutoRAE 2 Cradle.) Contacts on the bottom of the instrument meet the cradle's contacts, transferring power without other connections.

Note: Before setting the instrument into its charging cradle, visually inspect the contacts to make sure they are clean. If they are not, wipe them with a soft cloth. Do not use solvents or cleaners.

Follow this procedure to charge the instrument:

1. Plug the AC/DC adapter's barrel connector into the instrument's cradle.



2. Plug the AC/DC adapter into the wall outlet.
3. Place the instrument into the cradle, press down, and lean it back. It locks in place and the LED in the cradle glow

The instrument begins charging automatically. The "Primary" LED in the cradle blinks green to indicate charging. During charging, the diagonal lines in the battery icon on the instrument's display are animated and you see the message "Charging..."

When the instrument's battery is fully charged, the battery icon is no longer animated and shows a full battery. The message "Fully charged!" is shown. The cradle's LED glows continuously green.

Note: If you see the "Battery Charging Error" icon (a battery outline with an exclamation mark inside), check that the

instrument or rechargeable battery has been set into the cradle properly. If you still receive the message, check the Troubleshooting section of this guide.

Note: If the instrument or battery has been in the cradle for more than 10 hours and you see the "Battery Charging Error" icon and a message that says, "Charging Too Long," this indicates that the battery is not reaching a full charge. Try changing the battery and make sure the contacts between the instrument (or battery) are meeting the cradle. If the message is still shown, consult your distributor or RAE Systems Technical Services.

Charging A Spare Rechargeable Battery

A rechargeable Li-ion battery can be charged when it is not inside the monitor. The charging cradle is designed to accommodate both types of charging. Contacts on the bottom of the battery meet the contacts on the cradle, transferring power without other connections, and a spring-loaded capture holds the battery in place during charging.

1. Plug the AC/DC adapter into the monitor's cradle.
2. Place the battery into the cradle, with the gold-plated contacts on top of the six matching charging pins.
3. Plug the AC/DC adapter into the wall outlet.

The battery begins charging automatically. During charging, the Secondary LED in the cradle blinks green. When charging is complete, it glows steady green.

Release the battery from the cradle by pulling it back toward the rear of the cradle and tilting it out of its slot.

Note: If you need to replace the Li-ion battery pack, replacements are available from RAE Systems. The part number is 059-3051-000.

Note: An Alkaline Battery Adapter (part number 059-3052-000), which uses four AA alkaline batteries (Duracell MN1500), may be substituted for the Li-Ion battery.

WARNING!

To reduce the risk of ignition of hazardous atmospheres, recharge and replace batteries only in areas known to be non-hazardous. **Remove and replace batteries only in areas known to be non-hazardous.**

Low Voltage Warning

When the battery's charge falls below a preset voltage, the instrument warns you by beeping once and flashing once every minute, and the "empty battery" icon blinks on and off once per second. You should turn off the instrument within 10 minutes and either recharge the battery by placing the instrument in its cradle, or replace the battery with a fresh one with a full charge.

Clock Battery

An internal clock battery is mounted on one of the instrument's printed circuit boards. This long-life battery keeps settings in memory from being lost whenever the Li-ion battery or alkaline batteries are removed. This backup battery should last approximately five years, and must be replaced by an authorized RAE Systems service technician. It is not user-replaceable.

Data Protection While Power Is Off

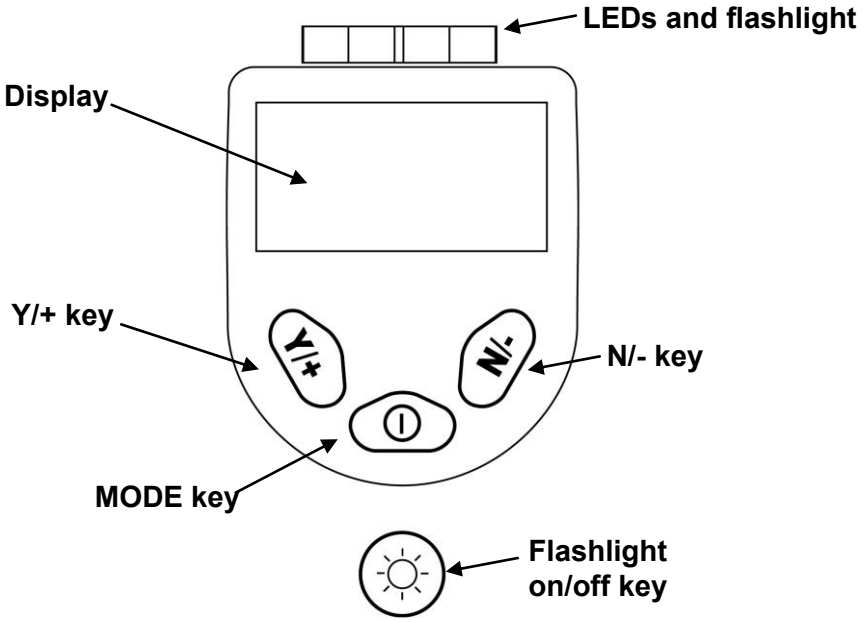
When the instrument is turned off, all the current real-time data including last measured values are erased. However, the datalog data is preserved in non-volatile memory. Even if the battery is disconnected, the datalog data will not be lost.

User Interface

The instrument's user interface consists of the display, LEDs, an alarm transducer, and four keys. The keys are:

Y/+
MODE
N/-
Flashlight on/off

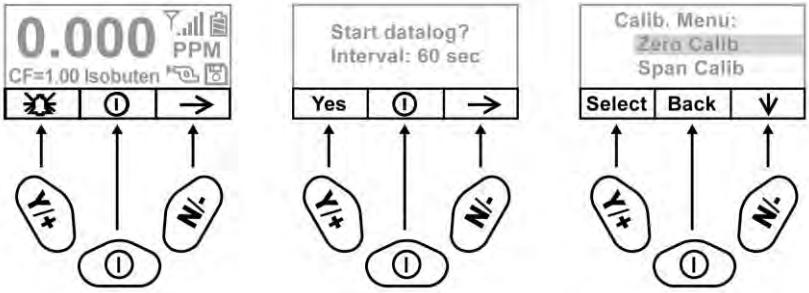
The LCD display provides visual feedback that includes the reading, time, battery condition, and other functions.



In addition to their labeled functions, the keys labeled Y/+, MODE, and N/- act as "soft keys" that control different parameters and make different selections within the instrument's menus. From menu to menu, each key controls a different parameter or makes a different selection.

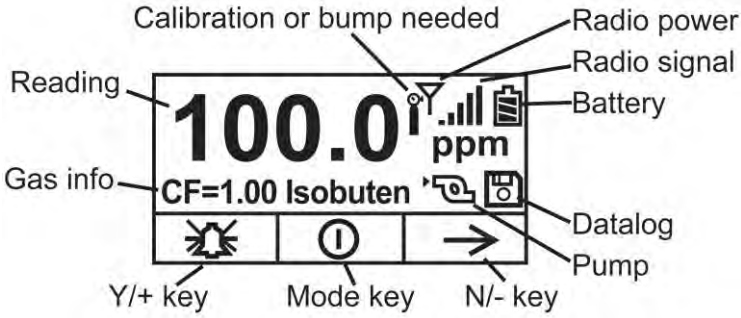
Three panes along the bottom of the display are "mapped" to the keys. These change as menus change, but at all times the left pane corresponds to the [Y/+] key, the center pane corresponds to the [MODE] key, and the right pane corresponds to the [N/-] key. Here are three examples of different menus with the relationships of the keys clearly shown:

RELATIONSHIP OF BUTTONS TO CONTROL FUNCTIONS



Display

The display shows the following information:



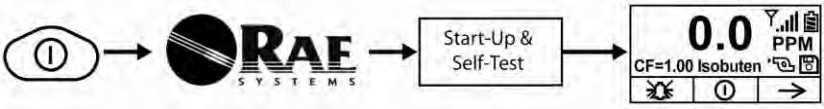
Gas info	Tells the Correction Factor and type of calibration gas
Reading	Concentration of gas as measured by the instrument
Calibration or bump needed	Dark icon indicates that calibration should be performed; light icon indicates bump should be performed
Radio power	Indicates whether radio (Mesh wireless or Bluetooth) connection is on or off
Radio signal	Indicates signal strength in 5-bar bargraph
Battery	Indicates battery level in 3 bars
Pump	Indicates that pump is working
Datalog	Indicates whether datalog is on or off
Y/+	Y/+ key's function for this screen
MODE	MODE key's function for this screen
N/-	N/- key's function for this screen

Operating The Instrument

The instrument is designed as a broadband VOC gas monitor and datalogger for work in hazardous environments. It gives real-time measurements and activates alarm signals whenever the exposure exceeds preset limits. Prior to factory shipment, the instrument is preset with default alarm limits and the sensor is pre-calibrated with standard calibration gas. However, you should test the instrument and verify the calibration before the first use. After the instrument is fully charged and calibrated, it is ready for immediate operation.

Turning The Instrument On

1. With the instrument turned off, press and hold [MODE].
2. When the display turns on, release the [MODE] key.



The RAE Systems logo should appear first. (If the logo does not appear, there is likely a problem and you should contact your distributor or RAE Systems Technical Support.) The instrument is now operating and performs self tests. If any tests (including sensor and memory tests fail), refer to the Troubleshooting section of this guide.

Once the startup procedure is complete, the instrument shows a numerical reading screen with icons. This indicates that the instrument is fully functional and ready to use.

Turning The Instrument Off

1. Press and hold the Mode key for 3 seconds. A 5-second countdown to shutoff begins.
2. Once the countdown stops, the instrument is off. Release the Mode key.
3. When you see "Unit off..." release your finger from the [MODE] key. The instrument is now off.

Note: You must hold your finger on the key for the entire shutoff process. If you remove your finger from the key during the countdown, the shutoff operation is canceled and the instrument continues normal operation.

Operating The Built-In Flashlight

The instrument has a built-in flashlight that helps you point the probe in dark places. Press the flashlight key to turn it on. Press it again to turn it off.

Note: Using the flashlight for extended periods shortens the battery's operating time before it needs recharging.

Pump Status

IMPORTANT!

During operation, make sure the probe inlet and the gas outlet are free of obstructions. Obstructions can cause premature wear on the pump, false readings, or pump stalling. During normal operation, the pump icon alternately shows inflow and outflow as shown here:

During duty cycling (PID lamp cleaning), the display shows these icons in alternation:

If there is a pump failure or obstruction that disrupts the pump, you will see this icon blinking on and off:

If you see this blinking icon, consult the Troubleshooting section of this guide.

Calibration Status

The instrument displays this icon if it requires calibration:

Calibration is required (and indicated by this icon) if:

- The lamp type has been changed (for example, from 10.6 eV to 9.8 eV).
- The sensor has been replaced.
- It has been 30 days or more since the instrument was last calibrated.
- If you have changed the calibration gas type without recalibrating the instrument.

Bump Status

The instrument displays this icon if it requires a bump test:

A bump test is required (and indicated by this icon) if:

- The defined period of time between bump tests has been exceeded (bump test overdue).
- The sensor has failed a previous bump test.
- The sensor(s) should be challenged on a periodic basis.

Policy Enforcement

The MiniRAE 3000 can be configured to enforce a facility/company's requirements that calibration and/or bump testing be performed at specified intervals, and to explicitly prompt the user that calibration/bump testing is required. Depending on how Policy Enforcement features are configured, the user may be required to perform a bump test or calibration prior to being able to use the instrument. That is, it can be set to not allow normal operation of the instrument unless calibration or bump testing is performed.

If the instrument has been bump tested and calibrated in compliance with the policy settings, a check-mark icon is included along the top of the MiniRAE 3000 screen:

If Policy Enforcement is enabled, then after startup the MiniRAE 3000 displays a screen that informs the user that the instrument requires either a bump test or a calibration. If both are required, then they are shown in sequence.

Note: Policy enforcement features are disabled by default.

Setting Policy Enforcement

You must use ProRAE Studio II to make changes to Policy Enforcement settings. You must use an AutoRAE 2 Cradle, a MiniRAE 3000 Travel Charger, or a MiniRAE 3000 Desktop Cradle. Policy violations are captured in the datalog.

Using The Travel Charger, Desktop Charger, or AutoRAE 2 Automatic Test And Calibration System

To program a MiniRAE 3000 via an AutoRAE 2, you need ProRAE Studio II Instrument Configuration and Data Management Software, the AutoRAE 2 connected to a power source, and a USB PC communications cable.

1. Connect a USB cable between a PC with ProRAE Studio II and the AutoRAE 2 Cradle, Travel Charger, or Desktop Cradle.
2. Apply power to the AutoRAE 2 Cradle, Travel Charger, or Desktop Cradle.
3. Turn off the MiniRAE 3000 (or put the MiniRAE 3000 into AutoRAE 2 Mode or Communication Mode) and set it in the cradle.
4. Start ProRAE Studio II software on the PC.
5. Select "Administrator" and input the password (the default is "rae").
6. Click "Detect the instruments automatically" (the magnifying glass icon with the letter "A" in it). After a few seconds, the AutoRAE 2 Cradle is found and it is shown, along with its serial number.
7. Click on the icon to highlight it, and then click "Select."
8. In ProRAE Studio II, the instrument or AutoRAE 2 Cradle is shown, including its Serial Number, under "Online."
9. Expand the view to show the instrument or to show the instrument in the AutoRAE 2 Cradle by clicking the "+" to the left of the image of the AutoRAE 2 Cradle.
10. Double-click on the icon representing the MiniRAE 3000.
11. Click "Setup."
12. In the menu that now appears on the left side, click "Policy Enforcement." It is highlighted, and the Policy Enforcement pane is shown. For "Must Calibrate" and "Must Bump," you have the options of no enforcement or enforcement (including "Can't Bypass," and "Can Bypass").

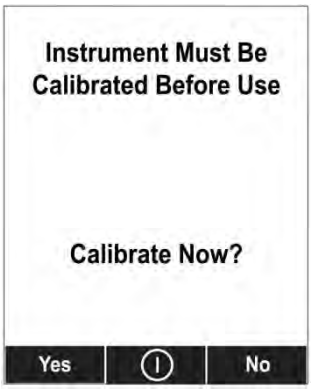
Must Calibrate. The user is prompted to calibrate the instrument when calibration is due (as set by the calibration interval). There are two programmable options:

- **Can't Bypass.** Unless calibration is performed, the instrument cannot be used, and the only option is to turn off the instrument.
- **Can Bypass.** If calibration is due but the user does not want to perform a calibration, the instrument can still be used. In this case, the instrument records that the user has bypassed the calibration requirement in a Policy Violation report.

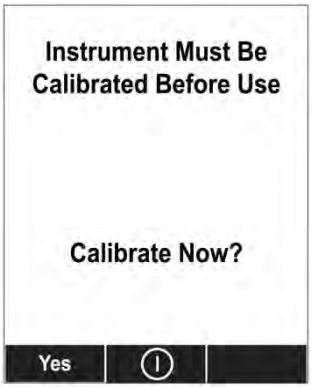
Must Bump. The user is prompted to bump test the instrument when a bump test is due (as set by the bump test interval). There are two programmable options:

- **Can't Bypass.** Unless a bump test is performed, the instrument cannot be used, and the only option is to turn off the instrument.
- **Can Bypass.** If a bump test is due but the user does not want to perform one, the instrument can still be used. In this case, the instrument records that the user has bypassed the bump testing requirement in a Policy Violation report.

These are the screens that are shown on a MiniRAE 3000 after startup if "Can Bypass" is selected:



If "Can't Bypass" is selected, the display looks like this, and only allows the options of performing the test or shutting down:



16. Once you have made your selections in ProRAE Studio II, you must upload the changes to the instrument. Click the icon labeled "Upload all settings to the instrument."

17. A confirmation screen is shown. Click "Yes" to perform the upload, or "No" to abort.
    Uploading takes a few seconds, and a progress bar is shown. You can abort the upload by clicking "Cancel."

18. Exit ProRAE Studio II.

19. Press [Y/+] on the MiniRAE 3000 to exit Communication Mode.

Operating Modes

Your instrument operates in different modes, depending on the model and its factory default settings. In some cases, you can change modes using a password and using the instrument's navigation. In other cases, you must use ProRAE Studio software.

The default setting for your instrument is:

User Mode: Basic
Operation Mode: Hygiene

This is outlined in detail on page 83.

The other options, covered later in this guide, are:

User Mode: Advanced (page 86)
Operation Mode: Hygiene

User Mode: Advanced (page 90)
Operation Mode: Search

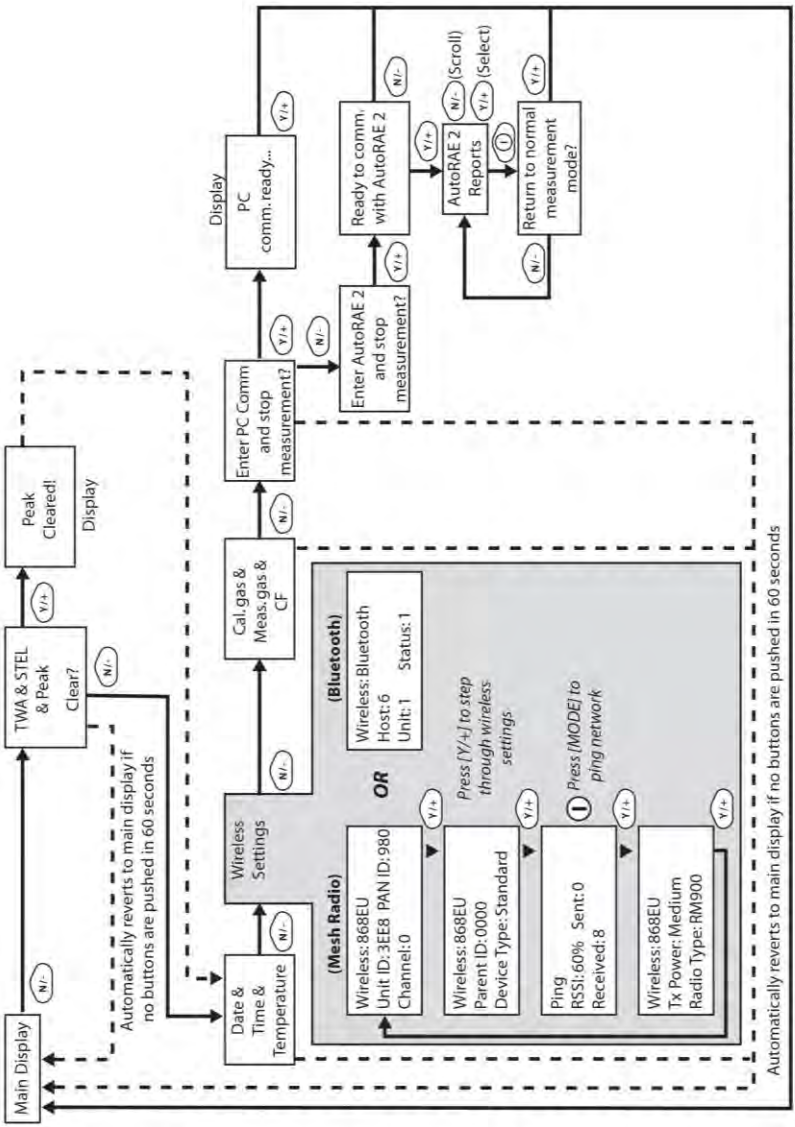
Using ProRAE Studio allows access to other options. In addition, Diagnostic Mode (page 91) is available for service technicians.

Basic User Level/Hygiene Mode (Default Settings)

The instrument is programmed to operate in Basic User Level/Hygiene Mode as its default. This gives you the most commonly needed features while requiring the fewest parameter adjustments.

Pressing [N/-] steps you from one screen to the next, and eventually return to the main display. If you do not press a key within 60 seconds after entering a display, the instrument reverts to its main display.

Note: While viewing any of these screens, you can shut off your instrument by pressing [MODE].



Note: Dashed line indicates automatic progression.

After the instrument is turned on, it runs through the start-up menu. Then the message "**Please apply zero gas…**" is displayed.

At this point, you can perform a zero air (fresh air) calibration. If the ambient air is clean, you can use that. Otherwise, use a cylinder of zero air. Refer to Zero Calibration on page 44 for a more detailed description of zero calibration.

Start zero calibration by pressing Start. You see the message "Zeroing…" followed by a 30-second countdown.

Note: You can press [MODE] to quit, bypassing the zero air calibration.

When zero calibration is complete, you see the message:

Zeroing is done!

Reading = 0.0 ppm

The instrument is now sampling and collecting data.

Note: At the Average & Peak, Date & Time & Temperature, Calibration Gas & Measurement Gas & Correction Factor, and PC Communications screens, the instrument automatically goes to the main display after 60 seconds if you do not push a key to make a selection.

Alarm Signals

During each measurement period, the gas concentration is compared with the programmed alarm limits (gas concentration alarm limit settings). If the concentration exceeds any of the preset limits, the loud buzzer and red flashing LED are activated immediately to warn you of the alarm condition.

In addition, the instrument alarms if one of the following conditions occurs: battery voltage falls below a preset voltage level, failure of the UV lamp, or pump stall.

Alarm Signal Summary

Message	Condition	Alarm Signal
HIGH	Gas exceeds "High Alarm" limit	3 beeps/flashes per second*
OVR	Gas exceeds measurement range	3 beeps/flashes per second*
MAX	Gas exceeds electronics' maximum range	3 beeps/flashes per second*
LOW	Gas exceeds "Low Alarm" limit	2 beeps/flashes per second*
TWA	Gas exceeds "TWA" limit	1 Beep/flash per second*
STEL	Gas exceeds "STEL" limit	1 Beep/flash per second*
Pump icon flashes	Pump failure	3 beeps/flashes per second
Lamp	PID lamp failure	3 beeps/flashes per second plus "Lamp" message on display
Battery icon flashes	Low battery	1 flash, 1 beep per minute plus battery icon flashes on display
CAL	Calibration failed, or needs calibration	1 beep/flash per second
NEG	Gas reading measures less than number stored in calibration	1 beep/flash per second

* Hygiene mode only. In Search mode, the number of beeps per second (1 to 7) depends upon the concentration of the sampled gas. Faster rates indicate higher concentrations.

Preset Alarm Limits & Calibration

The instrument is factory calibrated with standard calibration gas, and is programmed with default alarm limits.

Cal Gas (Isobutylene)	Cal Span	unit	Low	High	TWA	STEL
MiniRAE 3000	100	ppm	50	100	10	25

Testing The Alarm

You can test the alarm whenever the main (Reading) display is shown. Press [Y/+], and the audible and visible alarms are tested.

Integrated Sampling Pump

The instrument includes an integrated sampling pump. This diaphragm-type pump that provides a 450 to 550 cc per minute flow rate. Connecting a Teflon or metal tubing with 1/8" inside diameter to the gas inlet port of the instrument, this pump can pull in air samples from 100' (30 m) away horizontally or vertically.

Note: In Search Mode, the pump turns on when a sample measurement is started, and turns off when the sample is manually stopped.

If liquid or other objects are pulled into the inlet port filter, the instrument detects the obstruction and immediately shuts down the pump. The alarm is activated and a flashing pump icon is displayed.

You should acknowledge the pump shutoff condition by clearing the obstruction and pressing the [Y/+] key while in the main reading display to restart the pump.

Backlight

The LCD display is equipped with an LED backlight to assist in reading the display under poor lighting conditions.

Datalogging

During datalogging, the instrument displays a disk icon to indicate that datalogging is enabled. The instrument stores the measured gas concentration at the end of every sample period (when data logging is enabled). In addition, the following information is stored: user ID, site ID, serial number, last calibration date, and alarm limits. All data are retained (even after the unit is turned off) in non-volatile memory so that it can be down- loaded at a later time to a PC.

Datalogging event

When Datalogging is enabled, measurement readings are being saved. These data are stored in "groups" or "events." A new event is created and stored each time the instrument is turned on and is set to automatic datalogging, or a configuration parameter is changed, or datalogging is interrupted. The maximum time for one event is 24 hours or 28,800 points. If an event exceeds 24 hours, a new event is automatically created. Information, such as start time, user ID, site ID, gas name, serial number, last calibration date, and alarm limits are recorded.

Datalogging sample

After an event is recorded, the unit records a shorter form of the data. When transferred to a PC running ProRAE Studio, this data is arranged with a sample number, time, date, gas concentration, and other related information.

Auto/Manual/Snapshot Datalogging

The instrument has three datalog types:

Auto	Default mode. Collects datalog information when the instrument is sampling.
Manual	Datalogging occurs only when the instrument's datalogging is manually started (see page 63 for details).
Snapshot	Datalogs only during snapshot (single-event capture, initiated by pressing [MODE]) sampling. See page 65 for details.

Note: You can only choose one datalog type to be active at a time.

Accessories

The following accessories are included with the instrument:

- An AC Adapter (Battery Charger)
- Alkaline battery adapter
- External Filter
- Organic Vapor Zeroing kit

Hard-case kits also include these accessories:

- Calibration adapter
- Calibration regulator and Flow controller

Standard Kit & Accessories

AC Adapter (Battery Charger)

WARNING

To reduce the risk of ignition of hazardous atmospheres, recharge battery only in area known to be non-hazardous. Remove and replace battery only in area known to be non-hazardous.

Ne charger les batteries que dans emplacements designés non-dangereuses.

A battery charging circuit is built into the instrument cradle. It only needs a regular AC to 12 VDC adapter (wall-mount transformer, part number 500-0114-000) to charge the instrument.

To charge the battery inside the instrument:

1. Power off the instrument.
2. Connect the AC adapter to the DC jack on the instrument's cradle. If the instrument is off, it automatically turns on.
3. While charging, the display message shows "Charging." The Primary LED on the cradle flashes green when charging.
4. When the battery is fully charged, the LED changes to glowing green continuously, and the message "Fully charged" appears on the

display. If there is a charging error, the LED glows red continuously.

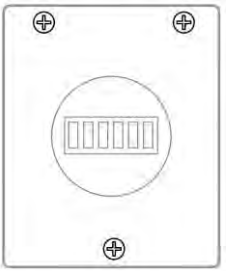
A completely discharged instrument can be charged to full capacity within 8 hours. Batteries drain slowly even if an instrument is off. Therefore, if the instrument has been in storage or has not been charged for several days or longer, check the charge before using it.

The factory-supplied battery is designed to last for 16 hours of normal operation (no alarm), for a new battery under the optimum circumstances. As the battery becomes older or is subject to adverse conditions (such as cold ambient temperature), its capacity will be significantly reduced.

Alkaline Battery Adapter

An alkaline battery adapter is supplied with each instrument. The adapter (part number 059-3052-000) accepts four AA alkaline batteries (use only Duracell MN1500) and provides approximately 12 hours of operation. The adapter is intended to be used in emergency situations when there is no time to charge the Li-ion battery pack.

To insert batteries into the adapter:



1. Remove the three Philips-head screws to open the compartment in the adapter.
2. Insert four fresh AA batteries as indicated by the polarity (+/-) markings.
3. Replace the cover. Replace the three screws.

To install the adapter in the instrument:

1. Remove the Li-ion battery pack from the instrument by sliding the tab and tilting out the battery.
2. Replace it with the alkaline battery adapter
3. Slide the tab back into place to secure the battery adapter.

IMPORTANT!

Alkaline batteries cannot be recharged. The instrument's internal circuit detects alkaline batteries and will not allow recharging. If you place the instrument in its cradle, the alkaline battery will not be recharged. The

internal charging circuit is designed to prevent damage to alkaline batteries and the charging circuit when alkaline batteries are installed inside the instrument. If you try to charge an alkaline batteries installed in the instrument, the instrument's display will say, "Alkaline Battery," indicating that it will not charge the alkaline batteries.

Note: When replacing alkaline batteries, dispose of old ones properly.

WARNING!

To reduce the risk of ignition of hazardous atmospheres, recharge the battery only in areas known to be non-hazardous. Remove and replace the battery only in areas known to be non-hazardous.

External Filter

The external filter is made of PTFE (Teflon®) membrane with a 0.45 micron pore size to prevent dust or other particles from being sucked into the sensor manifold, which would cause extensive damage to the instrument. It prolongs the operating life of the sensor. To install the external filter, simply connect it to the instrument's inlet tube.

Optional Accessories

Calibration Adapter

The calibration adapter for the instrument is a simple 6-inch Tygon tubing with a metal adapter on one end. During calibration, simply insert the metal adapter into the regular gas inlet probe of the instrument and the tubing to the gas regulator on the gas bottle.

Calibration Regulator

The Calibration Regulator is used in the calibration process. It regulates the gas flow rate from the Span gas cylinder into the gas inlet of the instrument during calibration process. The maximum flow rate allowed by the flow controller is about 0.5L/min (500 cc per min.). Alternatively, a demand-flow regulator or a Tedlar gas bag may be used to match the pump flow precisely.

Organic Vapor Zeroing Kit

The Organic Vapor Zeroing Kit is used for filtering organic air contaminants that may affect the zero calibration reading. To use the Organic Vapor Zeroing Kit, simply connect the filter to the inlet port of the instrument.

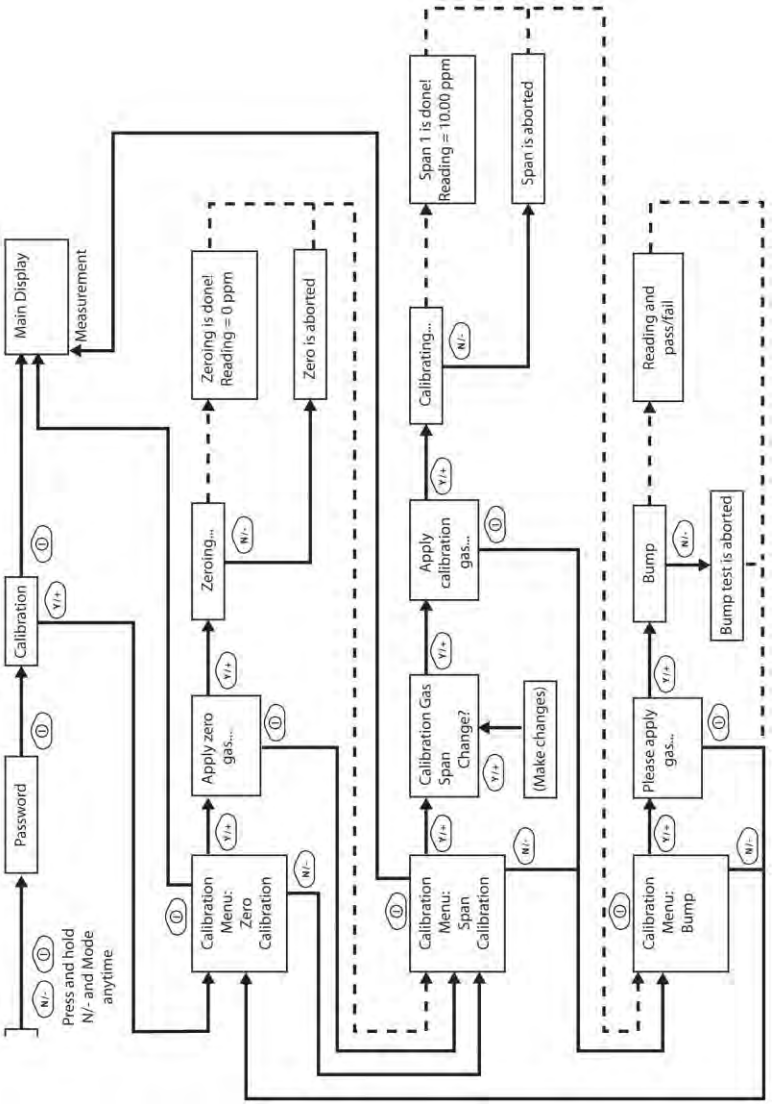
AutoRAE 2 Automatic Test & Calibration System

The AutoRAE 2 Automatic Test and Calibration System for RAE Systems portable gas monitors makes compliance with monitor test and calibration requirements as easy as pressing a button. Simply cradle the monitor and the system will take care of all calibration, testing, and recharging.

The AutoRAE 2 is a flexible, modular system that can be configured to meet your calibration requirements effectively and efficiently. An AutoRAE 2 system can be as simple as a single cradle deployed in standalone mode to calibrate one instrument at a time, or as powerful as a networked, controller-based system supporting ten monitors and five distinct calibration gas cylinders.

Standard Two-Point Calibration (Zero & Span, Optional Bump)

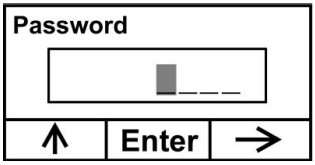
The following diagram shows the instrument's calibrations in Basic/Hygiene mode.



Note: Dashed line indicates automatic progression.

Entering Calibration

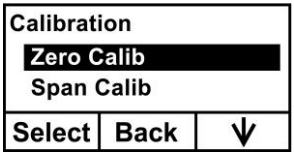
1. Press and hold [MODE] and [N/-] until you see the Password screen.



2. In Basic User Level, you do not need a password to perform calibrations. Instead of inputting a password, enter calibration by pressing [MODE].

   Note: If you inadvertently press [Y/+] and change any of the numbers, simply press [MODE] and you will be directed to the calibration menu.

The Calibration screen is now visible with Zero Calibration highlighted.



These are your options:

- Press [Y/+] to select the highlighted calibration (Zero Calib or Span Calib).
- Press [MODE] to exit calibration and return to the main display and resume measurement.
- Press [N/-] to toggle the highlighted calibration type.

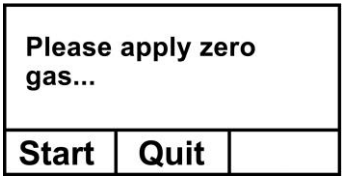
Zero (Fresh Air) Calibration

This procedure determines the zero point of the sensor calibration curve. To perform a fresh air calibration, use the calibration adapter to connect the instrument to a "fresh" air source such as from a cylinder or Tedlar bag (optional accessory). The "fresh" air is clean, dry air without organic impurities and an oxygen value of 20.9%. If such an air cylinder is not available, any clean ambient air without detectable contaminants or a charcoal filter can be used.

At the Zero Calibration menu, you can proceed to perform a Zero calibration or bypass Zero calibration and perform a Span calibration. You may also go back to the initial Calibration menu if you want to exit calibration.

- Press [Y/+] to start calibration.
- Press [MODE] to quit and return to the main calibration display.

If you have pressed [Y/+] to enter Zero calibration, then you will see this message:



1. Turn on your Zero calibration gas.
2. Press [Y/+] to start calibration.

   Note: At this point, you may press [MODE] if you decide that you do not want to initiate calibration. This will take you directly to the Calibration menu, highlighted for Span calibration.

3. Zero calibration starts a 30-second countdown and displays this message:

   Zeroing...

During the zeroing process, the instrument performs the Zero calibration automatically and does not require any action on your part.

Note: To abort the zeroing process at any time and proceed to Span calibration, press [N/-] at any time while zeroing is being performed. You will see a confirmation message that says "Zero aborted!" and then the Span calibration menu appears.

When Zero calibration is complete, you see this message:

Zeroing is done!
Reading = 0.0 ppm

The instrument will then show the Calibration menu on its display, with Span Calib highlighted.

Span Calibration

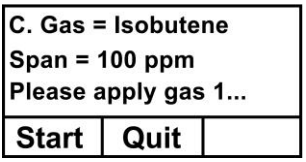
This procedure determines the second point of the sensor calibration curve for the sensor. A cylinder of standard reference gas (span gas) fitted with a 500 cc/min. flow-limiting regulator or a flow-matching regulator is the simplest way to perform this procedure. Choose the 500 cc/min. regulator only if the flow rate matches or slightly exceeds the flow rate of the instrument pump. Alternatively, the span gas can first be filled into a Tedlar bag or delivered through a demand-flow regulator. Connect the calibration adapter to the inlet port of the instrument, and connect the tubing to the regulator or Tedlar bag.

Another alternative is to use a regulator with >500 cc/min flow but allow the excess flow to escape through a T or an open tube. In the latter method, the span gas flows out through an open tube slightly wider than the probe, and the probe is inserted into the calibration tube.

At the Span Calibration menu, you perform a Span calibration. You may also go back to the Zero calibration menu or to the initial Calibration menu if you want to exit calibration.

- Press [Y/+] to enter Span calibration.
- Press [N/-] to skip Span calibration and return to Zero calibration.
- Press [MODE] to exit Span calibration and return to the top calibration menu.

If you have pressed [Y/+] to enter Span calibration, then you will see the name of your Span gas (the default is isobutylene) and the span value in parts per million (ppm). You will also see this message that prompts you:



1. Turn on your span calibration gas.
2. Press [Y/+] to initiate calibration.

Note: You may press [MODE] if you decide that you do not want to initiate calibration. This will abort the span calibration and take you directly to the Calibration menu for Zero calibration.

3. Span calibration starts and displays this message:

   Calibrating...

During the Span calibration process, there is a 30-second countdown and the instrument performs the Span calibration automatically. It requires no actions on your part.

Note: If you want to abort the Span calibration process, press [N/-] at any time during the process. You will see a confirmation message that says "Span is aborted!" and then the Zero calibration menu appears. You can then proceed to perform a Zero calibration, perform a Span calibration, or exit to the topmost Calibration menu.

When Span calibration is complete, you see a message similar to this (the value is an example only):

Span 1 is done!
Reading = 100.0 ppm

The instrument then exits Span calibration and shows the Zero calibration menu on its display.

Note: The reading should be very close to the span gas value.

Exiting Two-Point Calibration In Basic User Level

When you are done performing calibrations, press [MODE], which corresponds with "Back" on the display. You will see the following message:

Updating settings…

The instrument updates its settings and then returns to the main display. It begins or resumes monitoring.

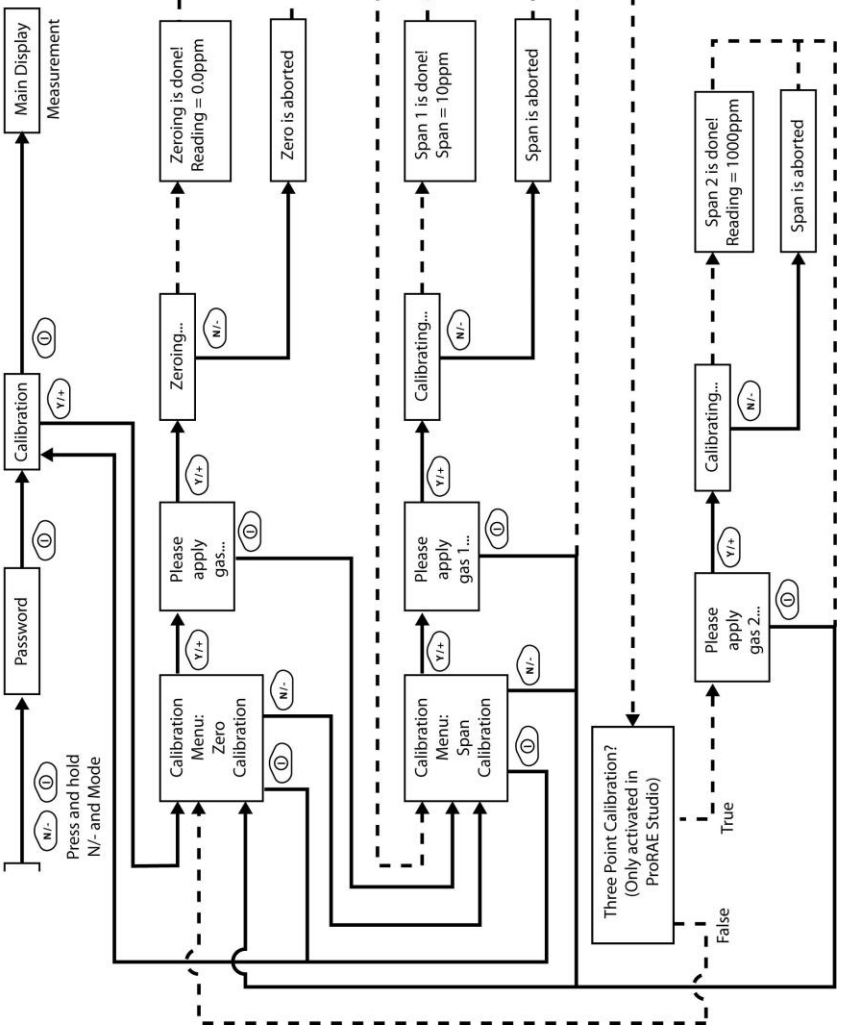
Three-Point Calibration

For enhanced accuracy, it is possible to perform a second Span calibration in addition to the Zero and Span calibrations outlined in the previous section. Your instrument first must be set to allow this third calibration. This requires using ProRAE Studio software and a PC, as well as a higher concentration of calibration gas.

Note: Once the third calibration is set, you do not need to use ProRAE Studio to allow future 3-point calibrations. Also, you can only disable 3-point calibration capability by using ProRAE Studio again.

Perform the Zero and Span calibrations. After the first Span calibration (Span 1) is completed, the display a second Span calibration (Span 2) can be performed. The process is identical to the first calibration. As in the Span 1 calibration, you may exit and return to the Zero calibration screen if you choose not to perform this calibration or to abort it.

Note: If a bump test is available, it appears after the last calibration in the menu. See "Two-Point Calibration," page 38, for details. Also, refer to page 53 for details on how to perform a bump test.



Note: Dashed line indicates automatic progression.

Span 2 Calibration

A cylinder of standard reference gas (span gas) fitted with a 500 cc/min. flow-limiting regulator or a flow-matching regulator is the simplest way to perform this procedure.

Note: This gas should be of a higher concentration than the gas used for Span 1 calibration.

Choose the 500 cc/min. regulator only if the flow rate matches or slightly exceeds the flow rate of the instrument pump. Alternatively, the span gas can first be filled into a Tedlar bag or delivered through a demand-flow regulator. Connect the calibration adapter to the inlet port of the instrument, and connect the tubing to the regulator or Tedlar bag.

Another alternative is to use a regulator with >500 cc/min flow but allow the excess flow to escape through a T or an open tube. In the latter method, the span gas flows out through an open tube slightly wider than the probe, and the probe is inserted into the calibration tube.

At the Span Calibration menu, you perform a Span calibration. You may also go back to the Zero calibration menu or to the initial Calibration menu if you want to exit calibration.

- Press [Y/+] to enter Span 2 calibration.
- Press [N/-] to skip Span calibration and return to Zero calibration.
- Press [MODE] to exit Span calibration and return to the top calibration menu.

If you have pressed [Y/+] to enter Span calibration, then you will see the name of your Span gas (the default is isobutylene) and the span value in parts per million (ppm). You will also see this message that prompts you:

Please apply gas...

4. Turn on your span calibration gas.
5. Press [Y/+] to initiate calibration.

Note: You may press [MODE] if you decide that you do not want to initiate calibration. This will take you directly to the Calibration menu for Zero calibration.

6. Span calibration starts a 30-second countdown and displays this message:

   Calibrating...

During the Span calibration process, the instrument performs the Span calibration automatically and does not require any action on your part.

Note: If you want to abort the Span calibration process, press [N/-] at any time during the process. You will see a confirmation message that says "Span is aborted!" and then the Zero calibration menu will appear. You can then proceed to perform a Zero calibration, perform a Span calibration, or exit to the topmost Calibration menu.

When Span calibration is complete, you will see a message similar to this (the value shown here is for example only):

Span 2 is done!
Reading = 1000 ppm

The instrument then exits Span calibration and shows the Zero calibration menu on its display.

Note: The reading should be very close to the span gas value.

Exiting Three-Point Calibration

When you are done performing calibrations, press [MODE], which corresponds with "Back" on the display. You will see the following message:

Updating settings…

The instrument updates its settings and then returns to the main display. It begins or resumes monitoring.

Bump Test

RAE Systems recommends that a bump test be conducted prior to each day's use. The purpose of a bump test is to ensure that the instrument's sensors respond to gas and all the alarms are enabled and functional.

- The MiniRAE 3000 must be calibrated if it does not pass a bump test when a new sensor is installed, after sensor maintenance has been performed, or at least once every 180 days, depending on use and sensor exposure to poisons and contaminants.
- Calibration and bump test intervals and procedures may vary due to national legislation and company policy.

To perform a bump test (functional challenge), follow these steps:

1. Select "Bump."
2. Install the calibration adapter and connect it to a source of calibration gas.
3. Verify that the displayed calibration value meets the concentration specified on the gas cylinder.
4. Start the flow of calibration gas.
5. Press [Y/+] to start the bump test.
6. You can abort the calibration at any time during the countdown by pressing [N/-].

7. If the calibration is not aborted, the display shows reading and then tells you whether the bump test passed or failed. If the bump test failed, then it automatically advances to the Calibration screen.

Important!

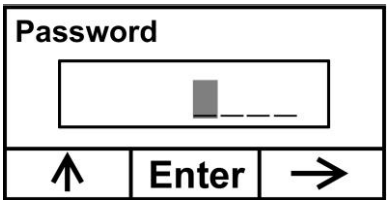
Anytime a bump test fails, you should perform a full calibration of the instrument.

Programming Mode

Programming Mode can be entered from either Hygiene Mode or Search Mode. If the current user mode is Basic, you must provide a 4-digit password to enter.

Entering Programming Mode

1. Press and hold [MODE] and [N/-] until you see the Password screen.



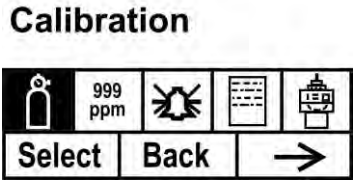
2. Input the 4-digit password:

- Increase the number from 0 through 9 by pressing [Y/+].
- Step from digit to digit using [N/-].
- Press [MODE] when you are done.

If you make a mistake, you can cycle through the digits by pressing [N/-] and then using [Y/+] to change the number in each position.

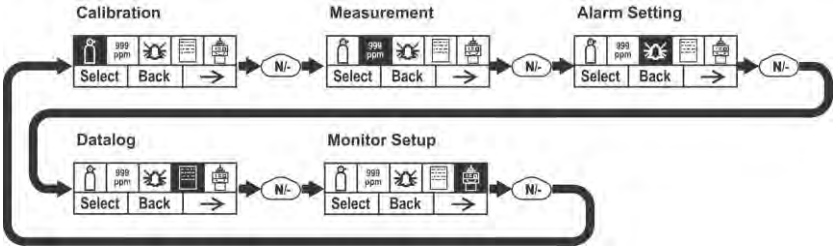
Note: The default password is 0000.

When you have successfully entered Programming Mode, you see this screen:



Note: The password can only be changed by connecting the instrument to a PC running ProRAE Studio software. Follow the instructions in ProRAE Studio to change it.

The Calibration label is shown and its icon is highlighted, but you can press [N/-] to step from one programming menu to the next, with the name of the menu shown at the top of the display and the corresponding icon highlighted. As you repeatedly press [N/-], the selection moves from left to right, and you see these screens:



Note: When you reach Monitor Setup and press [N/-], the menu cycles back to Calibration.

Programming Mode Menus

The Programming Mode allows anyone with the password to change the instrument's settings, calibrate the instrument, modify the sensor configuration, enter user information, etc. Programming Mode has five menus. Each menu includes several sub-menus to perform additional programming functions.

This table shows the menus and sub-menus:

Calibration	**Measurement**	**Alarm Setting**	**Datalog**	**Monitor Setup**
Zero Calibration	Meas. Gas	High Alarm	Clear Datalog	Radio Power
Span Calibration	Meas. Unit	Low Alarm	Interval	Op Mode
Bump		STEL Alarm	Data Selection	Site ID
		TWA Alarm	Datalog Type	User ID
		Alarm Mode		User Mode
		Buzzer & Light		Date
				Time
				Pump Duty Cycle
				Pump Speed
				Temperature Unit
				Language
				Real Time Protocol
				Power On Zero
				Unit ID
				LCD Contrast
				Lamp ID
				PAN ID
				Mesh Channel
				Mesh Interval

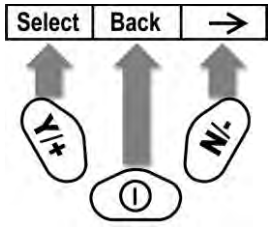
Once you enter Programming Mode, the LCD displays the first menu, Calibration. Each subsequent menu is accessed by pressing [N/-] repeatedly until the desired menu is displayed. To enter a sub-menu of a menu, press [Y/+].

Exiting Programming Mode

To exit Programming Mode and return to normal operation, press [MODE] once at any of the programming menu displays. You will see "Updating Settings…" as changes are registered and the mode changes.

Navigating Programming Mode Menus

Navigating through the Programming Mode menus is easy and consistent, using a single interface format of "Select," "Back" and "Next" at the top level. The three control buttons correspond to these choices as shown:



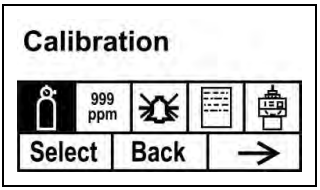
Note: Pressing [MODE] in the Programming Mode's top level causes the instrument to exit Programming Mode and return to monitoring.

The three keys perform the following functions in Programming Mode:

Key	Function in Programming Mode
[MODE]:	Exit menu when pressed momentarily or exit data entry mode
[Y/+]:	Increase alphanumerical value for data entry or confirm (yes) for a question
[N/-]:	Provides a "no" response to a question

Calibration

Two types of calibration are available: Zero (fresh air) and Span.



Select Zero or Span Calibration by pressing [N/+]. Once your choice is highlighted, press [Y/+].

Zero Calibration

The procedure for performing a zero calibration is covered on page 41.

Span Calibration

The procedure for performing a basic span calibration is covered on page 41.

Bump

The procedure for performing a bump calibration is covered on page 53.

A bump test can be performed either manually or using the AutoRAE 2 Automatic Test and Calibration System. When a bump test is done manually, the instrument makes a pass/fail decision based on sensor performance, but the user still has the responsibility to make sure all the alarms are enabled and functional.

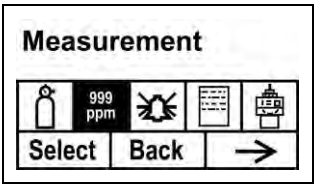
Note: Bump testing and calibration can be performed using an AutoRAE 2 Automatic Test & Calibration System. An AutoRAE 2 bump test takes care of both the sensor and alarm tests. Consult the AutoRAE 2 User's guide for details.

IMPORTANT!

If the instrument does not pass a bump test, perform a full calibration. If calibration also fails, the PID sensor or lamp may require cleaning or replacement. If the instrument repeatedly fails to calibrate, turn it off and refer it for servicing.

Measurement

The sub-menus for Measurement are Measurement Gas and Measurement Unit.



Meas. Gas

Measurement gases are organized in four lists:

- My List is a customized list of gases that you create. It contains a maximum of 10 gases and can only be built in ProRAE Studio on a PC and transferred to the instrument. **Note:** The first gas in the list is always isobutylene (it cannot be removed from the list).
- Last Ten is a list of the last ten gases used by your instrument. The list is built automatically and is only updated if the gas selected from Custom Gases or Library is not already in the Last Ten. This ensures that there is no repetition.
- Gas Library is a library that consists of all the gases found in RAE Systems' Technical Note TN-106 (available online at www.raesystems.com).
- Custom Gases are gases with user-modified parameters. Using ProRAE Studio, all parameters defining a gas can be modified,

including the name, span value(s), correction factor, and default alarm limits.

1. Scroll through each list by pressing [N/-].
2. Press [Y/+] to select one (My List, Last Ten, Gas Library, or Custom Gases).
3. Once you are in one of the categories, press [N/-] to scroll through its list of options and [Y/+] to select one. (If you press [MODE], you exit to the next submenu.)
4. Press [Y/+] to save your choice or [N/-] to undo your selection.

Leave the sub-menu and return to the Programming Mode menus by pressing [MODE].

Meas. Unit

Standard available measurement units include:

Abbreviation	Unit	MiniRAE 3000
ppm	parts per million	Yes
ppb	parts per billion	
mg/m3	milligrams per cubic meter	Yes
ug/m3	micrograms per cubic meter	

- Scroll through the list by pressing [N/-].
- Select by pressing [Y/+].
- Save your selection by pressing [Y/+] or undo your selection by pressing [N/-].

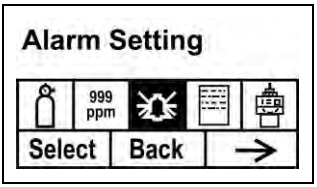
Leave the sub-menu and return to the Programming Mode menus by pressing [MODE].

Alarm Setting

During each measurement period, the gas concentration is compared with the programmed alarm limits (gas concentration alarm limit settings: Low, High, TWA and STEL). If the concentration exceeds any of the preset limits, the loud buzzer and red flashing LED are activated immediately to warn of the alarm condition.

An alarm signal summary is shown on page 33.

In this menu, you can change the High and Low alarm limits, the STEL limit, and the TWA. Press [Y/+] to to enter the Alarm Setting menu. **Note:** All settings are shown in ppb (parts per billion), or µg/m^3 (micrograms per cubic meter), depending on your setting.



1. Scroll through the Alarm Limit sub-menu using the [N/-] key until the display shows the desired limit to be changed (High Alarm, Low Alarm, STEL Alarm, and TWA Alarm)
2. Press [Y/+] to select one of the alarm types. The display shows a flashing cursor on the left-most digit of the previously stored alarm limit.
3. Press [Y/+] to increase each digit's value.
4. Press [N/-] to advance to the next digit.
5. Again, use [Y/+] to increase the number.

Repeat this process until all numbers are entered.

Press [MODE] when you are done.

- Press [Y/+] to save the changes.
- Press [N/-] to undo the changes and revert to the previous settings.

When all alarm types have been changed or bypassed, press [MODE] to exit to the Programming Menu.

High Alarm

You can change the High Alarm limit value. The value is typically set by the instrument to match the value for the current calibration gas. It is expressed in parts per billion (ppb). **Note:** The default value depends on the measurement gas.

To change the High Alarm value:

1. Press [Y/+] to increase each digit's value.
2. Press [N/-] to advance to the next digit.
3. Again, use [Y/+] to increase the number.

Repeat this process until all numbers are entered.
When you have completed your selections, press [MODE]. You will see two choices: Save and Undo. You have the opportunity to register the new settings or to change your mind and revert to your previous settings.

Press [Y/+] to save the changes.
Press [N/-] to undo the changes and revert to the previous settings.

Low Alarm

You can change the Low Alarm limit value. The value is typically set by the instrument to match the value for the current calibration gas. It is expressed in parts per billion (ppb). **Note:** The default value depends on the measurement gas.

To change the Low Alarm value:

1. Press [Y/+] to increase each digit's value.
2. Press [N/-] to advance to the next digit.
3. Again, use [Y/+] to increase the number.

Repeat this process until all numbers are entered.

When you have completed your selections, press [MODE]. You will see two choices: Save and Undo. You have the opportunity to register the new settings or to change your mind and revert to your previous settings.

- Press [Y/+] to save the changes.
- Press [N/-] to undo the changes and revert to the previous settings.

STEL Alarm

You can change the STEL Alarm limit value. The value is typically set by the instrument to match the value for the calibration gas. It is expressed in parts per billion (ppb). **Note:** The default value depends on the measurement gas.

To change the STEL Alarm value:

1. Press [Y/+] to increase each digit's value.
2. Press [N/-] to advance to the next digit.
3. Again, use [Y/+] to increase the number.

Repeat this process until all numbers are entered.

When you have completed your selections, press [MODE]. You will see two choices: Save and Undo. You have the opportunity to register the new settings or to change your mind and revert to your previous settings.

- Press [Y/+] to save the changes.
- Press [N/-] to undo the changes and revert to the previous settings.

TWA Alarm

You can change the TWA (time-weighted average) Alarm limit value. The value is typically set by the instrument to match the value for the calibration gas. It is expressed in parts per billion (ppb). **Note:** The default value depends on the measurement gas.

To change the TWA Alarm value:

1. Press [Y/+] to increase each digit's value.
2. Press [N/-] to advance to the next digit.
3. Again, use [Y/+] to increase the number.

Repeat this process until all numbers are entered.

When you have completed your selections, press [MODE]. You will see two choices:

- Save
- Undo

You have the opportunity to register the new settings or to change your mind and revert to your previous settings.

- Press [Y/+] to save the changes.
- Press [N/-] to undo the changes and revert to the previous settings.

Alarm Mode

There are two selectable alarm modes:

Auto Reset	When the alarm condition is no longer present, the alarm stops and automatically resets itself.
Latch	When the alarm is triggered, you can manually stop the alarm. The latched setting only controls alarms for High Alarm, Low Alarm, STEL Alarm, and TWA alarm. **Note:** To clear an alarm when the instrument is set to "Latched," press [Y/+] when the main (Reading) display is shown.

1. Press **[N/-]** to step from one alarm type to the other.
2. Press **[Y/+]** to select an alarm type.

When you have completed your selections, press [MODE].

You will see two choices: Save and Undo. You have the opportunity to register the new settings or to change your mind and revert to your previous settings.

- Press [Y/+] to save the changes.
- Press [N/-] to undo the changes and revert to the previous settings.

Buzzer & Light

The buzzer and light alarms can be programmed to be on or off individually or in combination. Your choices are:

- Both on
- Light only
- Buzzer only
- Both off

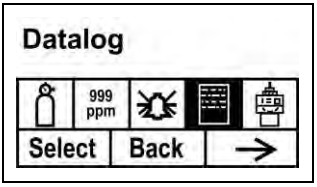
1. Press [N/-] to step from one option to the next.
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates your selection).
3. When you have completed your selections, press [MODE].

   You will see two choices: Save and Undo. You have the opportunity to register the new settings or to change your mind and revert to your previous settings.

   - Press [Y/+] to save the changes.
   - Press [N/-] to undo the changes and revert to the previous settings.

Datalog

The instrument calculates and stores the concentration and ID of each sample taken. In the datalog sub-menu, a user can perform the tasks and functions shown below.



1. Scroll through the Datalog sub-menu using the [N/-] key until the display shows the desired parameter to be changed:

   Clear Datalog
   Interval
   Data Selection
   Datalog Type

2. Press [Y/+] to make your selection. Exit by pressing [MODE] for Back.

Clear Datalog

This erases all the data stored in the datalog.

Note: Once the datalog is cleared, the data cannot be recovered.

Press [Y/+] to clear the datalog. The display asks, "Are you sure?"

- Press [Y/+] if you want to clear the datalog. When it has been cleared, the display shows "Datalog Cleared!"
- Press [N/-] if you do not want to clear the datalog.

The display changes, and you are taken to the next sub-menu, Interval.

Interval

Intervals are shown in seconds. The default value is 60 seconds. The maximum interval is 3600 seconds.

1. Press [Y/+] to increase each digit's value.
2. Press [N/-] to advance to the next digit.
3. Again, use [Y/+] to increase the number.

Repeat this process until all numbers are entered.

When you have completed your selections, press [MODE].

You will see two choices: Save and Undo. You have the opportunity to register the new settings or to change your mind and revert to your previous settings.

- Press [Y/+] to save the changes.
- Press [N/-] to undo the changes and revert to the previous settings.

Data Selection

Data Selection allows you to select which types of data are stored and made available when you offload your datalog to a computer via ProRAE Studio software.

You can choose any or all of three types of data (you must choose at least one):

- Average
- Maximum
- Minimum

1. Press [N/-] to step from one option to the next. The highlighter indicates your choice.
2. Press [Y/+] to toggle your selection on or off (the check box indicates "on" with an "X").
3. When you have completed your selections, press [MODE].

You will see two choices: Save and Undo. You have the opportunity to register the new settings or to change your mind and revert to your previous settings.

- Press [Y/+] to save the changes.
- Press [N/-] to undo the changes and revert to the previous settings.

Datalog Type

The instrument has three datalog types:

Auto	Default mode. Collects datalog information when the instrument is sampling.
Manual	Datalogging occurs only when the instrument's datalogging is manually started (see below for details).
Snapshot	Datalogs only during single-event capture sampling.

Note: You can only choose one datalog type to be active at a time.

1. Press [N/-] to step from one option to the next.
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates "on").
3. When you have completed your selection, press [MODE].

You will see two choices: Save and Undo. You have the opportunity to register the new settings or to change your mind and revert to your previous settings.

- Press [Y/+] to save the changes.

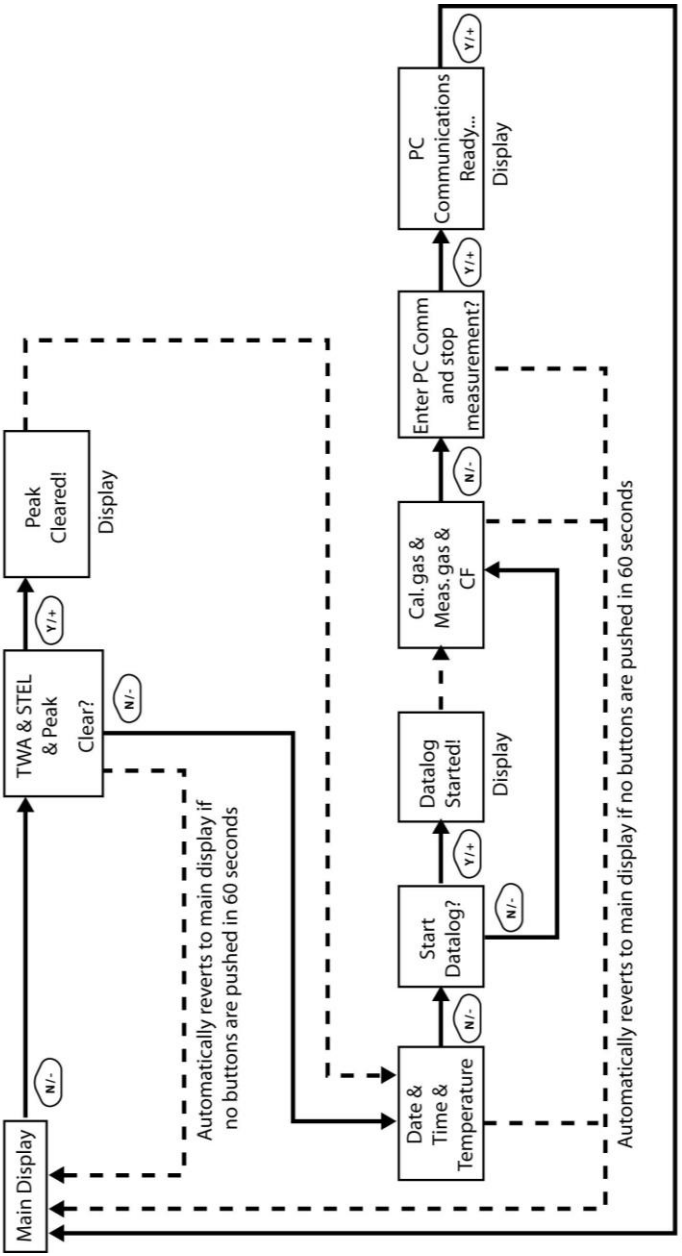
Press [N/-] to undo the changes and revert to the previous settings.

Manual Datalog

When the instrument is set to Manual Datalog, you turn datalogging on and off by stepping through the displays from the Main Display, and then pressing the keys to select datalog on/off functions.

- When you reach the screen that says "Start Datalog?" press [Y/+] to start it. You see "Datalog Started," confirming that datalogging is now on.

When you reach the screen that says "Stop Datalog?" press [Y/+] to stop it. You see "Datalog Stopped," confirming that datalogging is now off.



Note: Dashed line indicates automatic progression.

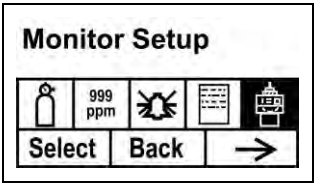
Snapshot Datalog

When the instrument is in Snapshot datalogging mode, it captures a single "snapshot" of the data at the moment of your choosing. Whenever the instrument is on and it is set to Snapshot, all you have to do is press [MODE] each time you want to capture a snapshot of the data at that instant.

When you send the data to a computer using ProRAE Studio, the data snapshots are uniquely identified by time and other parameters.

Monitor Setup

Many settings can be accessed in this menu, including setting the date and time and adjusting the pump's on/off duty cycle.



Radio Power

The radio connection can be turned on or off.

1. Press [N/-] to step from one option to the next (on or off).
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates that the option is selected).
3. When you have completed your selection, press [MODE].

- Press [Y/+] to accept the new radio setting (on or off).
- Press [N/-] to discard the change and move to the next sub-menu.

Op Mode

Under Monitor Setup is "Op Mode."

Press [Y/+] to select.

You see two options (one is highlighted):

Hygiene
Search

The current mode is indicated by a dark circle within the circle in front of either Hygiene or Search.

1. Select Hygiene or Search by pressing [N/-]. The highlighting changes from one to the other each time you press [N/-].
2. Press [Y/+] to select that mode for the instrument.
3. Press [MODE] when you want to register your selection to place the instrument in the selected mode.
4. Press [Y/+] to commit the change and exit to the Monitor Setup screen, or press [N/-] to Undo (exit to the Monitor Setup screen without changing the Mode).

Site ID

Enter an 8-digit alphanumeric/character Site ID in the programming mode. This Site ID is included in the datalog report.

1. Press [Y/+] and the display shows the current site ID. Example: "RAE00001." Note that the left-most digit flashes to indicate it is the selected one.
2. Press [Y/+] to step through all 26 letters (A to Z) and 10 numerals (0 to 9).
   Note: The last four digits must be numerals.
3. Press [N/-] to advance to the next digit. The next digit to the right flashes.

Repeat this process until all eight digits of the new site ID are entered.

Press [MODE] to exit.

If there is any change to the existing site ID, the display shows "Save?" Press [Y/+] to accept the new site ID. Press [N/-] to discard the change and move to the next sub-menu.

User ID

Enter an 8-digit alphanumeric User ID in the programming mode. This User ID is included in the datalog report.

1. Press [Y/+] and the display shows the current User ID. Example: "RAE00001." Note that the left-most digit flashes to indicate it is the selected one.
2. Press [Y/+] to step through all 26 letters (A to Z) and 10 numerals (0 to 9).
3. Press [N/-] to advance to the next digit. The next digit to the right flashes.

   Repeat this process until all eight digits of the new User ID are entered.

Press [MODE] to exit.

If there is any change to the existing User ID, the display shows "Save" Press [Y/+] to accept the new site ID. Press [N/-] to discard (undo) the change and move to the next sub-menu.

User Mode

The instrument has two user modes:

Basic Basic users can only see and use a basic set of functions.
Advanced Advanced users can see all screens and perform all available functions.

Note: The default value for User Mode is Basic.

To change the User Mode:

1. Press [N/-] to step from one option to the next. The highlighting changes each time you press [N/-].
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates "on").
3. When you have completed your selection, press [MODE].
4. Press [Y/+] to accept the new User Mode. Press [N/-] to discard the change and move to the next sub-menu.

Date

The Date is expressed as Month/Day/Year, with two digits for each.

1. Press [Y/+] and the display shows the current date. Note that the left-most digit flashes to indicate it is selected.
2. Press [Y/+] to step through all 10 numerals (0 to 9).
3. Press [N/-] to advance to the next digit. The next digit to the right flashes.

   Repeat this process until all six digits of the new date are entered.

Press [MODE] to exit.

- Press [Y/+] to save the new date.
- Press [N/-] to undo the change and move to the next sub-menu.

Time

The Time is expressed as Hours/Minutes/Seconds, with two digits for each. The time is in 24-hour (military) format.

1. Press [Y/+] and the display shows the current time. Note that the left-most digit flashes to indicate it is selected.
2. Press [Y/+] to step through all 10 numerals (0 to 9).
3. Press [N/-] to advance to the next digit. The next digit to the right flashes.

   Repeat this process until all six digits of the new time are entered.

Press [MODE] to exit.

- Press [Y/+] to save the new date.
- Press [N/-] to undo the change and move to the next sub-menu.

Pump Duty Cycle

The pump's duty cycle is the ratio of its on time to off time. The duty cycle ranges from 50% to 100% (always on), and the period is 10 seconds. Therefore, a duty cycle of 60% means that the pump is on for 6 seconds and off for four seconds. Duty cycling is employed by the instrument to clean the PID. A lower duty cycle has a greater effect on keeping the PID clean than a higher duty cycle.

Important! Pump duty cycling is interrupted when the instrument senses a gas. The pump's duty cycle is disabled when the measurement is greater than the 2ppm threshold and is re-enabled when the reading falls below 90% of the threshold (1.8 ppm).

1. Press [Y/+] to increase the value.
2. When you have completed your selection, press [MODE].
   - Press [Y/+] to save the new duty cycle value.
   - Press [N/-] to undo the change and move to the next sub-menu.

Pump Speed

The pump can operate at two speeds, high and low. Running at low speed is quieter and conserves a small amount of power. There is almost no difference in sampling accuracy.

1. Press [N/-] to step from one option to the next.
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates "on").
3. When you have completed your selection, press [MODE].
   - Press [Y/+] to save the new temperature unit.
   - Press [N/-] to undo the change and move to the next sub-menu.

Temperature Unit

The temperature display can be switched between Fahrenheit and Celsius units.

1. Press [N/-] to step from one option to the next.
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates "on").
3. When you have completed your selection, press [MODE].
   - Press [Y/+] to save the new temperature unit.
   - Press [N/-] to undo the change and move to the next sub-menu.

Language

English is the default language, but other languages can be selected for the instrument.

1. Press [N/-] to step from one option to the next.
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates "on").
3. When you have completed your selection, press [MODE].
   - Press [Y/+] to save your new language choice.
   - Press [N/-] to undo it and return to the previous language selection.

Real Time Protocol

Real Time Protocol is the setting for data transmission.

The choices are:

P2M (cable)	Point to multipoint. Data is transferred from the instrument to multiple locations using a wired connection. Default data rate: 19200 bps.
P2P (cable)	Point to point. Data is transferred only between the instrument and one other location, such as a computer. Default data rate: 9600 bps.
P2M (wireless)	Point to multipoint, wireless. Data is transferred wirelessly and can be received by multiple receivers.

1. Press [N/-] to step from one option to the next.
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates "on").
3. When you have completed your selection, press [MODE].
   - Press [Y/+] to save the new real-time communications protocol.
   - Press [N/-] to undo the change and move to the next sub-menu.

Power On Zero

When Power On Zero is on, the instrument performs a zero calibration when it is turned on.

1. Press [N/-] to step from one option to the next.
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates your selection).
3. When you have completed your selection, press [MODE].
   - Press [Y/+] to save the change.
   - Press [N/-] to discard the change and move to the next sub-menu.

Unit ID

This three-digit number keeps data separated by instrument when more than one instrument is used in a network. If multiple sensing units are attempting to communicate with the same Host, then the units must all have a different Unit ID.

1. Press [Y/+] to step through all 10 numerals (0 to 9). If you pass the numeral you want, keep pressing [Y/+]. After it counts up to 9, it starts counting up from 0 again.
2. Press [N/-] to advance to the next digit. The next digit to the right flashes.

Repeat this process until all three digits of the Unit ID are entered.

3. Press [MODE] when you are done.
   - Press [Y/+] to save the change.
   - Press [N/-] to discard the change and move to the next sub-menu.

LCD Contrast

The display's contrast can be increased or decreased from its default setting. You may not need to ever change the default setting, but sometimes you can optimize the display to suit extreme temperature and ambient brightness/darkness conditions.

- The minimum value is 20.
- The maximum value is 60.

1. Press [Y/+] to increase the value or [N/-] to decrease the value.
2. Press [MODE] to save your selection.
   - Press [Y/+] to save your new contrast value.
   - Press [N/-] to undo it and return to the previous value.

Lamp ID

The instrument must be set to the correct lamp value in order to function correctly. Always match the value that was installed in your instrument from the factory or the value of the PID lamp you are replacing.

1. Press [N/-] to step from one option to the next.
2. Press [Y/+] to make your selection (the dark circle in the "radio button" indicates "on").
3. When you have completed your selection, press [MODE].

PAN ID

The MiniRAE 3000 and any other devices that you want to interconnect wirelessly must have the same PAN ID. You can set the PAN ID in the instrument or through ProRAE Studio II.

1. Press [N/-] to advance through the digits from left to right.
2. Press [Y/+] to] to advance through the numbers (1, 2, 3, etc.).
3. Press [MODE] to register your choice when you are done.

Mesh Channel

Note: For mesh radio modems operating at 868MHz, only channel 0 is available. For other frequencies, channels 1 through 10 are allowed.

1. Press [Y/+] to increase the number and [N/-] to advance to the next digit.
2. After moving to the last digit and making changes, press [MODE].
    - Press [Y/+] to save the change.
    - Press [N/-] to undo the change.

Mesh Interval

Set the time interval at which the instrument's mesh radio sends out a signal. This can range from once every 10 seconds to once every four minutes (240 seconds). The transmission frequency is user-adjustable, but a rate of at least once every 30 seconds is recommended. **Note:** Shorter intervals reduce battery life.

1. Press [N/-] to step from one option to the next.
2. Press [Y/+] to make a selection.
3. When you are done, press [MODE].

Hygiene Mode

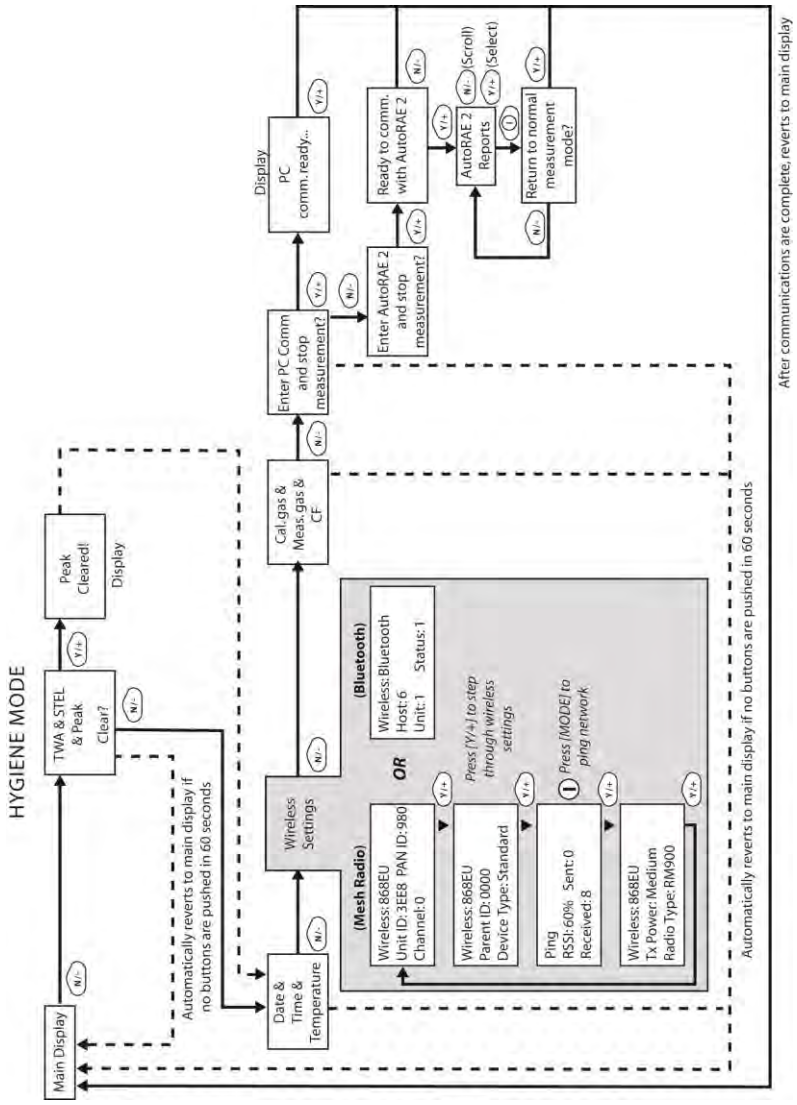
The instrument usually operates in Hygiene Mode, which provides basic functionality. However, it is possible to operate it in a second mode called Search Mode. Here are the primary differences:

Hygiene Mode: Automatic measurements, continuously running and datalogging, and calculates additional exposure values.

Search Mode: Manual start/stop of measurements and display of certain exposure values.

Basic User Level & Hygiene Mode

The default setting is navigated in the following way:



Note: Dashed line indicates automatic progression.

Pressing [N/-] steps you from screen to screen. Options include clearing the Peak value and turning on the instrument's PC Communications for data transfer to a PC.

Entering Search Mode From Hygiene Mode

In order to change the instrument's operational mode from Hygiene Mode to Search Mode, you must enter the password-protected Programming Mode:

1. Hold [MODE] and [N/-] until you see the password screen.
2. Use [Y/+] to increment to the number you want for the first digit. (If you pass by the desired number, press [Y/+] until it cycles through to 0 again. Then press [Y/+] until you reach the desired number.)
3. Press [N/-] to advance to the next digit.
4. Again press [Y/+] to increment the number.
5. Press [N/-] to advance to the next digit.

Continue the process until all four numbers of the password have been input. Then press [MODE] to proceed.

The screen changes to icons with the label "Calibration."

1. Press [N/-] to advance to "Monitor Setup."
2. Press [Y/+] to select Monitor Setup.

Under Monitor Setup, you will see "Op Mode."

Press [Y/+] to select.

You will see:

Hygiene
Search

The current mode is indicated by a dark circle within the circle in front of either Hygiene or Search.

1. Select Hygiene or Search by pressing [N/-].
2. Press [Y/+] to place the instrument into the selected mode.

3. Press [MODE] when you want to register your selection to place the instrument in the selected mode.
4. Press [Y/+] to commit the change and exit to the Monitor Setup screen, or press [N/-] to Undo (exit to the Monitor Setup screen without changing the Mode).

Advanced User Level (Hygiene Mode Or Search Mode)

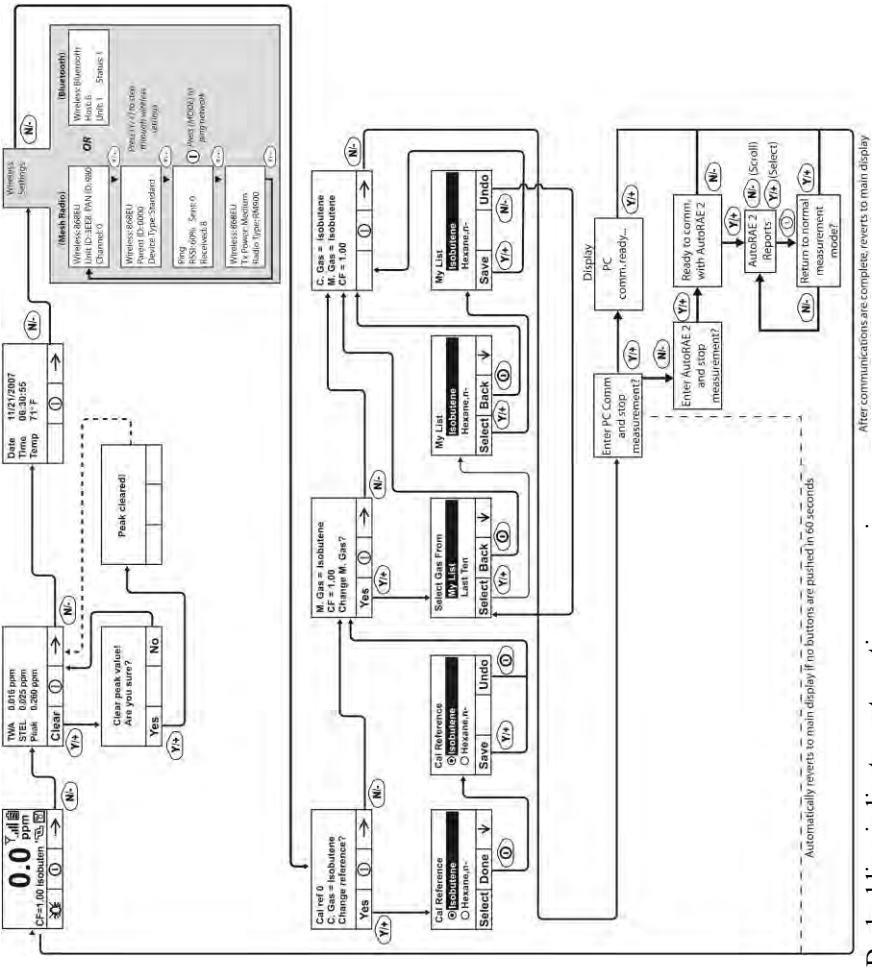
The User Mode called Advanced User Level allows a greater number of parameters to be changed than Basic User Level. It can be used with either of the Operation Modes, Hygiene Mode or Search Mode.

Advanced User Level & Hygiene Mode

With the instrument in Operation Mode: Hygiene Mode, enter User Mode: Advanced User Level (refer to the section called Monitor Mode for instructions).

Once you are in Advanced User Level and Hygiene Mode together, you can change the calibration reference and measurement gas, in addition to performing normal monitoring functions.

Pressing [N/-] progresses through the screens, while pressing [Y/+] selects options. Pressing [MODE] makes menu choices when it is shown for "Done" or "Back." Pressing and holding [Mode] whenever the circle with a vertical line in the middle is shown activates the countdown to shutoff.

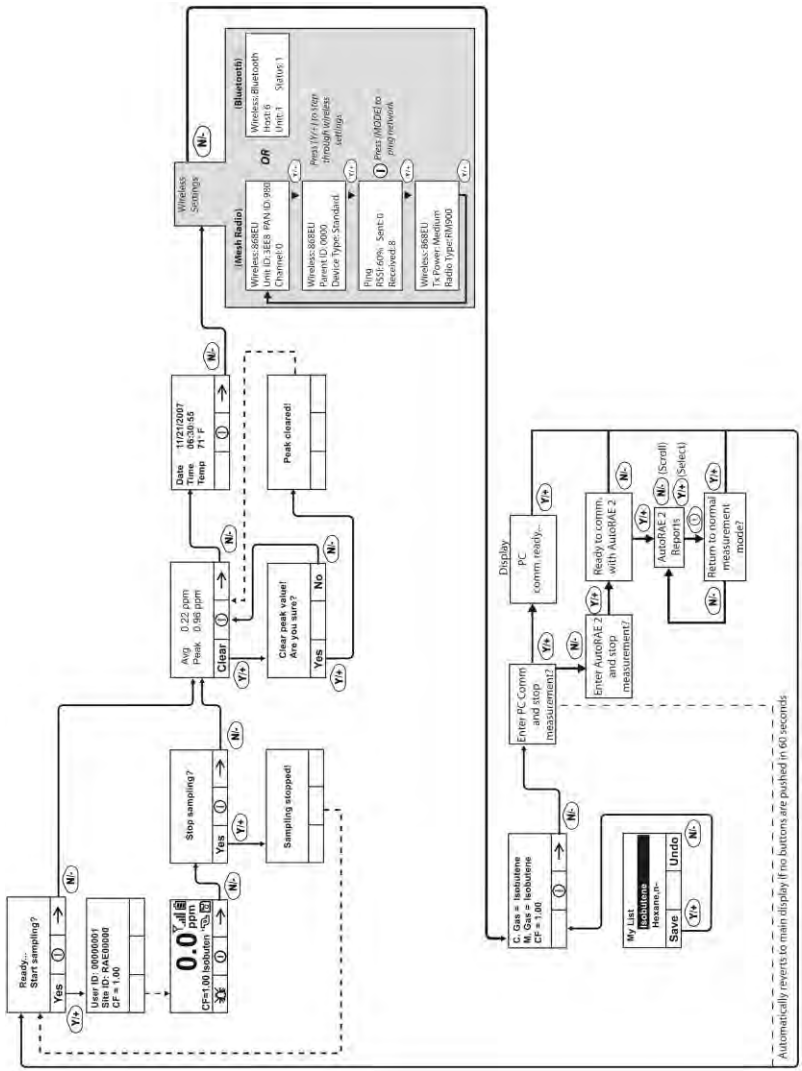


Note: Dashed line indicates automatic progression.

Basic User Level & Search Mode

With the instrument in Operation Mode: Search Mode, enter User Mode and select Basic User Level (refer to the section called User Mode for instructions).

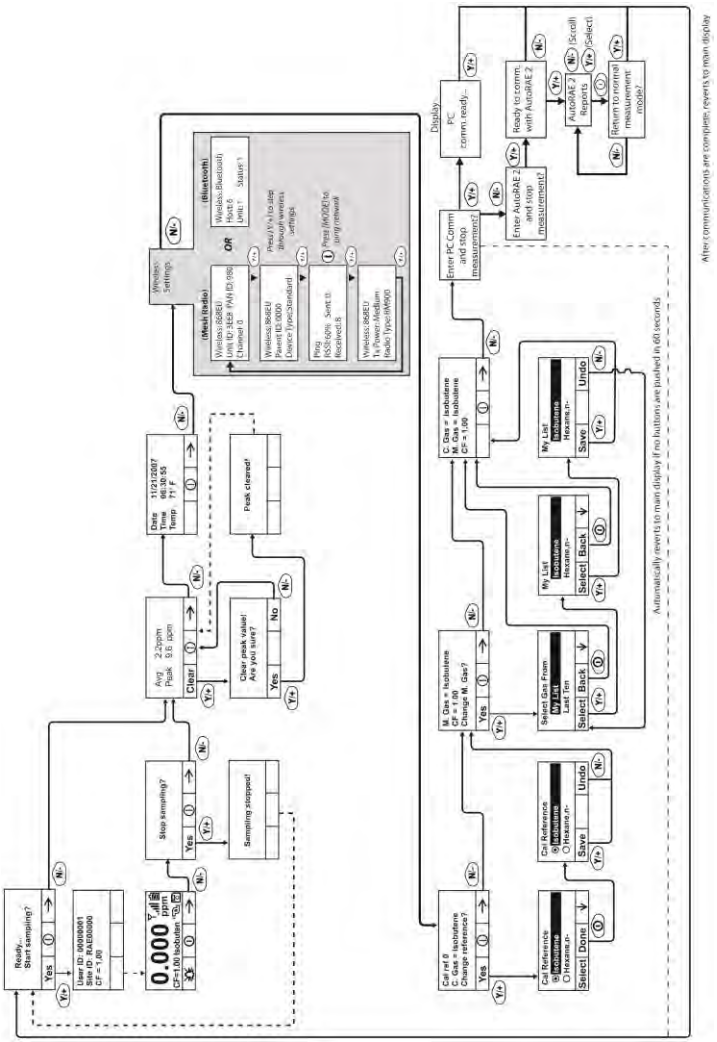
When the instrument is in Search Mode, it only samples when you activate sampling. When you see the display that says, "Ready…Start sampling?" press [Y/+] to start. The pump turns on and the instrument begins collecting data. To stop sampling, press [N/-] while the main display is showing. You will see a new screen that says, "Stop sampling?" Press [Y/+] to stop sampling. Press [N/-] if you want sampling to continue.



Note: Dashed line indicates automatic progression.

Advanced User Level & Search Mode

With the instrument in Operation Mode: Search Mode, enter User Mode and select Advanced User Level (refer to the section called Monitor Mode for instructions). Operation is similar to Basic User Level & Sampling Mode, but now allows you to change calibration and measurement reference gases. Refer to the section on measurement gases on page 60 for more details.



Note: Dashed line indicates automatic progression.

Diagnostic Mode

IMPORTANT! Diagnostic Mode is designed for servicing and manufacturing, and therefore is not intended for everyday use, even by advanced users. It provides raw data from sensors and about settings, but only allows adjustment of pump stall parameters, which should only be changed by qualified personnel.

Note: If the instrument is turned on in Diagnostic Mode and you switch to User Mode, datalog data remains in raw count form. To change to standard readings, you must restart the instrument.

Entering Diagnostic Mode

Note: To enter Diagnostic Mode, you must begin with the instrument turned off.

Press and hold [Y/+] and [MODE] until the instrument starts.

The instrument goes through a brief startup, and then displays raw data for the PID sensor. These numbers are raw sensor readings without calibration. The instrument is now in Diagnostic Mode.

Note: In Diagnostic Mode, the pump and lamp are normally on.

You can enter Programming Mode and calibrate the instrument as usual by pressing both [MODE] and [N/-] for three seconds.

You can enter Monitoring Mode by pressing [MODE] and [Y/+] together for three seconds.

Once the instrument is started up in Diagnostic Mode, you can switch between Diagnostic Mode and Monitoring Mode by pressing and holding [MODE] and [Y/+] simultaneously for two seconds.

In Diagnostic mode, you can step through parameter screens by pressing [MODE].

Adjusting The Pump Stall Threshold

If the gas inlet is blocked but the pump does not shut down, or the pump shuts down too easily with a slight blockage, the pump stall threshold value may be set too high or too low.

Use the following steps to adjust the pump stall threshold:

Pump High

In Diagnostic Mode, press the [MODE] key until "Pump High" is displayed. The display shows the maximum, minimum, and stall values for the pump at its high speed. Write down the "Max" reading.

Block the gas inlet and watch the pump current reading (labeled "I") increase. Write down its blocked reading. **Note:** If the pump current reading does not increase significantly (less than 10 counts), then there may be a leak in the gas inlet or the pump is weak or defective.

Add the two readings you wrote down. This is the average of the maximum block count and the maximum idle count. Divide that number by 2. Use the [Y/+] or [N/-] key to increase or decrease the stall value to equal that number.

Press the [MODE] key to exit this display.

Pump Low

In Diagnostic Mode, press the [MODE] key until "Pump Low" is displayed. The display shows the maximum, minimum, and stall values for the pump at its low speed. Write down the "Max" reading.

Block the gas inlet and watch the pump current reading (labeled "I") increase. Write down its blocked reading. **Note:** If the pump current reading does not increase significantly (less than 10 counts), then there may be a leak in the gas inlet or the pump is weak or defective.

Add the two readings you wrote down. This is the average of the maximum block count and the maximum idle count. Divide that

number by 2. Use the [Y/+] or [N/-] key to increase or decrease the stall value to equal that number.

Press the [MODE] key to exit this display.

Exiting Diagnostic Mode

You can exit Diagnostic Mode and go directly to Programming Mode or Monitor Mode as outlined above, or you can exit Diagnostic Mode completely.

To exit Diagnostic Mode so that it cannot be re-entered without a restart:

Shut down the instrument. When it is off, restart it by holding the [MODE] key. Diagnostic Mode cannot be entered until the instrument is restarted as outlined in "Entering Diagnostic Mode."

Transferring Data To & From A Computer

Once you have connected your instrument cradle to the PC, you can can transfer data, including a download of the datalog to the computer and updates of firmware to the instrument (should this ever be necessary).

Downloading The Datalog To A PC

1. Connect the data cable to the PC and the cradle.
2. Place the instrument into its cradle. The charging LED should be illuminated.
3. Start ProRAE Studio on your PC.
4. From ProRAE Studio, select "Operation" and select Setup Connection.
5. Select the COM port to establish a communication link between the PC and the instrument.
6. To receive the datalog in the PC, select "Downlog Datalog."
7. When you see "Unit Information," click OK.

During the data transfer, the display shows a progress bar.

When the transfer is done, you will see a screen with the datalog information. You can now export this datalog for other use or printing.

Uploading Firmware To The instrument From A PC

Uploading new firmware to your instrument requires connecting the instrument and PC. Follow these steps to make the connection:

1. Connect the data cable to the PC and the cradle.
2. Place the instrument into its cradle. The charging LED should be illuminated.
3. Start RAEProgrammer 7000 on your PC.
4. From RAEProgrammer 7000, select "Operation" and select Setup Connection.
5. Select the COM port to establish a communication link between the PC and the instrument.
6. Select Operation → Download Firmware.

Once communication is established, follow the instructions that accompany RAEProgrammer 7000 and the firmware to upload the new firmware to your instrument.

Note: Check for the latest updates to ProRAEProgrammer 7000 at www.raesystems.com.

Maintenance

The major maintenance items of the instrument are:

- Battery pack
- Sensor module
- PID lamp
- Sampling pump
- Inlet connectors and filters

Note: Maintenance should be performed by qualified personnel only.

NOTE: The printed circuit board of the instrument is connected to the battery pack even if the power is turned off. **Therefore, it is very important to disconnect the battery pack before servicing or replacing any components inside the instrument**. **Severe damage to the printed circuit board or battery may occur if the battery pack is not disconnected before servicing the unit.**

Battery Charging & Replacement

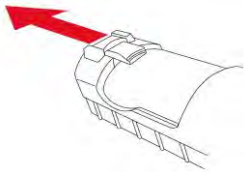
When the display shows a flashing empty battery icon, the battery requires recharging. It is recommended to recharge the instrument upon returning from fieldwork. A fully charged battery runs a instrument for 16 hours continuously. The charging time is less than 8 hours for a fully discharged battery. The battery may be replaced in the field (in areas known to be non-hazardous), if required.

WARNING!

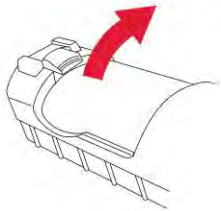
To reduce the risk of ignition of hazardous atmospheres, recharge battery only in area known to be non-hazardous. **Remove and replace battery only in areas known to be non-hazardous.**

Replacing The Li-ion Battery

1. Turn off the instrument.
2. Located on the rear of the instrument is a battery tab. Slide it down to unlock the battery.



3. Remove the battery pack from the battery compartment by tilting it out.



4. Replace a fully charged spare battery pack inside the battery compartment. Make sure the battery pack is oriented properly inside the compartment.
5. Slide the capture tab back up to its locked position.

Replacing The Alkaline Battery Adapter

An alkaline battery adapter is supplied with each instrument. The adapter (part number 059-3052-000) accepts four AA alkaline batteries (use only Duracell MN1500) and provides approximately 12 hours of operation. The adapter is intended to be used in emergency situations when there is no time to charge the Li-ion battery pack.

To insert batteries into the adapter:

1. Remove the three Philips-head screws to open the compartment.
2. Insert four fresh AA batteries as indicated by the polarity (+/-) markings.
3. Replace the cover. Replace the three screws.

To install the adapter in the instrument:

1. Remove the Li-ion battery pack from the battery compartment by sliding the tab and tilting out the battery.
2. Replace it with the alkaline battery adapter
3. Slide the tab back into place to secure the battery adapter.

IMPORTANT!

Alkaline batteries cannot be recharged. The instrument's internal circuit detects alkaline batteries and will not allow recharging. If you place the instrument in its cradle, the alkaline battery will not be recharged. The internal charging circuit is designed to prevent damage to alkaline batteries and the charging circuit when alkaline batteries are installed inside the instrument.

Note: When replacing alkaline batteries, dispose of old ones properly.

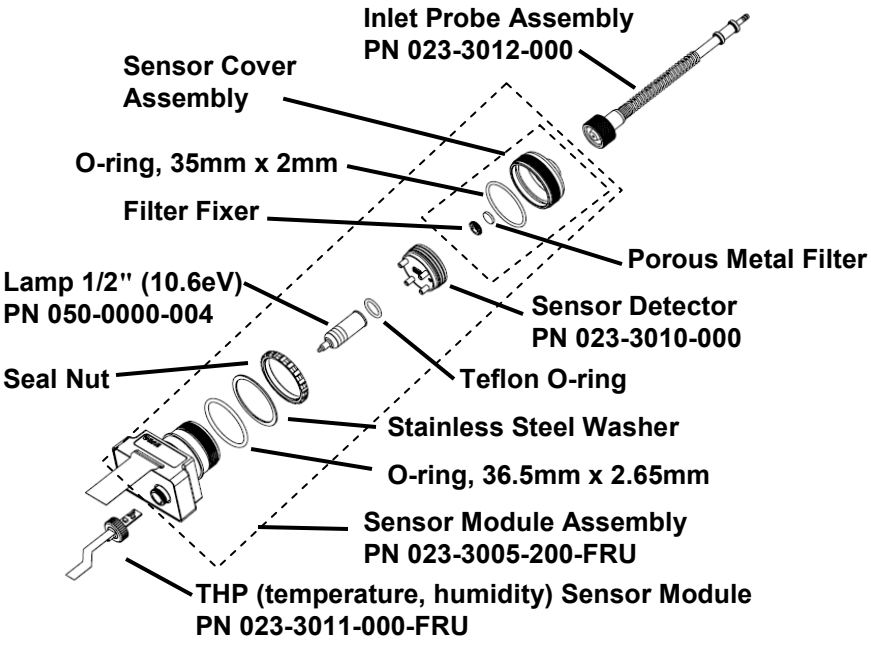
WARNING!

To reduce the risk of ignition of hazardous atmospheres, recharge the battery only in areas known to be non-hazardous. Remove and replace the battery only in areas known to be non-hazardous.

Note: The internal charging circuit is designed to prevent charging to alkaline batteries.

PID Sensor & Lamp Cleaning/Replacement

The sensor module is made of several components and is attached to the lamp-housing unit as shown below.



Sensor Components

Note: The cleaning procedure is not normally needed. Clean the PID sensor module, the lamp and the lamp housing only if:

1. The reading is inaccurate even after calibration.
2. The reading is very sensitive to air moisture.
3. A liquid has been sucked into the unit and damaged the unit.

Use of the external filter helps to prevent contamination of the sensor.

To access the sensor components and lamp, gently unscrew the lamp-housing cap, remove the sensor adapter with the gas inlet probe and the metal filter all together. Then hold the PID sensor and pull it straight out. A slight, gentle rocking motion helps release the sensor.

Cleaning The PID Sensor

Place the entire PID sensor module into GC grade methanol. It is highly recommended that an ultrasound bath to be used to clean the sensor for at least 15 minutes. Then dry the sensor thoroughly. Never touch the electrodes of the sensor by hand.
Also use a methanol-soaked cotton swab to wipe off the lamp housing where it contacts the sensor when the sensor is installed.

Turn over the sensor so that the pins point up and the sensor cavity is visible. Examine the sensor electrodes for any corrosion, damage, or bending out of alignment. The metal sensor electrode "fingers" should be flat and straight. If necessary, carefully bend the sensor fingers to ensure that they do not touch the Teflon portions and that they are parallel to each other. Make sure that the nuts on the sensor pins are snug but not overtight. If the sensor is corroded or otherwise damaged, it should be replaced.

Cleaning The Lamp Housing Or Changing The Lamp

If the lamp does not turn on, the instrument will display an error message to indicate replacement of the lamp may be required.

1. If the lamp is operational, clean the lamp window surface and the lamp housing by wiping it with GC grade methanol using a cotton swab using moderate pressure. After cleaning, hold the lamp up to the light at an angle to detect any remaining film. Repeat the process until the lamp window is clean. Never use water solutions to clean the lamp. Dry the lamp and the lamp housing thoroughly after cleaning.

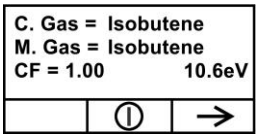
   CAUTION: Never touch the window surface with the fingers or anything else that may leave a film. Never use acetone or aqueous solutions.

2. If the lamp does not turn on, remove the lamp from the lamp housing. Place the lamp O-ring onto the new lamp. Insert the new lamp, avoiding contact with the flat window surface.
3. Reinstall the PID sensor module.
4. Tighten the Lamp Housing Cap.

Determining The Lamp Type

The monitor can accommodate three lamp values: 10.6eV (standard), 9.8eV, and 11.7eV. Always make sure you are using the correct lamp value and that the instrument is set to use that lamp.

Also, when the monitor is running, the lamp type is shown along with the calibration and measurement gas and Correction Factor:



Note: This screen can be accessed from the reading screen by pressing [N/-] four times.

You can manually determine the lamp type, too:

1. Turn off the instrument and remove the lamp. Now look at the serial number. The following identify the lamp type:

    - 10.6eV SN: 106 2Nxxxxx
    - 9.8eV SN: 098 2Nxxxxx
    - 11.7eV SN: 117 2Nxxxxx

Programming The Lamp ID

The correct measurement gas library is used by the instrument when you ensure that the right lamp value is programmed.

To manually select the Lamp ID:

1. Enter the Programming menu.
2. Select Monitor Setup.
3. Scroll down and select the Lamp ID sub-menu.
4. Press [N/-] to scroll down to the desired Lamp ID.
5. Press [Y/+] to select.
6. Press [MODE] to select Done.
7. Select "Save."
8. Return to the main menu.

Recalibrate the instrument before returning it to service.

Sampling Pump

When approaching the end of the specified lifetime of the pump, it will consume higher amount of energy and reduce its sample draw capability significantly. When this occurs, it is necessary to replace or rebuild the pump. When checking the pump flow, make sure that the inlet connector is tight and the inlet tubing is in good condition. Connect a flow meter to the gas inlet probe. The flow rate should be above 450 cc/min when there is no air leakage.

If the pump is not working properly, refer the instrument to qualified service personnel for further testing and, if necessary, pump repair or replacement.

Cleaning The Instrument

Occasional cleaning with a soft cloth is recommended. Do not use detergents or chemicals.

Visually inspect the contacts at the base of the instrument, on the battery, and on the charging cradle to make sure they are clean. If they are not, wipe them with a soft, dry cloth. Never use solvents or cleaners.

Ordering Replacement Parts

If you need replacement parts, contact your local RAE Systems distributor. A list is available online:

http://www.raesystems.com

In the U.S., you can order sensors, replacement batteries, and other accessories online at:

http://istore.raesystems.com/

Special Servicing Note

If the instrument needs to be serviced, contact either:

1. The RAE Systems distributor from whom the instrument was purchased; they will return the instrument on your behalf.

   or

2. The RAE Systems Technical Service Department. Before returning the instrument for service or repair, obtain a Returned Material Authorization (RMA) number for proper tracking of your equipment. This number needs to be on all documentation and posted on the outside of the box in which the instrument is returned for service or upgrade. Packages without RMA Numbers will be refused at the factory.

Troubleshooting

Problem	Possible Reasons & Solutions	
Cannot turn on power after charging the battery	**Reasons:**	Discharged battery. Defective battery.
	Solutions:	Charge or replace battery.
Lost password	**Solutions:**	Call Technical Support at +1 408-752-0723 or toll-free at +1 888-723-4800
Reading abnormally High	**Reasons:**	Dirty filter. Dirty sensor module. Excessive moisture and water condensation. Incorrect calibration.
	Solutions:	Replace filter. Blow-dry the sensor module. Calibrate the unit.
Reading abnormally Low	**Reasons:**	Dirty filter. Dirty sensor module. Weak or dirty lamp. Incorrect calibration.
	Solutions:	Replace filter. Remove Calibration Adapter. Calibrate the unit. Check for air leakage.
Buzzer Inoperative	**Reasons:**	Bad buzzer.
	Solutions:	Check that buzzer is not turned off. Call authorized service center.

Inlet flow too low	**Reasons:**	Pump diaphragm damaged or has debris. Flow path leaks.
	Solutions:	Check flow path for leaks; sensor module O-ring, tube connectors, Teflon tube compression fitting. Call Technical Support at +1 408-752-0723 or toll-free at +1 888-723-4800
"Lamp" message during operation	**Reasons:**	Lamp drive circuit. Weak or defective PID lamp, defective.
	Solutions:	Turn the unit off and back on. Replace UV lamp

Technical Support

To contact RAE Systems Technical Support Team:

Monday through Friday, 7:00AM to 5:00PM Pacific (US) Time
Phone (toll-free): +1 888-723-4800
Phone: +1 408-952-8461
Email: tech@raesystems.com

RAE Systems Contacts

RAE Systems by Honeywell
World Headquarters
3775 N. First St.
San Jose, CA 95134-1708 USA
Phone: 408.952.8200
Toll-Free: 888.723.4800
Fax: 408.952.8480

E-mail (technical support): RAE-tech@honeywell.com
Web Site: www.raesystems.com

WORLDWIDE SALES OFFICES
USA/Canada 1.877.723.2878
Europe +800.333.222.44/+41.44.943.4380
Middle East +971.4.450.5852
China +86.10.5885.8788-3000
Asia Pacific +852.2669.0828

Controlled Part of Manual

Intrinsic Safety:
US and Canada: Class I, Division 1, Groups A,B,C,D T4

Europe: ATEX (0575 Ex II 2G Ex ia IIC/IIB T4 Gb)
KEMA 07 ATEX 0127
Complies with EN60079-0:2009, EN60079-11:2007
IECEx CSA 10.0005 Ex ia IIC/IIB T4 Gb
Complies with IEC 60079-0:2007, IEC 60079-11:2006

Temperature: -20º C to 50º C (-4º to 122º F)

Humidity: 0% to 95% relative humidity (non-condensing)

Basic Operation

Turning The Instrument On

1. With the instrument turned off, press and hold [MODE].
2. When the display turns on, release the [MODE] key.

The instrument is now operating and performs self tests. Once the self tests are complete, the display shows a graph or numerical gas reading. This indicates that the instrument is fully functional and ready to use.

Turning The Instrument Off

1. Press and hold the Mode key for 3 seconds. A 5-second countdown to shutoff begins.
2. When you see "Unit off..." release your finger from the [MODE] key. The instrument is now off.

Note: You must hold your finger on the key for the entire shutoff process. If you remove your finger from the key during the countdown, the shutoff operation is canceled and the instrument continues normal operation.

Alarm Signals

During each measurement period, the gas concentration is compared with the programmed alarm limits (gas concentration alarm limit settings). If the concentration exceeds any of the preset limits, the loud buzzer and red flashing LED are activated immediately to warn you of the alarm condition.

In addition, the instrument alarms if one of the following conditions occurs: battery voltage falls below a preset voltage level, failure of the UV lamp, pump stall, or when the datalog memory is full.

Alarm Signal Summary

Message	Condition	Alarm Signal
HIGH	Gas exceeds "High Alarm" limit	3 beeps/flashes per second*
OVR	Gas exceeds measurement range	3 beeps/flashes per second*
MAX	Gas exceeds electronics' maximum range	3 beeps/flashes per second*
LOW	Gas exceeds "Low Alarm" limit	2 beeps/flashes per second*
TWA	Gas exceeds "TWA" limit	1 Beep/flash per second*
STEL	Gas exceeds "STEL" limit	1 Beep/flash per second*
Pump icon flashes	Pump failure	3 beeps/flashes per second
Lamp	PID lamp failure	3 beeps/flashes per second plus "Lamp" message on display

Battery icon flashes	Low battery	1 flash, 1 beep per minute plus battery icon flashes on display
CAL	Calibration failed, or needs calibration	1 beep/flash per second
NEG	Gas reading measures less than number stored in calibration	1 beep/flash per second

Preset Alarm Limits & Calibration

The instrument is factory calibrated with standard calibration gas, and is programmed with default alarm limits.

Cal Gas (Isobutylene)	Cal Span	unit	Low	High	TWA	STEL
ppbRAE 3000	10	ppm	10	25	10	25
MiniRAE 3000	100	ppm	50	100	10	25
MiniRAE Lite	100	ppm	50	100	10	25
UltraRAE 3000	100	ppm	50	100	10	25

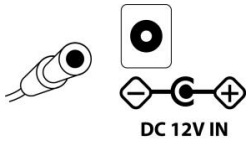
Charging The Battery

Always fully charge the battery before using the instrument. The instrument's Li-ion/NiMH battery is charged by placing the instrument in its cradle. Contacts on the bottom of the instrument meet the cradle's contacts, transferring power without other connections.

Note: Before setting the instrument into its charging cradle, visually inspect the contacts to make sure they are clean. If they are not, wipe them with a soft cloth. Do not use solvents or cleaners.

Follow this procedure to charge the instrument:

1. Plug the AC/DC adapter's barrel connector into the instrument's cradle.



2. Plug the AC/DC adapter into the wall outlet.
3. Place the instrument into the cradle, press down, and lean it back. It locks in place and the LED in the cradle glows.

Note: To release the instrument, press down and tilt the top out of the cradle and lift up.

The instrument begins charging automatically. The LED on the front of the cradle marked "Primary" blinks during charging. During charging, the diagonal lines in the battery icon on the instrument's display are animated and you see the message "Charging..."

When the instrument's battery is fully charged, the battery icon is no longer animated and shows a full battery. The message "Fully charged!" is shown and the Primary LED on the cradle glows continuously green.

Note: A spare Li-ion battery (059-3051-000) or NiMH(059-3054-000) can be charged by placing it directly in the charging port on the back of the cradle. It can be charged at the same time as the instrument. Press the battery in place, sliding it slightly toward the front of the cradle. This locks it in the cradle. To release the battery, slide it forward again and tilt it up.

Note: An Alkaline Battery Adapter (part number 059-3052-000), which uses four AA alkaline batteries (Duracell MN1500), may be substituted for the Li-Ion battery.

WARNING!

To reduce the risk of ignition of hazardous atmospheres, recharge and replace batteries only in areas known to be non-hazardous. **Remove and replace batteries only in areas known to be non-hazardous.**

Low Voltage Warning

When the battery's charge falls below a preset voltage, the instrument warns you by beeping once and flashing once every minute, and the battery icon blinks once per second. You should turn off the instrument within 10 minutes and either recharge the battery by placing the instrument in its cradle, or replace the battery with a fresh one with a full charge.

Clock Battery

An internal clock battery is mounted on one of the instrument's printed circuit boards. This long-life battery keeps settings in memory from being lost whenever the Li-ion, NiMH, or alkaline batteries are removed. This backup battery should last approximately five years, and must be replaced by an authorized RAE Systems service technician. It is not user-replaceable.

WARNING

To reduce the risk of ignition of hazardous atmospheres, recharge battery only in area known to be non-hazardous. Remove and replace battery only in an area known to be non-hazardous.

Replacing Rechargeable Li-Ion or NiMH Battery

Caution: Turn off the instrument before removing or replacing the battery.

Alkaline Battery Adapter

An alkaline battery adapter is supplied with each instrument. The adapter (part number 059-3052-000) accepts four AA alkaline batteries (use only Duracell MN1500).

Do not mix old and new batteries or different type batteries.

Troubleshooting

Problem	Possible Reasons & Solutions	
Cannot turn on power after charging the battery	**Reasons:**	Discharged battery. Defective battery.
	Solutions:	Charge or replace battery.
Lost password	**Solutions:**	Call Technical Support at +1 408-752-0723 or toll-free at +1 888-723-4800
Reading abnormally High	**Reasons:**	Dirty filter. Dirty sensor module. Excessive moisture and water condensation. Incorrect calibration.
	Solutions:	Replace filter. Blow-dry the sensor module. Calibrate the unit.
Reading abnormally Low	**Reasons:**	Dirty filter. Dirty sensor module. Weak or dirty lamp. Incorrect calibration.
	Solutions:	Replace filter. Remove Calibration Adapter. Calibrate the unit. Check for air leakage.
Buzzer Inoperative	**Reasons:**	Bad buzzer.
	Solutions:	Check that buzzer is not turned off. Call authorized service center.

Inlet flow too low	**Reasons:**	Pump diaphragm damaged or has debris. Flow path leaks.
	Solutions:	Check flow path for leaks; sensor module O-ring, tube connectors, Teflon tube compression fitting. Call Technical Support at +1 408-752-0723 or toll-free at +1 888-723-4800
"Lamp" message during operation	**Reasons:**	Lamp drive circuit. Weak or defective PID lamp, defective.
	Solutions:	Turn the unit off and back on. Replace UV lamp

RAE Systems by Honeywell
World Headquarters
3775 N. First St.
San Jose, CA 95134-1708 USA
Phone: 408.952.8200
Toll-Free: 888.723.4800
Fax: 408.952.8480

E-mail (technical support): RAE-tech@honeywell.com
Web Site: www.raesystems.com

WORLDWIDE SALES OFFICES
USA/Canada 1.877.723.2878
Europe +800.333.222.44/+41.44.943.4380
Middle East +971.4.450.5852
China +86.10.5885.8788-3000
Asia Pacific +852.2669.0828

Rev. F
February 2016
P/N 059-4020-000

DUSTTRAK™ II AEROSOL MONITOR MODEL 8530/8530EP/8532

OPERATION AND SERVICE MANUAL

P/N 6001893, REVISION S
JANUARY 2019

DustTrak II 8530 Desktop and 8532 Handheld

DustTrak II 8530EP Monitor

START SEEING THE BENEFITS OF REGISTERING TODAY!

Thank you for your TSI instrument purchase. Occasionally, TSI releases information on software updates, product enhancements and new products. By registering your instrument, TSI will be able to send this important information to you.

http://register.tsi.com

As part of the registration process, you will be asked for your comments on TSI products and services. TSI's customer feedback program gives customers like you a way to tell us how we are doing.

UNDERSTANDING, ACCELERATED

TSI Incorporated - Visit our website **www.tsi.com** for more information.

USA	**Tel:** +1 800 874 2811	**India**	**Tel:** +91 80 67877200
UK	**Tel:** +44 149 4 459200	**China**	**Tel:** +86 10 8219 7688
France	**Tel:** +33 1 41 19 21 99	**Singapore**	**Tel:** +65 6595 6388
Germany	**Tel:** +49 241 523030		

©2015 TSI Incorporated

Printed in U.S.A.

Copyright ©
TSI Incorporated / 2008–2019 / All rights reserved.

Address
TSI Incorporated / 500 Cardigan Road / Shoreview, MN 55126 / USA

Fax No.
(651) 490-3824

Limitation of Warranty and Liability (effective April 2014)

(For country-specific terms and conditions outside of the USA, please visit www.tsi.com.)

Seller warrants the goods, excluding software sold hereunder, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for twenty-four (24) months, or if less, the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions and exceptions:

a. Hot-wire or hot-film sensors used with research anemometers, and certain other components when indicated in specifications, are warranted for 90 days from the date of shipment;
b. DustTrak internal pump for Models 8530 and 8533 is warranted for two (2) years or 4000 hours, whichever comes first;
c. DustTrak external pump for Models 8530EP and 8533EP is warranted for two (2) years or 8760 hours, whichever comes first;
d. DustTrak internal pump for Models 8530 and 8533 is warranted for operation within ambient temperatures between 5–45°C. Warranty is void when the internal pump is operating outside of this temperature range;
e. Parts repaired or replaced as a result of repair services are warranted to be free from defects in workmanship and material, under normal use, for 90 days from the date of shipment;
f. Seller does not provide any warranty on finished goods manufactured by others or on any fuses, batteries or other consumable materials. Only the original manufacturer's warranty applies;
g. This warranty does not cover calibration requirements, and seller warrants only that the instrument or product is properly calibrated at the time of its manufacture. Instruments returned for calibration are not covered by this warranty;
h. This warranty is **VOID** if the instrument is opened by anyone other than a factory authorized service center with the one exception where requirements set forth in the manual allow an operator to replace consumables or perform recommended cleaning;
i. This warranty is **VOID** if the product has been misused, neglected, subjected to accidental or intentional damage, or is not properly installed, maintained, or cleaned according to the requirements of the manual. Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, goods which are incorporated into other products or equipment, or which are modified by any person other than Seller.

The foregoing is **IN LIEU OF** all other warranties and is subject to the **LIMITATIONS** stated herein. **NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. WITH RESPECT TO SELLER'S BREACH OF THE IMPLIED WARRANTY AGAINST INFRINGEMENT, SAID WARRANTY IS LIMITED TO CLAIMS OF DIRECT INFRINGEMENT AND EXCLUDES CLAIMS OF CONTRIBUTORY OR INDUCED INFRINGEMENTS. BUYER'S EXCLUSIVE REMEDY SHALL BE THE RETURN OF THE PURCHASE PRICE DISCOUNTED FOR REASONABLE WEAR AND TEAR OR AT SELLER'S OPTION REPLACEMENT OF THE GOODS WITH NON-INFRINGING GOODS.**

TO THE EXTENT PERMITTED BY LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF SELLER'S LIABILITY FOR ANY AND ALL LOSSES, INJURIES, OR DAMAGES CONCERNING THE GOODS (INCLUDING CLAIMS BASED ON CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) SHALL BE THE RETURN OF GOODS TO SELLER AND THE REFUND OF THE PURCHASE PRICE, OR, AT THE OPTION OF SELLER, THE REPAIR OR REPLACEMENT OF THE GOODS. IN THE CASE OF SOFTWARE, SELLER WILL REPAIR OR REPLACE DEFECTIVE SOFTWARE OR IF UNABLE TO DO SO, WILL REFUND THE PURCHASE PRICE OF THE SOFTWARE. IN NO EVENT SHALL SELLER BE LIABLE FOR LOST PROFITS, BUSINESS INTERRUPTION OR ANY SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES. SELLER SHALL NOT BE RESPONSIBLE FOR INSTALLATION, DISMANTLING OR REINSTALLATION COSTS OR CHARGES. No Action, regardless of form, may be brought against Seller more than 12 months after a cause of action has accrued. The goods returned under warranty to Seller's factory shall be at Buyer's risk of loss, and will be returned, if at all, at Seller's risk of loss.

Buyer and all users are deemed to have accepted this LIMITATION OF WARRANTY AND LIABILITY, which contains the complete and exclusive limited warranty of Seller. This LIMITATION OF WARRANTY AND LIABILITY may not be amended, modified or its terms waived, except by writing signed by an Officer of Seller.

Service Policy

Knowing that inoperative or defective instruments are as detrimental to TSI as they are to our customers, our service policy is designed to give prompt attention to any problems. If any malfunction is discovered, please contact your nearest sales office or representative, or call TSI's Customer Service department at (800) 680-1220 (USA) or (001 651) 490-2860 (International) or visit www.tsi.com.

CONTENTS

SAFETY INFORMATION V
Laser Safety v
Labels vi
Description of Caution/Warning Symbols vii
Caution vii
Warning vii
Caution and Warning Symbols vii
Reusing and Recycling vii

CHAPTER 1 UNPACKING AND PARTS IDENTIFICATION 1
Unpacking the DustTrak II Aerosol Monitor 2
Optional Accessories 7
Parts Identification for the DustTrak II Desktop Aerosol Monitor Models 8530 8
Parts Identification for the DustTrak II Desktop Aerosol Monitor Model 8530EP 9
External Pump Module (8530EP only) 9
Parts Identification for the DustTrak II Handheld Aerosol Monitor Model 8532 10

CHAPTER 2 SETTING UP 11
Supplying Power to the DustTrak II Aerosol Monitor 11
Installing the Batteries in Model 8530/8530EP Desktop 11
Installing the Batteries in Model 8532 Handheld 12
Connecting the External Pump to DustTrak Model 8530EP 12
Using the AC Adapter to Run Instrument 14
Battery Charging 14
Inlet Cap 15
Size-Selective Impactors 15
Dorr-Oliver Cyclone 16
Instrument Setup 16
Connecting to the Computer 16
Installing TrakPro™ Data Analysis Software 16
Connecting Analog/Alarm Output 17
Wiring the Analog Output 18
Wiring the Alarm 18

CHAPTER 3 OPERATION 19
Getting Started 19
For Model DustTrak 8530EP only 19
Setup Menu 22
Zero Cal 23
Flow Cal 24
User Cal 25
Alarm 30
Analog 32
Settings 33
Run Mode 35
Survey Mode 36
Manual Mode 37

Log Mode (1–5) 38
Locking Feature 39
Taking Mass Concentration Measurements 41
Screen Regions 42
Stats 43
Graphing 43
Viewing Data 45
Title Bar 46

CHAPTER 4 MAINTENANCE 47
Maintenance Schedule 47
Zeroing Instrument 48
Cleaning the Inlet 48
Cleaning and Oiling Impactors 49
Replacing the Internal Filters 50
Replacing the Filters in the External Pump Module 54
Storage Precautions 54

CHAPTER 5 TROUBLESHOOTING 55

APPENDIX A SPECIFICATIONS 61

APPENDIX B ZERO MODULE 63

INDEX 65

These Application Notes can also be found on TSI's web site:
http://www.tsi.com

EXPMN-001 DustTrak II Theory of Operation.pdf
EXPMN-003 DustTrak II Impactor.pdf

Safety Information

IMPORTANT

There are no user serviceable parts inside the instrument. Refer all repair and maintenance to a qualified factory-authorized technician. All maintenance and repair information in this manual is included for use by a qualified factory-authorized technician.

Laser Safety

- The Model 8530/8532 DustTrak II monitor is a Class I laser-based instrument.
- During normal operation, you will ***not*** be exposed to laser radiation.
- Precaution should be taken to avoid exposure to hazardous radiation in the form of intense, focused, visible light.
- Exposure to this light may cause blindness.

Take these precautions:

- ***DO NOT*** remove any parts from the DustTrak II monitor unless you are specifically told to do so in this manual
- ***DO NOT*** remove the housing or covers. There are no serviceable components inside the housing.

WARNING

The use of controls, adjustments, or procedures other than those specified in this manual may result in exposure to hazardous optical radiation.

WARNING

There are no user-serviceable parts inside this instrument. The instrument should only be opened by TSI or a TSI approved service technician.

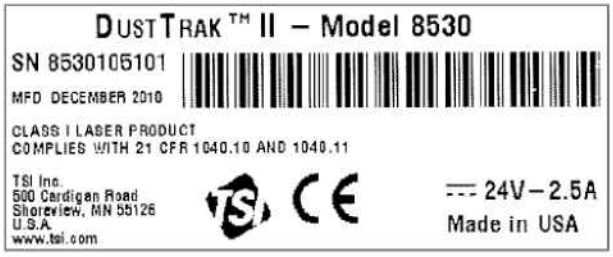
WARNING

If the DustTrak monitor is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

When operated according to the manufacturer's instruction, this device is a Class I laser product as defined by U.S. Department of Health and Human Services standards under the Radiation Control for Health and Safety Act of 1968. A certification and identification label like the one shown below is affixed to each instrument.

Labels

Advisory labels and identification labels are attached to the instrument.

1. Serial Number Label (bottom)	
2. Laser Radiation Label (internal)	**DANGER!** VISIBLE LASER RADIATION WHEN OPEN. AVOID DIRECT EXPOSURE TO BEAM WARNING: NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL
3. Battery label	**!!WARNING!!** THIS INSTRUMENT WAS DESIGNED TO USE ONLY TSI SUPPLIED BATTERIES, PN 801680 or **!!WARNING!!** THIS INSTRUMENT WAS DESIGNED TO USE ONLY TSI SUPPLIED BATTERY, PN 801681
4. European symbol for non-disposable item. Item must be recycled.	

Description of Caution/Warning Symbols

Appropriate caution/warning statements are used throughout the manual and on the instrument that require you to take cautionary measures when working with the instrument.

Caution

Caution

Failure to follow the procedures prescribed in this manual might result in irreparable equipment damage. Important information about the operation and maintenance of this instrument is included in this manual.

Warning

WARNING

Warning means that unsafe use of the instrument could result in serious injury to you or cause damage to the instrument. Follow the procedures prescribed.

Caution and Warning Symbols

The following symbols may accompany cautions and warnings to indicate the nature and consequences of hazards:

	Warns that the instrument contains a laser and that important information about its safe operation and maintenance is included in the manual.
	Warns that the instrument is susceptible to electro-static discharge (ESD) and ESD protection should be followed to avoid damage.
	Indicates the connector is connected to earth ground and cabinet ground.

Reusing and Recycling

As part of TSI Incorporated's effort to have a minimal negative impact on the communities in which its products are manufactured and used:

- Do ***not*** dispose of used batteries in the trash. Follow local environmental requirements for battery recycling.
- If instrument becomes obsolete, return to TSI for disassembly and recycling.

(This page intentionally left blank)

Chapter 1

Unpacking and Parts Identification

Carefully unpack the Model 8530/8532 DustTrak™ II Aerosol Monitor from the shipping container. Use the tables and illustrations below to make certain that there are no missing components. Contact TSI immediately if anything is missing or damaged.

Note

If you purchased a DustTrak II Model 8530-NA (no accessories) Aerosol Monitor, it only comes with the following items:

- DustTrak II Model 8530 Aerosol Monitor
- Operations manual
- TrakPro™ Data Analysis Software CD
- One-year calibration certificate
- Service paperwork
- 2-year warranty

All accessories for the DustTrak II Model 8530 Aerosol Monitor are sold separately. Contact TSI at (800) 680-1220 for information on accessories and how to purchase them through a TSI sales representative.

(continued on next page)

Unpacking the DustTrak II Aerosol Monitor

Compare all the components you received with those listed in the table below. If any parts are missing, contact TSI.

Item	Qty	Part Number	Description
or	1	8530	Desktop II
		8532	Handheld II
	1	801670	Desktop II Carrying Case
		801669	Handheld II Carrying Case
	1	1090014	Data Analysis Software CD-ROM
	1	800663	Zero Filter

Item	Qty	Part Number	Description
or	1	801680	7800 mAH Lithium Ion Rechargeable Battery (Desktop)
		801681	Rechargeable lithium ion battery (Handheld)
	1	1303740	USB cable
	1	801652	Analog/alarm output cable (Desktop models only)
	1	6001893	Operation and Service Manual
	1	N/A	Calibration Certificate

Item	Qty	Part Number	Description
	1	801688	Conductive Tubing
	1	801668	Filter removal tool (Spanner Driver)
	4	801673	Spare Internal Filter Elements Desktop Model Only
	2		37-mm filter includes: Filter body top Filter body bottom Mesh screen
	1		Comes with 37-mm cartridge opening tool
	8	801666	Spare Internal Filters Handheld Model Only
	1	801667	Impactor Kit
		$PM_{2.5}$ assembled Top Bottom Impaction Plate $PM_{1.0}$ Top $PM_{4.0}$ Top PM_{10} Top Extra Impaction Plate	
	1	801691	Dorr-Oliver Cyclone

Item	Qty	Part Number	Description
	1	801684	Power Supply – Desktop
		801694	Power Supply – Handheld
	2	N/A	Stylus
		When shipped, one stylus will be in the accessory bag, the second stylus attached to instrument.	
	1	3012094	Screwdriver, dual ended. (For Handheld Models only)
	1	801674	Impactor Oil
	2	801698	Inlet cap
		When shipped, one inlet will be in the accessory bag, the second inlet attached to instrument.	
	1	801675	External Pump Kit *for 8530EP only*

Item	Qty	Part Number	Description
	1	801797	External Pump Power Cable (to DustTrak monitor) *for 8530EP only*
	1	801798	External Pump Flow Tube (to DustTrak monitor) *for 8530EP only*
	1		Exhaust Adapter, DustTrak monitor *for 8530EP only*

Optional Accessories

The following photos and table list optional accessories. If you ordered optional accessories, make certain they have been received and are in working order.

Accessories	Qty	Part Number	Description
	1	801675	External Pump Kit
	2	801795	DustTrak II/DRX External Pump Service Kit for 8530EP only. Contains two filters for External Pump
	1	801685	Battery Charger, 2-Bay, Battery 801680 for Desktop DustTrak monitor
	1	801686	Battery Charger, Battery 801681 for Handheld DustTrak monitor

Parts Identification for the DustTrak II Desktop Aerosol Monitor Models 8530

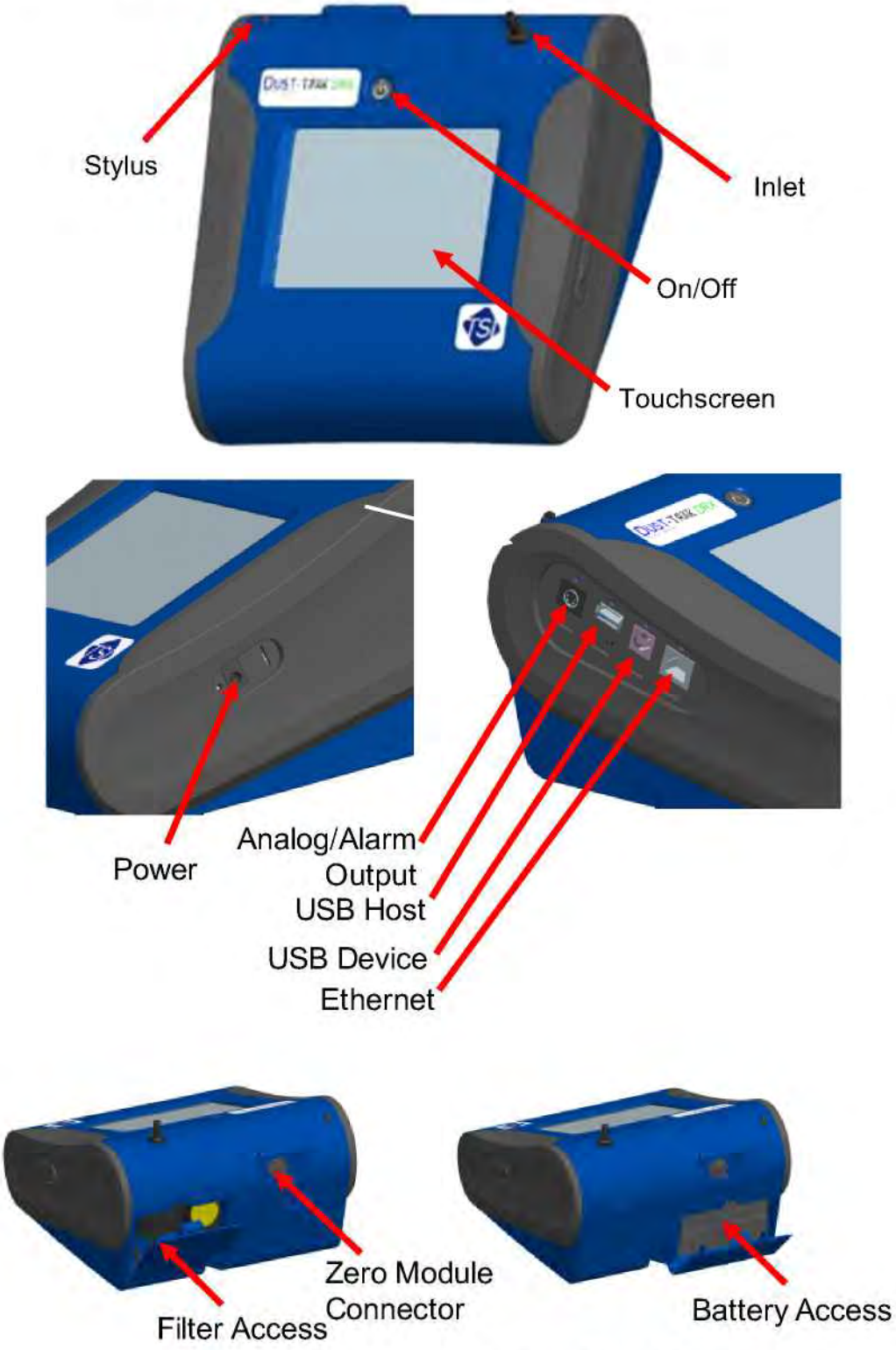
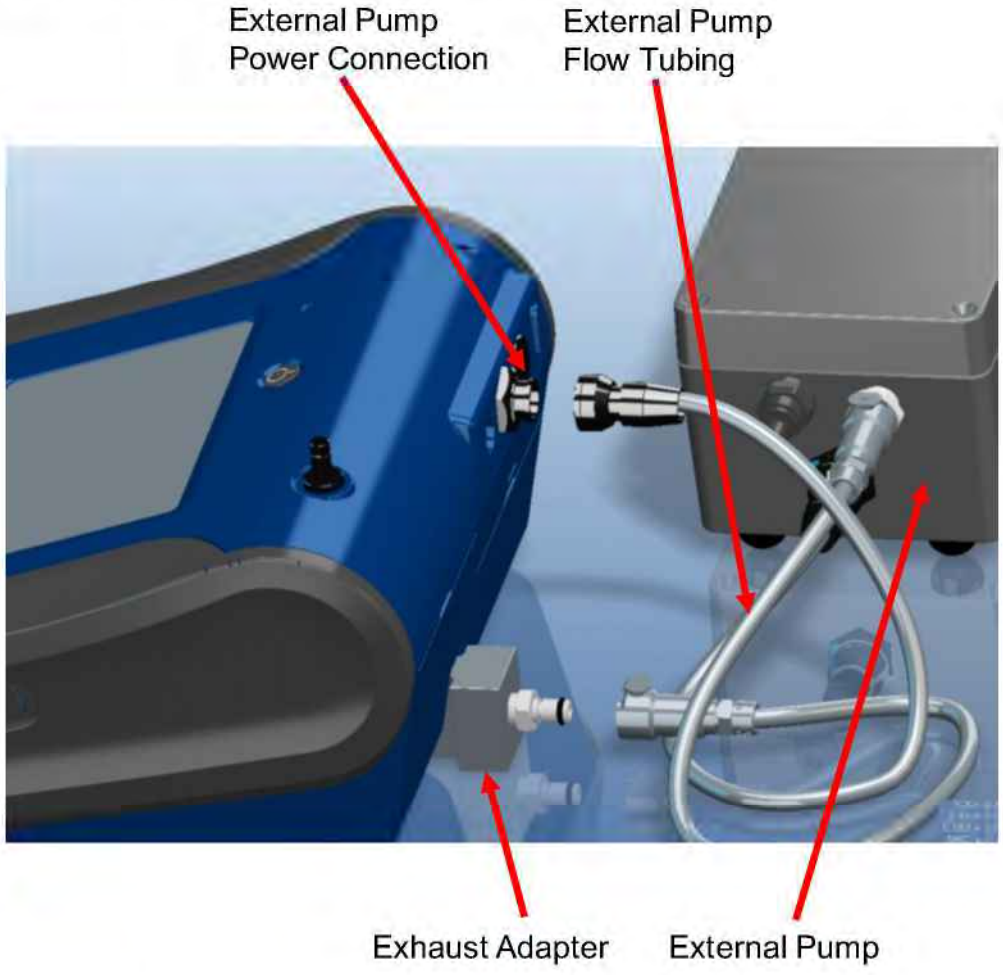


Figure 1-1: Features on Desktop Model 8530

Parts Identification for the DustTrak II Desktop Aerosol Monitor Model 8530EP



External Pump Module (8530EP only)

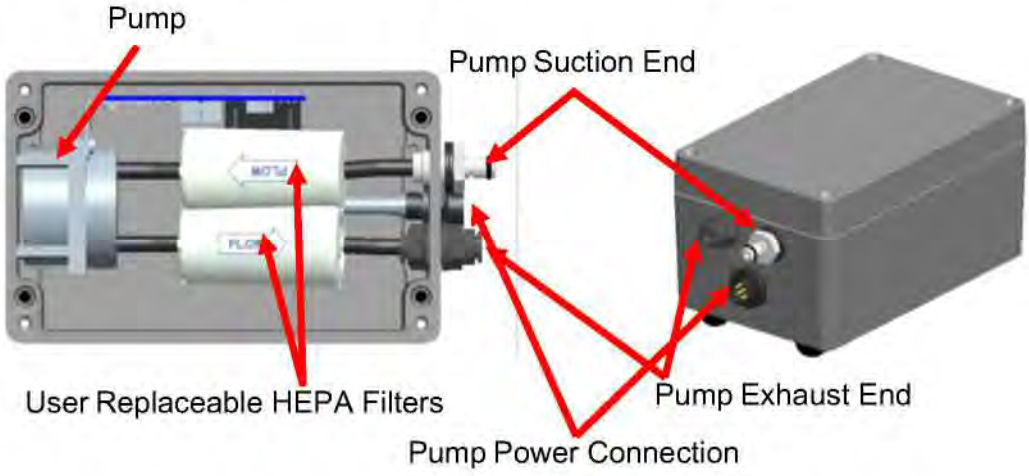


Figure 1-2: Features on Desktop Model 8530EP

Parts Identification for the DustTrak II Handheld Aerosol Monitor Model 8532

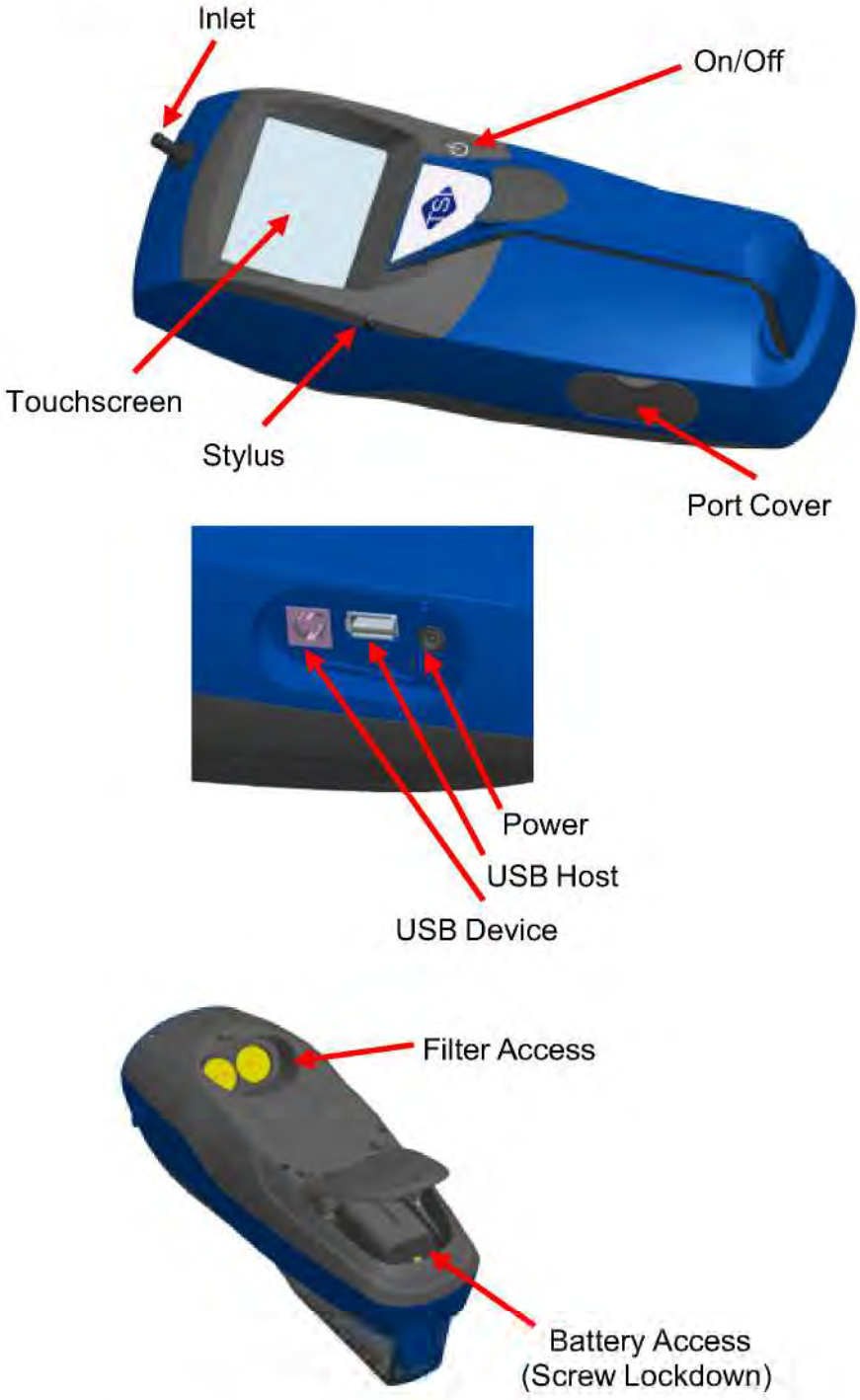


Figure 1-3: Features on Handheld Model

Chapter 2

Setting Up

Supplying Power to the DustTrak II Aerosol Monitor

The DustTrak II Aerosol Monitor must be powered by either batteries or using the external AC adapter.

WARNING

The instrument has been design to be used with batteries supplied by TSI. **DO NOT** use a substitute.

Disposing of old batteries must be recycled in accordance with the local environmental regulations.

WARNING

DO NOT use non-rechargeable batteries in this instrument. Fire, explosions, or other hazards may result.

Installing the Batteries in Model 8530/8530EP Desktop

Remove the battery cover and slide one or two batteries into the battery slots. A single battery can be put into either slot. Orient the batteries with the label side facing up (see Figure 2-1).

Figure 2-1: Batteries into Desktop Unit

Installing the Batteries in Model 8532 Handheld

Remove the battery cover by loosening captured screw on the bottom of the unit. Orient battery with brass connectors facing forward. Insert battery into cavity and slide forward to engage into pins. Replace the battery cover and secure by tightening screw (see Figure 2-2).

Figure 2-2: Batteries into Handheld Unit

Connecting the External Pump to DustTrak Model 8530EP

The Model 8530EP is a Desktop DustTrak monitor with an external pump. This DustTrak has no internal pump and will not work with any other external pump other than the one provided by TSI (P/N 801675). The Model 8530EP is intended for applications where the DustTrak is operated continuously over extended periods (several days to months) under wide temperature fluctuations (0 to 50°C). The external pump is designed to be more robust for 24/7 operation of the DustTrak monitor and is warranted to operate continuously for one full year or 8760 hours. The Model 8530EP is ideal for fugitive dust monitoring.

The pump and the DustTrak monitor come separately and require assembly. Follow the steps below to connect the pump with the Model 8530EP DustTrak monitor.

WARNING

Turn the DustTrak monitor OFF before connecting the external pump. Turn the DustTrak monitor ON only after connecting the External Module.

1. Connect the pump end of the quick connect to the pump module (see Figure 2-3).

Figure 2-3: Connect Pump End of Quick Connect to Pump Module

2. Likewise, plug one end of the power connector to the pump module as shown above. Turn the power connector until it clicks and locks in place. This prevents the connector from disconnecting due to vibration or movement.

Figure 2-4: Connect Exhaust Adapter to Exhaust of DustTrak Monitor

3. Connect the exhaust adapter to the exhaust of the DustTrak monitor (see Figure 2-4).
4. Connect the other end of the flow tubing to the exhaust adapter of the DustTrak monitor.
5. Connect the other end of the power connector to the DustTrak monitor (see Figure 2-5).

Figure 2-5: Connect Power Connector to DustTrak Monitor

WARNING

The Pump module design does not allow for installation outdoors without any protection from the elements. Always operate it within an enclosure.

The DustTrak external pump module does not require an A/C adapter. It is always powered off the DustTrak monitor.

Notes

1. The power connector and the flow quick connect "click" when securely connected. The power connector must be rotated clockwise past the locking pin.
2. Do ***not*** hot-plug the External Pump Module when the DustTrak monitor is turned ON. Always connect the External Pump module first and then turn the DustTrak monitor ON.
3. TSI recommends that the DustTrak monitor with the external pump be operated in the Model 8535 Environmental Enclosure.
4. TSI recommends that the pump module be operated when mounted on its feet and avoid operating at other orientations as much as possible.
5. Pump module and the DustTrak monitor should be at the same electrical potential.
6. The additional port on the external pump module is where the pump exhausts the flow. For applications where the DustTrak monitor is sampling from a chamber or a duct at pressures significantly different from the ambient, TSI recommends plumbing the exhaust of the external pump back in to the chamber/duct.

Using the AC Adapter to Run Instrument

The AC adapter allows you to power the DustTrak monitor from an AC wall outlet. When using the AC adapter, the batteries (if installed) are bypassed.

Battery Charging

This instrument will charge the Lithium Ion battery packs. Insert the batteries into the battery compartment, plug the instrument into AC power, and turn the instrument on. Batteries will charge only when the instrument is on and in stand-by mode. Batteries will not charge if the instrument is turned off or is actively taken measurements. Charging will stop when the batteries are fully charged.

WARNING

When Charging Battery the ambient temp **MUST NOT** exceed 42°C.

Inlet Cap

When using the DustTrak monitor to sample environmental air, the inlet cap should be put over the instrument. This cap will keep large objects from dropping into and plugging the inlet. The cap will also keep direct light from shinning into the chamber and skewing the results.

The inlet cap can simply be pressed onto the instruments inlet.

Figure 2-6: Putting on Inlet Cap

Size-Selective Impactors

Size-selective impactors can be attached to the inlet of the DustTrak II instruments. Size-selective impactors can be used to pre-condition the size range of the particles entering the instrument. PM_1, $PM_{2.5}$, PM_4 (Respirable) and PM_{10} impactors are available. **The instrument must run at the factory default setting of 3.0 L/min for the impactors to achieve the correct cut points.**

The size-selective impactor is composed of three parts; the cap, impaction plate and bottom. Selection of the cap will determine cut size of the impactor. Each cap is labeled with the particle cut size (1 µm, 2.5 µm, 4.0 µm or 10 µm). The same impaction plate and bottom are used on all impactor sizes.

Figure 2-7: Size-Selective Impactor

The impactor assembly is attached to the instrument in place of the inlet cap. The inlet cap does not need to be used if an impactor is being used. See Chapter 4, "Maintenance," for instructions on how to add oil to the impaction plate.

Dorr-Oliver Cyclone

A Dorr-Oliver cyclone is shipped with the instrument. The Dorr-Oliver cyclone removes particles over 4.0 µm in size. The Dorr-Oliver cyclone is attached to the instrument by sliding the cyclone clip over the protruding catch. The tube from the Dorr-Oliver cyclone needs to be routed to the inlet of the instrument.

Figure 2-8: Installing Door-Oliver Cyclone

Do not use Inlet attachments (impactors or inlet cap) when using the Dorr-Oliver Cyclone. **The instrument flow rate must be changed to 1.7 L/min when using the Dorr-Oliver Cyclone in order to achieve a 4 µm (respirable) cut-point.** See the Flow Cal instructions in the Operations chapter for instructions on how to change the instruments flow rate.

Instrument Setup

The DustTrak II monitor can be connected to a computer to download data and upload sampling programs.

Connecting to the Computer

Connect the USB host port of a Microsoft Windows®-based computer to the USB device port on the side of the DustTrak monitor.

Installing TrakPro™ Data Analysis Software

TrakPro software can preprogram the DustTrak monitor, download data, view and create raw data and statistical reports, create graphs, and combine graphs with data from other TSI instruments that use TrakPro software. The following sections describe how to install the software and set up the computer.

Note
To use TrakPro software with the DustTrak Aerosol Monitor, the PC must be running Microsoft Windows® and the computer must have an available Universal Serial Bus (USB) port.

®Windows is a registered trademark of Microsoft Corporation.
®Microsoft and Windows are registered trademarks of Microsoft Corporation.

1. Insert the TrakPro Data Analysis Software CD into the CD-ROM drive. The install screen starts automatically.

Note
If the software does not start automatically after a few minutes, manually run the program listed on the label of the CD using the **Run** command on the Windows Start Menu.

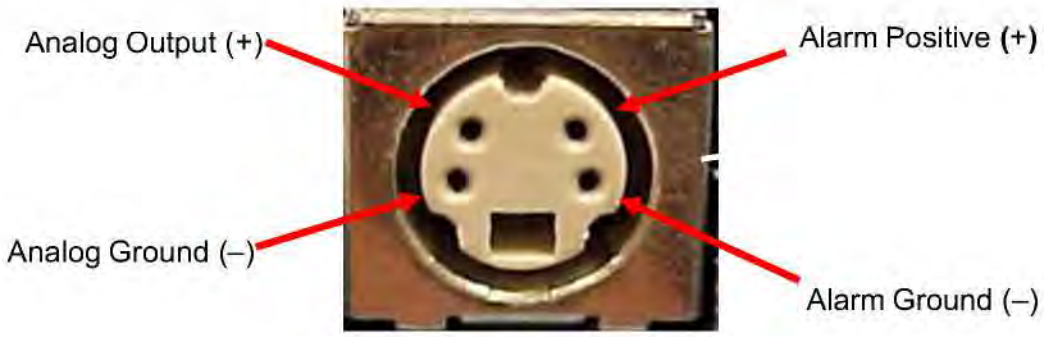
2. Follow the directions to install TrakPro software.

TrakPro software contains a comprehensive installation guide. TSI recommends printing out this guide prior to starting the TrakPro software installation on your computer, so it may be consulted during the installation. The TrakPro Software manual is located in the "Help" file in TrakPro software. There is no separately printed TrakPro Data Analysis software manual.

Connecting Analog/Alarm Output

The Analog/Alarm Output Cable plugs into the alarm connection on the side of the instrument. This feature is on the desktop model 8530 only.

The cable contains a 4-pin, mini-DIN connector. The pin-outs for the connector and the wiring for the cable are shown below.



4-pin miniDIN connector

Cable Wiring Diagram	
Brown Wire	Analog Ground
Orange Wire	Analog Out
Red Wire	Alarm (+)
White Wire	Alarm (-)
Black Wire	Shield

Figure 2-9: Cable Wiring Diagram

Wiring the Analog Output

System specifications:

- Output voltage: 0 to 5 VDC. With a maximum output of 15 mA.
- Output Current 4 mA to 20 mA with a maximum load impendence of 250 ohms.
- Correct polarity must be observed (see pin-outs above).

The output cable supplied by TSI (P/N 801652) is labeled with the pin-out wiring diagram. Additional equipment may be needed for making connections to the system that TSI does not supply. It is your responsibility to specify and supply all additional equipment.

Wiring the Alarm

System specifications:

- Maximum voltage: 15 VDC (**DO NOT USE AC POWER**)
- Maximum current: 1 Amp
- Correct polarity must be observed (see pin-outs above)
- The alarm switch, located inside the DustTrak monitor must be located on the ground side of the alarm system.

WARNING

The DustTrak monitor Alarm Output function **SHOULD NOT** be used to detect hazardous conditions or to provide an alarm for protecting human life, health or safety.

Caution

The alarm switch **MUST NOT** be wired to AC power! Failure to install the user alarm properly could damage the DustTrak instrument and/or void the instrument warranty! Please read and follow all instructions before wiring or operating the user alarm.

WARNING

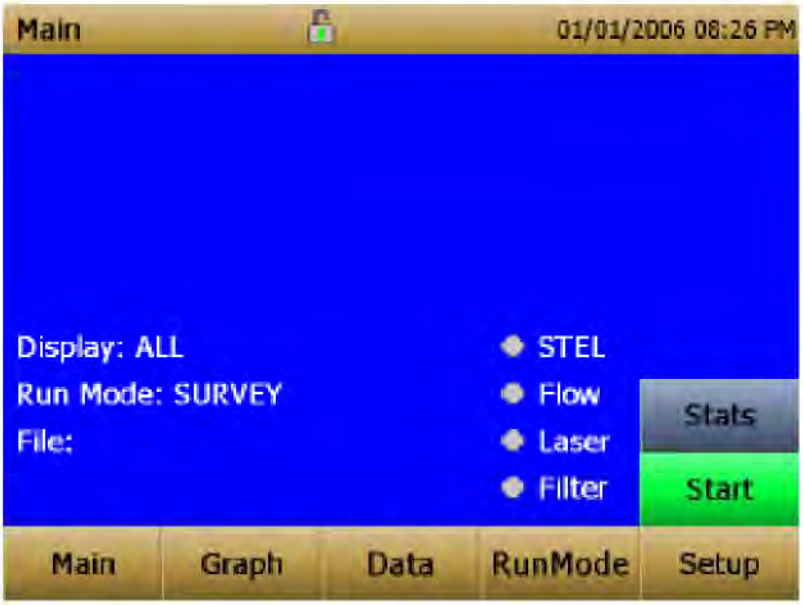
When connected to the analog out and alarm out connector, you **MUST** use safety certified equipment and/or power sources.

Chapter 3

Operation

Getting Started

The **START UP** screen is displayed initially when the instrument is turned on, following the initial TSI logo splash screen.



Use a stylus or fingertip, touch the “buttons” on the screen to activate different menus.

For Model DustTrak 8530EP only

W A R N I N G

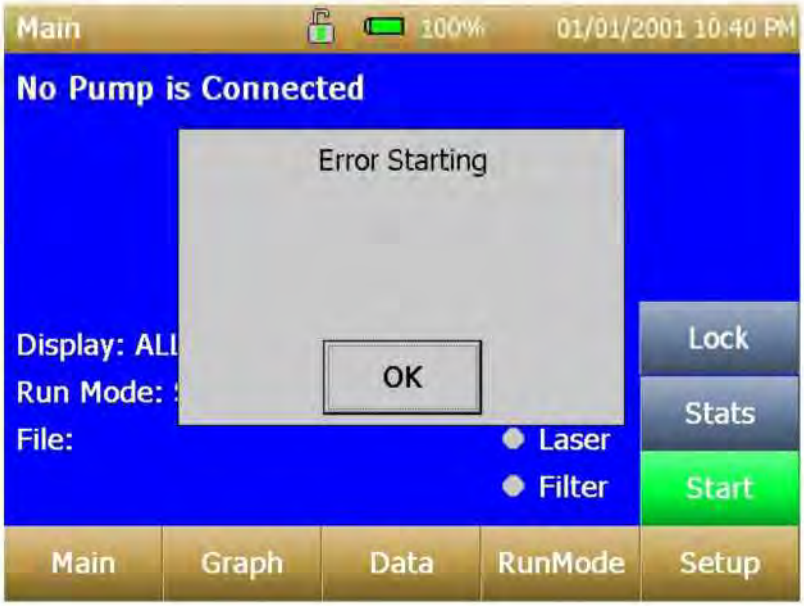
Always setup and operate the DustTrak monitor with External Pump Module with the External Pump Module connected to the DustTrak monitor. Failure to do so will result in communication errors.

Communication errors take place under four different scenarios as follows:

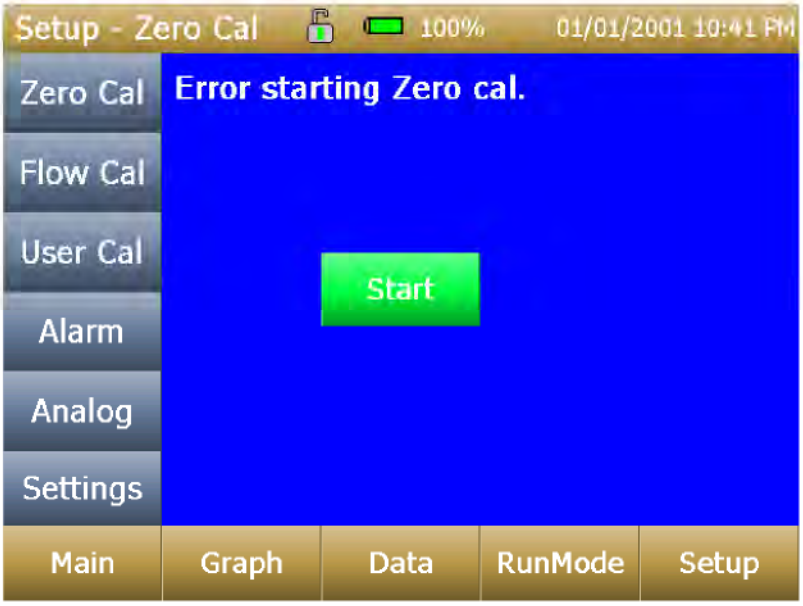
1. When the unit is idle and is ***not*** connected to the External Pump Module, a warning displays on the Main screen.

Note
"No Pump is Connected" is a sticky error. Even after the warning message, if the External Pump Module is connected to the DustTrak, the error will not disappear until the screen is refreshed. Refresh the screen by going into a different menu and returning to the Main menu.

2. When the unit is ***not*** connected to the External Pump Module and an attempt is made to start a run by selecting "Start", an error appears on the Main screen.

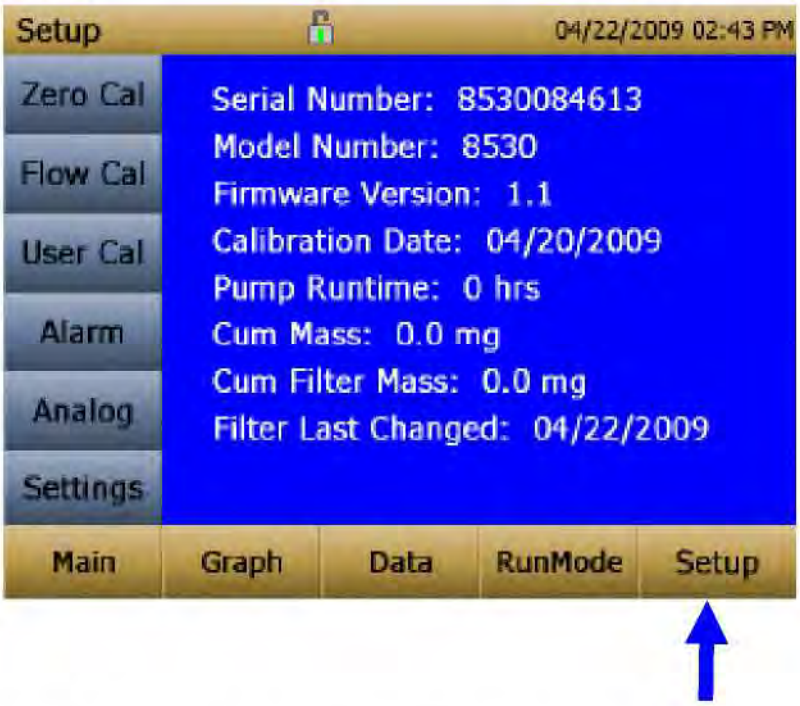


3. If the pump is ***not*** connected while attempting to perform a Zero Cal, an error appears on the Setup screen.



4. If the pump is ***not*** connected while attempting to perform a Flow Cal, an error appears on the Setup screen.

Setup Menu

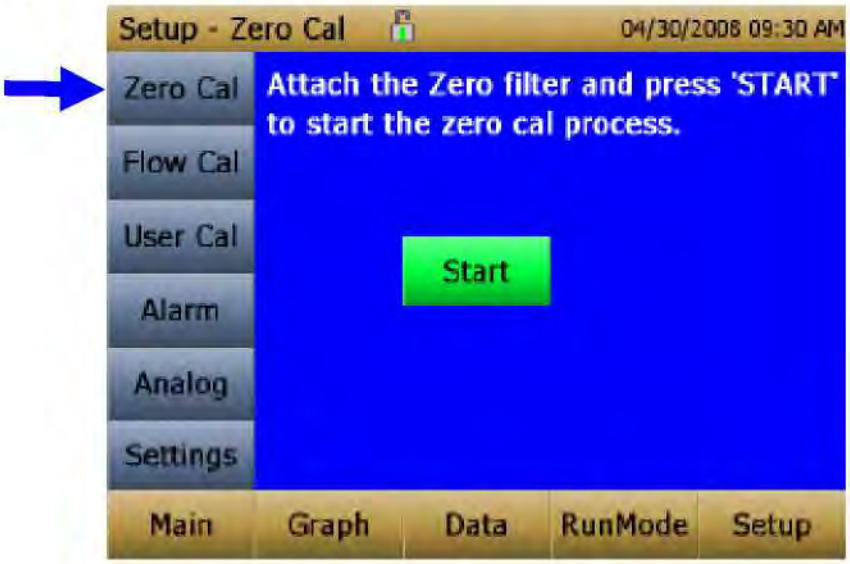


Pressing **Setup** activates the Setup Menu touchscreen buttons along the left edge of the screen. Setup is not accessible when the instrument is sampling.

The main screen of the **Setup** screen displays the following information:

Serial Number	The instruments serial number.
Model Number	The instruments model number.
Firmware Version	Instruments current version of firmware.
Calibration Date	Date of the last factory calibration.
Pump Run Time	Pump running time in hours.
Cum Mass Conc	Amount of mass run through instrument over life.
Cum Filter Conc	Amount of mass run through instrument since last filter change.
Filter Time	Date of last filter change.

Zero Cal



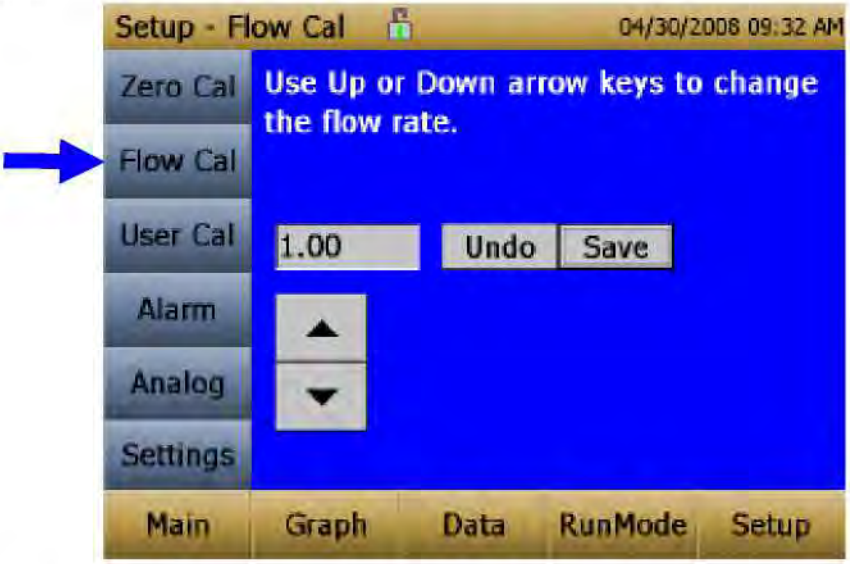
Run **Zero Cal** the first time the instrument is used and repeat prior to every use. Zero Cal requires that the zero filter be attached prior to running. Zero Cal must also be performed if the unit is reading negative concentrations. It is not possible for the DustTrak to read negative concentrations. Negative concentrations are a symptom of zero drift.

NEVER perform a zero cal without attaching a zero filter.

1. Press **Zero Cal** Button
2. Attach Zero Filter
3. Press the **Start** button to start Zeroing process.
4. A count-down clock will appear indicating the time remaining. The screen with indicate “Zero Cal Complete” when done.

Remove filter after zeroing has been completed. The instrument is now zero calibrated and ready for use.

Flow Cal



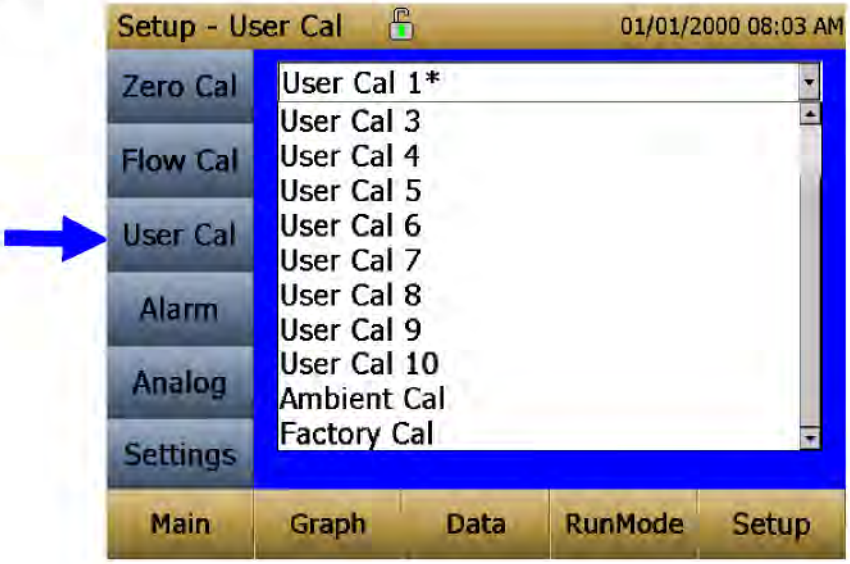
Run **Flow Cal** to change the flow set point. The flow set point is factory set to 3 L/min total flow. 2 L/min of the total flow is measured aerosol flow. 1 L/min of total flow is split off, filtered, and used for sheath flow. There is an internal ΔP flowmeter in the DustTrak II instrument that controls flow rate to ±5% of the factory setpoint. TSI recommends checking the flow with an external flow reference meter, especially when collecting data. The pump will automatically start when entering the Flow Cal screen.

1. Attach a flow calibrator (reference flow meter) to inlet port. You may use a bubble buret, mass flow meter, dry piston or rotameter as flow measurement devices.
2. Move the arrows up or down to achieve desired flow rate on the reference flowmeter. Each up or down arrow will change the flow about 1%. Allow time between button presses to let pump change to the new flow rate.

   Select **Save** once the desired flow rate is achieved. Select **Undo** to return to the factory set point.

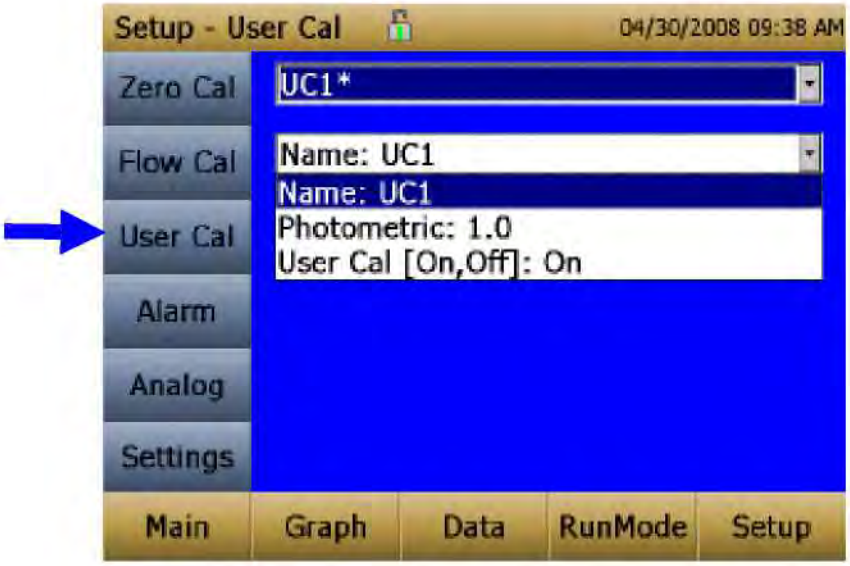
Note
The flow rate can be adjusted from approximately 1.5 to 4.0 L/min. If needed, this feature can be used to adjust the flow rate to a value other than the factory set point, allowing for the use with the provided Dorr-Oliver Cyclone (1.7 L/min required) or 3rd party size selective inlets (cyclones or impactors) that may require a different flow rate.

User Cal



User Cal allows you to store and use 10 different calibration factors. In addition, there are two factory defaults, one is the "Ambient Cal" and the other is the "Factory Cal". The "Ambient Cal" is appropriate for outdoor ambient dust or fugitive dust monitoring. The "Factory Cal" is the calibration to ISO 12103-1, A1 Arizona test dust for which a calibration certificate is provided with the instrument. The "Factory Cal" is appropriate for most workplace aerosol monitoring. The currently active user calibration is highlighted with an asterisk "*".

Four variables can be set for each user calibration.



Name	User can rename calibration to a description name.
Photometric	Changes the factory calibration of particle signal, based on Arizona Road Dust, to actual aerosol being measured. See below for sets to set this calibration.
User Cal [on,off]	Selecting **On** will activate current user calibration and deactivate the previously selected user calibration.

Taking a Gravimetric Sample Using the DustTrak Monitor

When sampling with the DustTrak monitor, you can simultaneously take a gravimetric sample either for custom calibration of the DustTrak monitor or for collecting the sample on to the gravimetric filter downstream of the DustTrak monitor without a need for additional gravimetric sampling pump and filter assembly. To accomplish this, follow the instructions given below:

1. Setup the DustTrak monitor to sample how long you want the sample run time to be. The following example shows a sample for 8 hours.
2. Under RunMode menu, put the instrument in Manual Log (Manual Logging is reviewed later in this section), which will enable you to start and stop the pump at any time you choose.
3. Set the logging interval. One minute (i.e., “01:00”) is a good choice.
4. Make sure you have a preweighed 37-mm gravimetric filter cassette loaded into the DustTrak monitor. See Chapter 4, “Replacing the Internal Filters” on how to access the filter (see figure 4-8) and replace it.

Note
Use only the conductive plastic filter cassette holder (SKC Part# 225-308).

5. Under the Setup Menu, make sure the DustTrak monitor is set to the desired flow rate. For DustTrak II Model 8530, the flow can be varied from 1.7 to 4 L/min for use with various inlet conditioners. For DustTrak DRX Model 8533, ***the flow cannot be changed.*** The flows for DustTrak II monitor can be changed by changing the default flow calibration setpoint from 1.0 to any value between 0.5 to 1.5 in the span adjustment. An external flowmeter is needed to measure the total flow. Flow can be changed by clicking on the UP or DOWN arrow keys shown below:

6. Conduct a preflow calibration on the DustTrak monitor using the same kind of sample media you will sample with. Now, attach the sample media you intend to sample with and start sampling aerosol for the desired time. After the desired run time, stop the sampling. Remove the filter from the DustTrak monitor and follow your laboratory's criteria for filter post weight. Conduct a post-flow calibration with the same sample media done with the pre-flow calibration and determine if these flow calibrations are within ±5% of each other. If they are, use the following to calculate the actual flow rate for the DustTrak monitor. The laboratory will need the following information to calculate mass concentration in mg/m^3:

   - Total sample time in minutes.
   - Flow rate—flow rate of the DustTrak monitor used for gravimetric analysis is only $^2/_3$ the total flow since $^1/_3$ of the flow is used as sheath flow.
   - Total liters of air sampled = total sample time x flow rate.

7. Using this information the laboratory can determine the concentration using the following formula:

$$concentration, \frac{mg}{m^3} = \frac{Filter\ Post\ Weight\ (mg) - Filter\ Pre\ Weight\ (mg)}{\frac{2}{3} * \frac{DustTrak^{TM}\ Monitor\ Flow\ Rate\ (\frac{L}{min})}{1000} * Total\ Sample\ Time\ (\text{min})}$$

Note

The flow rate used for gravimetric analysis is only $^2/_3$ the total flow since $^1/_3$ of the flow is used as sheath flow.

8. For instructions on how to calibrate the DustTrak monitor using this data, see section below on "Determining the Calibration Factor for a Specific Aerosol".

Photometric Calibration Factor

In most situations, the DustTrak monitor with its built-in data logging capability can provide very good information on how the concentration of an aerosol changes for different processes over time. Factory calibration to the respirable fraction of standard ISO 12103-1, A1 test dust is fairly representative of a wide variety of workplace aerosols. Because optical mass measurements are dependent upon particle size and material properties, there may be times in which a custom calibration would improve your accuracy for a specific aerosol.

Determining an aerosol specific photometric calibration requires that you determine a true mass concentration (e.g., gravimetric analysis) for the aerosol you want to measure. The true mass concentration is used to calculate the custom calibration factor for that aerosol. Once you have a custom calibration factor, you can reuse it each time you make measurements in the same aerosol environment.

Determining the Calibration Factor for a Specific Aerosol

The DustTrak II monitor is factory calibrated to the respirable fraction of standard ISO 12103-1, A1 test dust. The DustTrak monitor can be easily calibrated to any arbitrary aerosol by adjusting the custom calibration factor. The DustTrak monitor's custom calibration factor is assigned the value of 1.00 for the factory calibration to standard ISO test dust. This procedure describes how to determine the calibration factor for a specific aerosol. Using the value of 1.00 will always revert back to the factory calibration.

To determine a new calibration factor you need some way of accurately measuring the concentration of aerosol, hereafter referred to as the reference instrument. A gravimetric analysis is often the best choice, though it is limited to nonvolatile aerosols. The internal 37 mm filter cartridge, in the desktop units, can be used to collect the reference gravimetric reference sample.

To make an accurate calibration you must simultaneously measure the aerosol concentration with the DustTrak monitor and your reference instrument.

1. Zero the DustTrak II monitor.
2. Put the instrument in Manual Log (Manual Logging is reviewed later in this section).
3. Set the logging interval. One minute (i.e., "01:00") is often a good choice.
4. Co-locate the DustTrak II monitor and the reference sampler together so that they are measuring from the same area. The 37-mm filter cartridge in the desktop unit can be used to collect the particles to be weighed for the gravimetric reference.
5. Start sampling aerosol with both instruments at the same time.

Note

Greater accuracy will be obtained with longer samples. The time you permit for sampling often depends on the reference instrument and characteristics of the measured aerosol. It may take some time to collect sufficient aerosol onto a filter cassette for accurate gravimetric analysis. Refer to instructions of your reference instrument for sampling times.

6. Stop sampling with both instruments at the same time.
7. Record the DustTrak monitor average concentration by viewing the sample average in the Data screen. (Data Screen is reviewed later in this chapter.)
8. Determine the mass concentration in mg/m^3 from your reference instrument. For gravimetric sampling this means weighing the gravimetric sample.

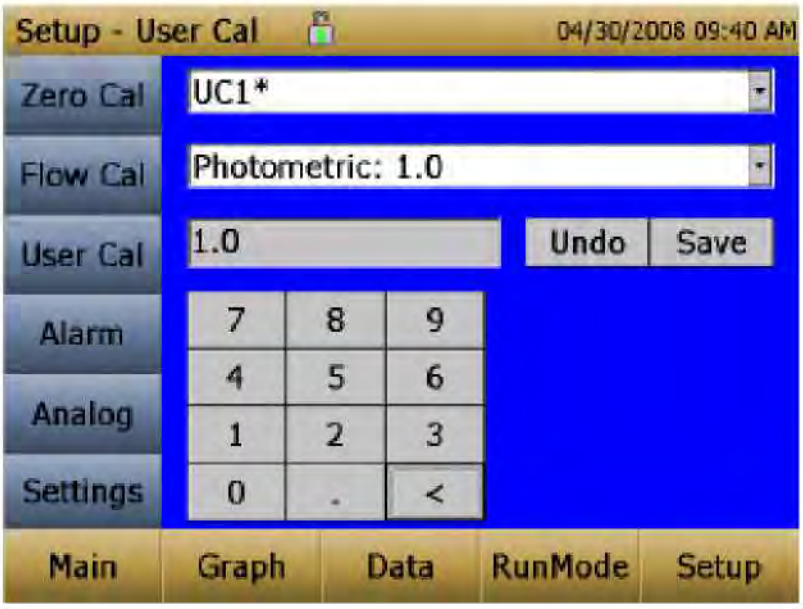
Note

If you used the internal gravimetric filter in the DustTrak Model 8530, the flow rate used to compute the concentration should be 2 L/min, not 3 L/min since only 2 L/min of aerosol flow reaches the filter.

9. Compute the new calibration constant, NewCal, using the following formula:

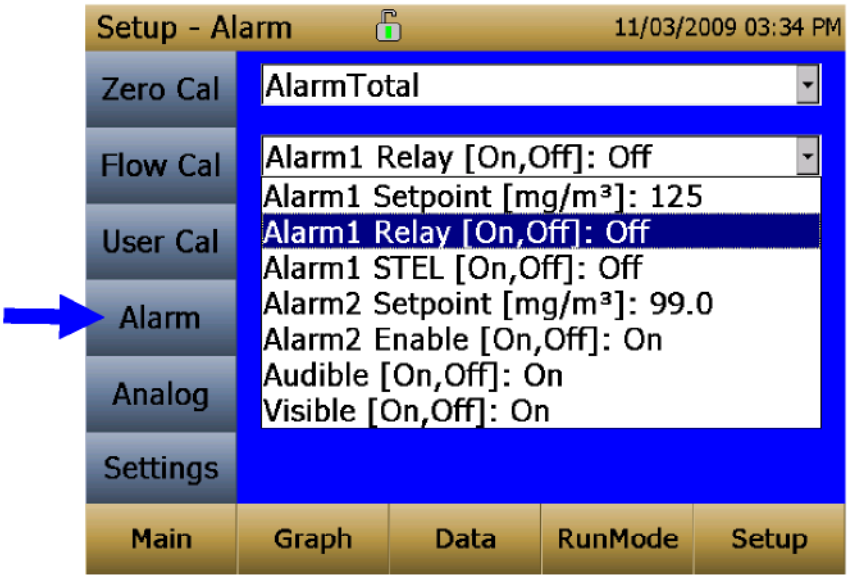
$$NewCal = \left(\frac{Reference\ Concentration}{DustTrak\ Concentration} \right) \cdot CurrentCal$$

10. Select **Photometric** from the User Cal drop down selection and enter the NewCal factor using the onscreen controls.



Alarm

Alarm allows you to set an alarm level that will be triggered if the instrument's reading goes above the setpoint. However, the alarm functioning is determined by the logging interval. The alarm will turn ON only if the average concentration over the logging interval exceeds the set point. If the logging interval is too long and the concentration exceeds the set point and stays at that level, the alarm will not turn ON until after the logging interval has passed. Likewise, the alarm will not stop until after the concentration has dropped below 5% of the threshold and after the logging interval has passed.



Note

The Alarm is dependent on the logging interval. For the DustTrak to alarm as soon as the Alarm Setpoint is exceeded, the logging interval must be set as low as possible (i.e., 1 second or 2 seconds). If a long test duration does not permit setting such a short logging interval, use the STEL alarm instead. The STEL is always based on 1 second concentrations and is independent of the logging interval. For more details on the STEL alarm, see section below on STEL.

In Survey mode, the alarm is dependent on the time constant.

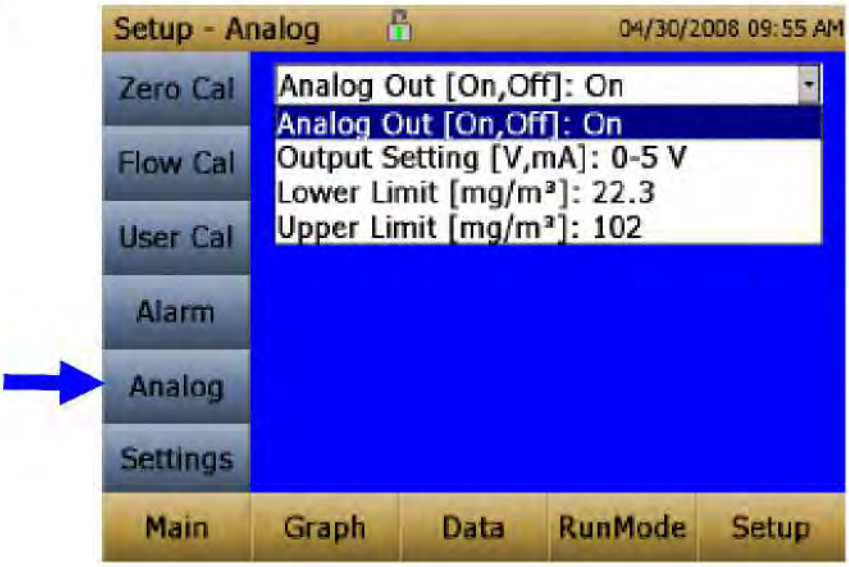
Alarm1 Setpoint [mg/m^3]	The alarm1 setpoint is the mass concentration level upon which the alarm1 is triggered. Alarm will trigger if the mass concentration, taken at the logging interval, rises above the setpoint. **Note** Alarm 2 must be lower than Alarm 1 when both alarms are enabled.
Alarm1 Relay [On, Off]	When the relay alarm is turned on, unit will close relay switch when Alarm1 level is surpassed. Relay selection is available on the 8530 desktop model only.
Alarm1 STEL [On, Off]	When the STEL alarm is turned on, STEL data will be collected when Alarm1 level is surpassed. STEL selection is available on the 8530 desktop model only. See STEL Note below.
Alarm2 Setpoint [mg/m^3]	The alarm2 setpoint is the mass concentration level upon which the alarm2 triggers. Alarm triggers if the mass concentration, taken at the logging interval, rises above the setpoint. **Note** Alarm 2 must be lower than Alarm 1 when both alarms are enabled.
Alarm2 Enable [On, Off]	Enables Alarm2 to be logged and will activate the Audible or Visible alarms if they are enabled.
Alarm Audible [On, Off]	When the audible alarm is turned on, the instrument will activate internal beeper when Alarm1 or Alarm2 level is surpassed.
Alarm1 Visible [On, Off]	When the visible alarm is turned on, unit will show the alarm icon (Alarm1 , Alarm 2) in title bar when Alarm1 or Alarm2 level is surpassed.

STEL Alarm

STEL stands for **S**hort **T**erm **E**xposure **L**imit. When a STEL alarm is selected, the instrument will inspect the data on a second by second basis, independent from the selected logging interval. If the mass exceeds the STEL limit, then a STEL event triggers and the following actions will be taken.

STEL indicator	The STEL indicator will show Red on the main screen.
Data	Data will be taken of the STEL alarm channel at a 1 minute logging interval for **15 minutes**. This data will be stored in a separate file named STEL_XXX, where XXX will be matched to the logged data file. The instrument will also continue to log the mass concentration data at the logging interval selected.
STEL Alarm repeat	If the instrument remains over the STEL limit after the 15 minute interval, or if the instrument exceeds the STEL limit later during the sample period, additional STEL files will be generated.

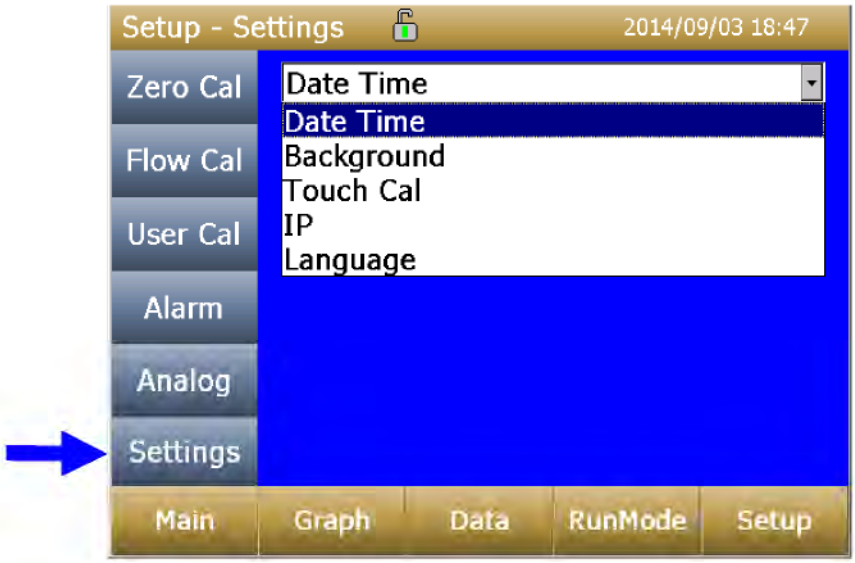
Analog



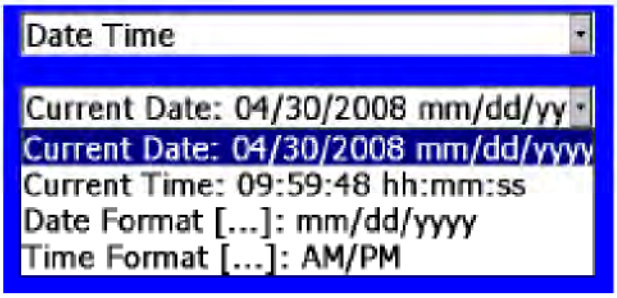
Analog setup screen sets the parameters that will drive the analog out port. Applies to the 8530 Desktop model only.

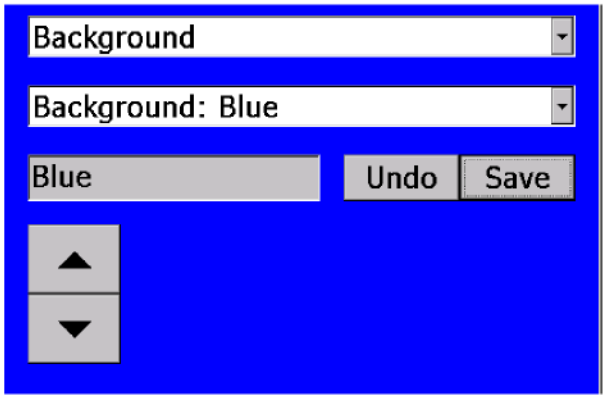
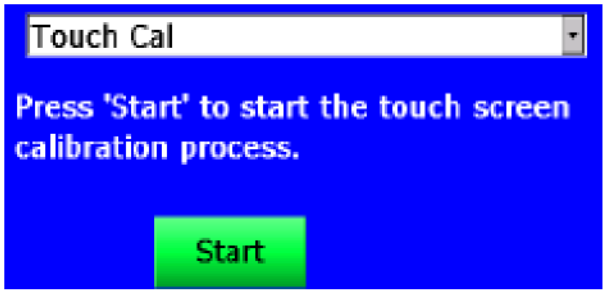
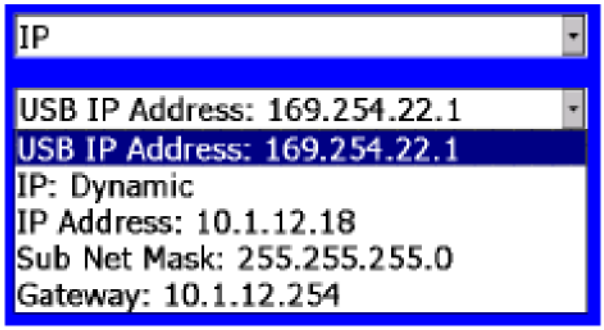
Analog out [On, Off]	Turns analog out port on.
Size Fraction	Selects the size channel that will drive the analog out.
Output Setting [V, mA]	Select between 0 to 5 V and 4 to 20 mA.
Lower Limit [mg/m^3]	Mass concentration reading of the selected channel that will correspond to 0 V or 4 mA.
Upper Limit [mg/m^3]	Mass concentration reading of the selected channel that will correspond to 5 V or 20 mA.

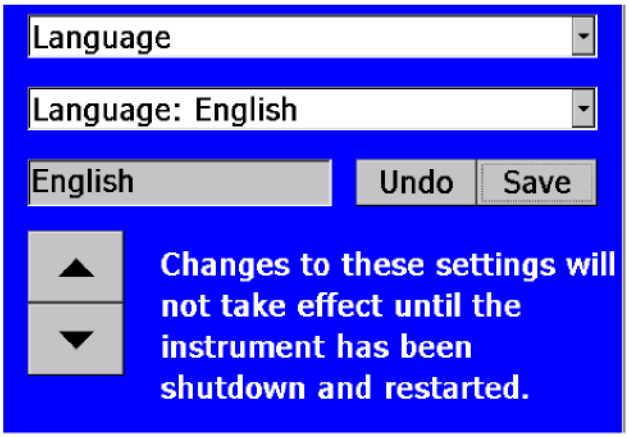
Settings



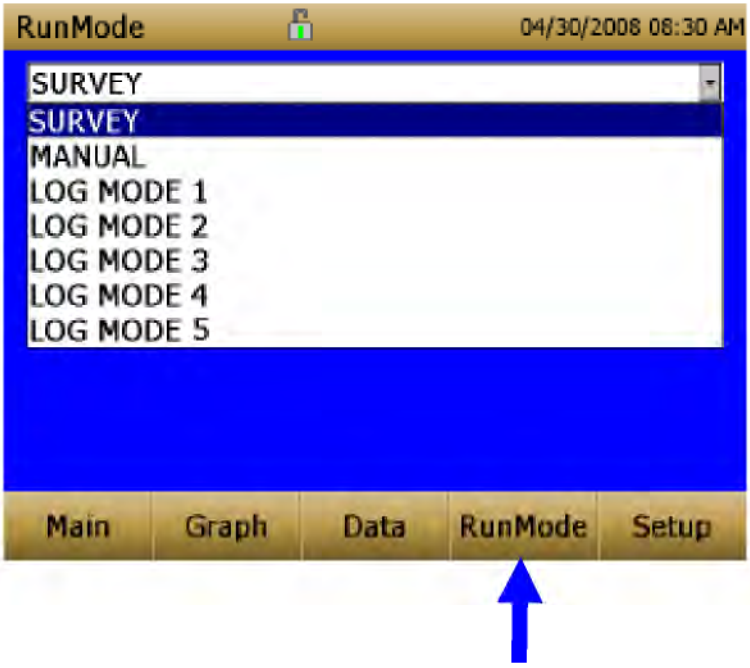
Settings screen sets basic unit parameters.

Date Time	 Sets current date, current time and date/time format. Time can be set in 12 or 24 hour format. Date can be set in yyyy/dd/mm, yyyy/mm/dd or yyyy/dd/mm.

Background	 Switches between blue and white backgrounds.
Touch Cal	 Calibrates the touch cal screen.
IP	 **USB PORT IP Address**: USB IP is the address assigned to the instrument by the NDIS driver. It is shown but cannot be changed. **Ethernet Port IP parameters**: (Model 8530 Desktop only.) IP method can be set to static or dynamic. For static IP, IP address, default gateway, and subnet mask can be set. For Dynamic, The IP assigned by the network is shown. This cannot be changed. See Note below.

	IP Note
	After changing the instrument to Dynamic or Static, reboot the instrument. In Dynamic Mode, the unit will show the IP to which is assigned (after being rebooted).
Language	 Switches between display languages. After changing the display language, reboot the instrument.

Run Mode

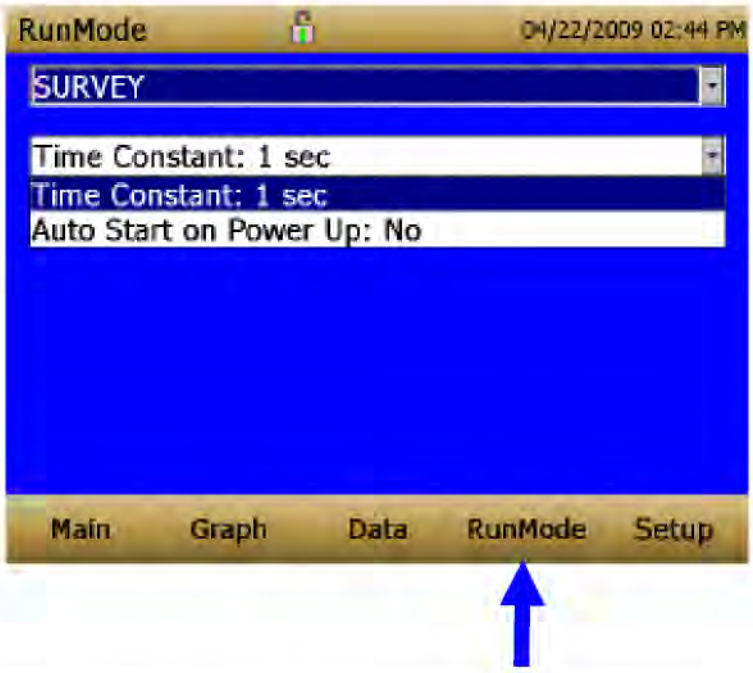


The **RunMode** tab brings up sampling mode options.

Sampling mode options include **Survey Mode**, **Manual Log**, and **Log Mode 1-5**.

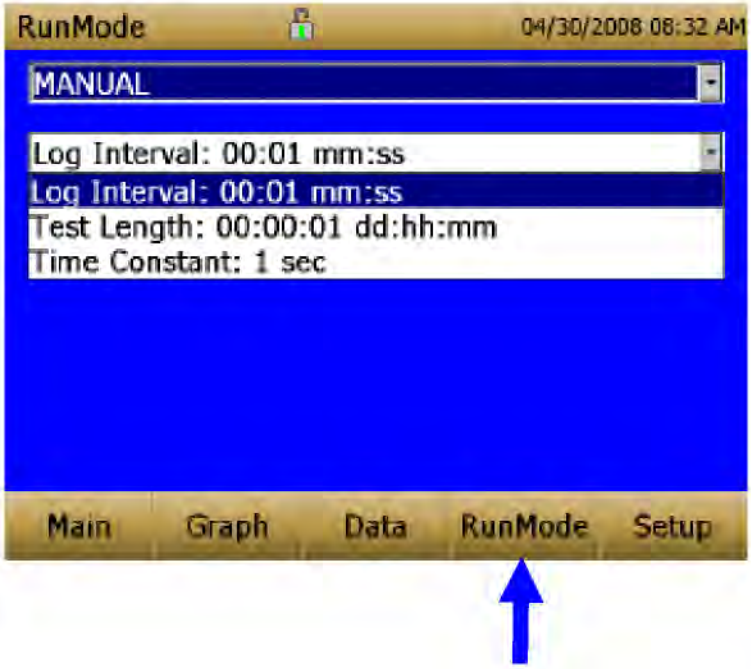
Survey	Survey Mode runs a real time, continuous active sample, but does not log data.
Manual	Manual Log sets the instrument to log data for a specified run time.
Log Modes	Log Mode starts and stops the instrument at specified times, run for a specified test length, and perform multiple tests of the same length with a specified time period between tests.

Survey Mode



Time Constant	Time Constant can be set from 1 to 60 seconds. This will control the update rate of the main screen. It is the rolling average of data displayed on the main screen and is not linked to logged data in either Manual or Program Log modes.
Auto Start on Power Up	When set to “Yes”, unit will start a measurement upon being powered on, if the unit was set to “Survey” when it was turned off. When set to “No”, the unit will be in idle when it is powered on.

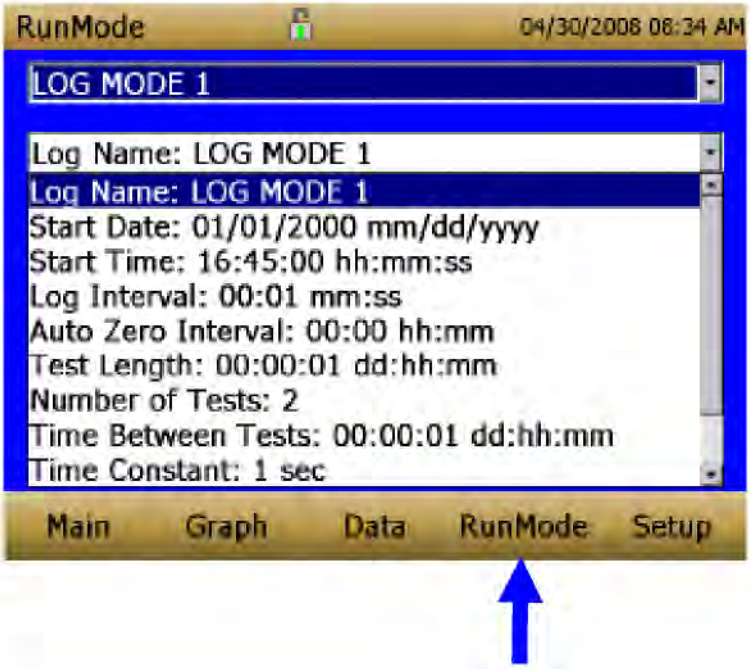
Manual Mode



Log Interval	The log interval can be set from 1 second to 60 minutes. It is the amount of time between logged data points.
Test Length	Test length can be set from 1 minute to the limit of the data storage.
Time Constant	Time Constant can be set from 1 to 60 seconds. This will control the update rate of the main screen. It is the rolling average of data displayed on the main screen and is not linked to logged data in either Manual or Program Log modes.

In Manual mode, data will be stored to a file named "*Manual_XYZ*" where *XYZ* is an incrementing integer.

Log Mode (1–5)



Log Name	Log Name, brings up a virtual keypad to name the Logged Data file.
Start Date	Start Date, select the date the test will start.
Start Time	Start Time, select the time the test will start.
Log Interval	The log interval can be set from 1 second to 60 minutes. It is the amount of time between logged data points.
Auto Zero Interval	Interval between re-zeroing the instrument using the Auto-Zero accessory. Model 8530 desktop only.
Test Length	From 1 minute to the limit of the data storage.
Number of Tests	Number of tests, 1 to 999.
Time between Tests	Time between tests, 1 minute to 30 days.
Time Constant	Time Constant can be set from 1 to 60 seconds. This will control the update rate of the main screen. It is the rolling average of data displayed on the main screen and is not linked to logged data in either Manual or Program Log modes.
Use Start Date	Use Start Date, option to use programmed start date or by pass programmed start date.
Use Start Time	Use Start Time, option to use programmed start time or bypass programmed start time.

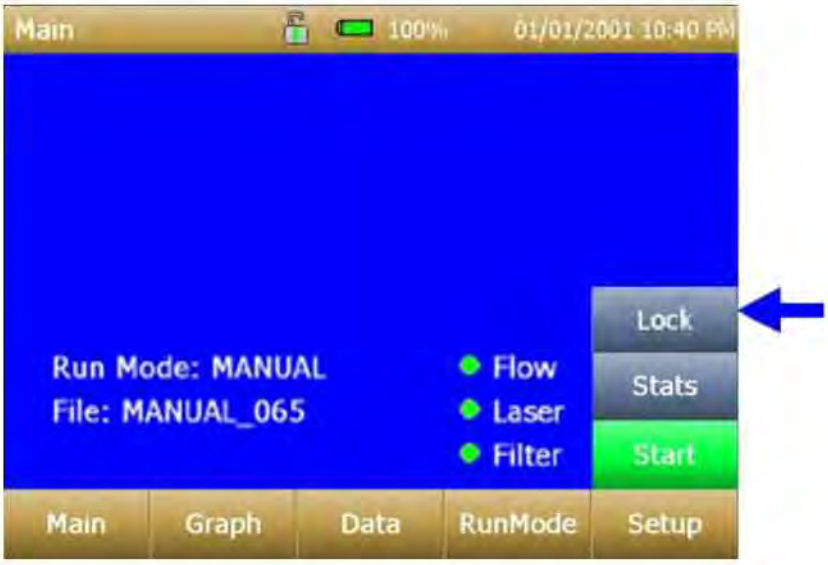
In Log mode, data will be stored to a file named "*LogName_XYZ*" where *LogName* is the user entered log name and *XYZ* is an incrementing integer.

Locking Feature

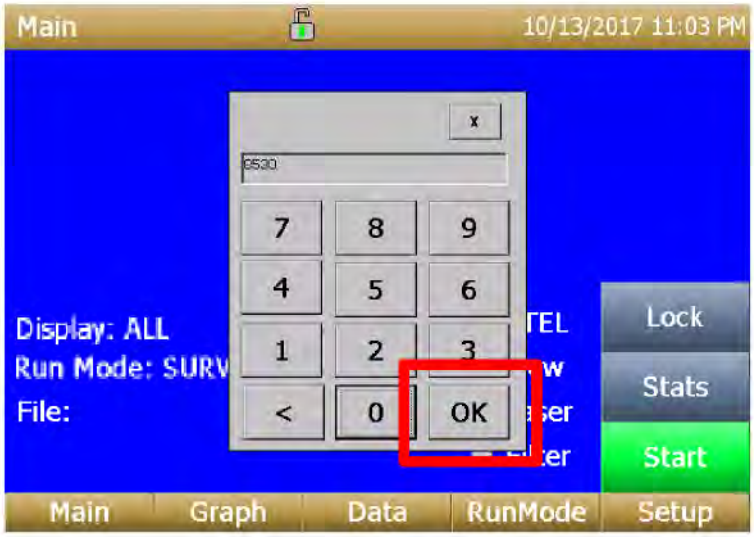
The locking feature allows you to lock the screen at any time. This can be done during mass concentration measurements and while the instrument is idle.

Note
This feature is only available on Desktop models. It is not available on Handheld models.

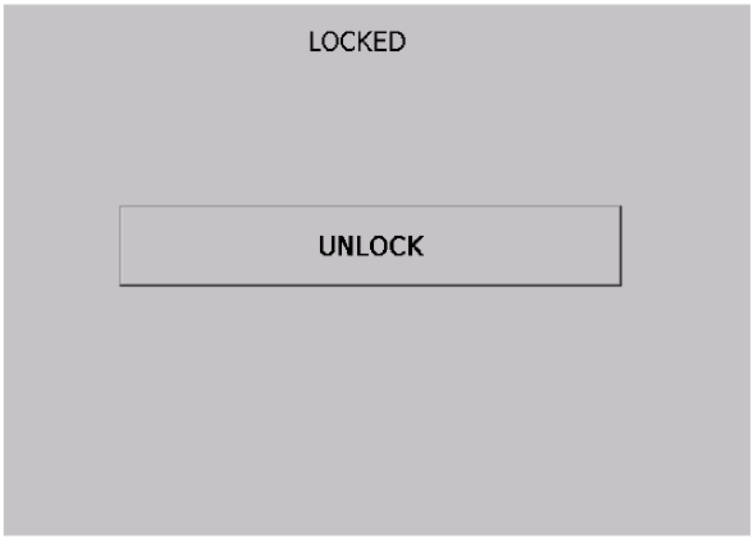
To enable this feature, touch the **Lock** button on the main screen.



Next enter the model of the instrument. For 8530EP models, 8530 should be used. After entering the model number, touch **OK**.



The screen is now locked.



To unlock, touch **UNLOCK** and re-enter the model number. For 8530EP models, 8530 should be used. After entering the model number, touch **OK**.

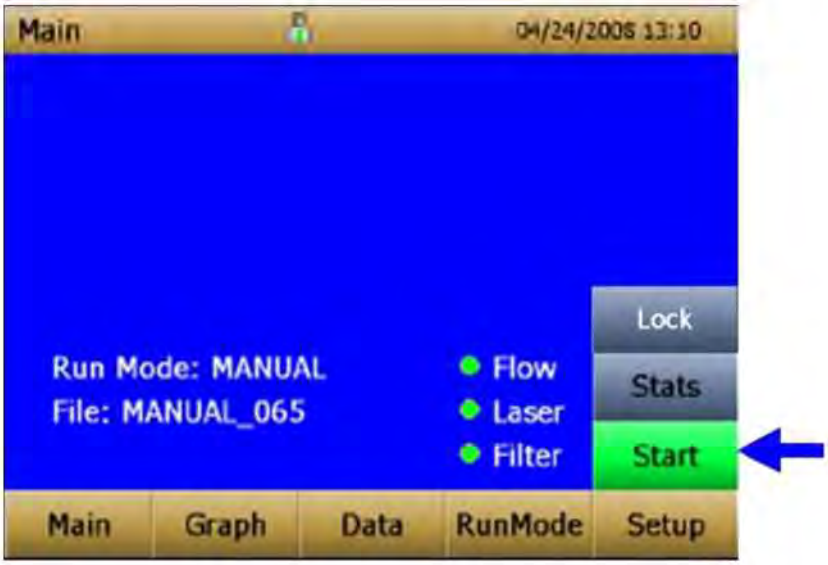
Note

If you happen to enter the model number incorrectly and touch **OK**, you will be given another chance to enter it correctly. There is no limit to number of chances.

Taking Mass Concentration Measurements

Measurements are started and controlled from the main screen.

Prior to starting a measurement the instrument should be zeroed from the **Setup** screen and the run mode should be configured and selected from the **RunMode** screen.



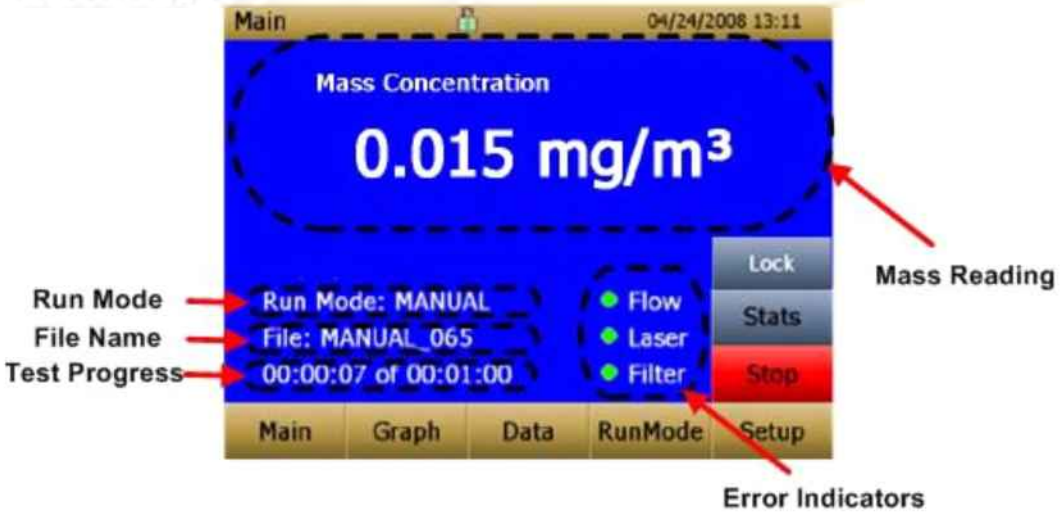
When the instrument is on, but not taking any mass measurements the start button will be green and instruments pump will not be running. To start taking a measurement, press the green start button.

For the Model 8530EP DustTrak monitor with external pump, make sure the external pump is connected to the DustTrak monitor as described in Chapter 2. If the pump is not connected and the green start button is pressed, the DustTrak monitor will identify that the pump is not connected and a warning will be displayed as shown below:

Connect the External Pump Module to the DustTrak monitor and then try again. TSI recommends powering down the DustTrak monitor before connecting the External Pump Module to the DustTrak monitor. Connect the power cable and the flow tubing between the DustTrak monitor and the External pump module, as applicable.

While taking a measurement the screen will display the current measured mass concentration. The various regions of the screen are shown below.

Screen Regions



Mass Reading	Shows the instruments mass measurements.
Run Mode Region	Shows the run mode selected from the RunMode screen.
File Name Region	Displays the file name to which the data is currently being saved.
Test Progress Region	Shows the time-based progress of the test.
Error Indicator Region	Shows the current stats of the instrument STEL: Shows if STEL is in progress (desktop instruments only) Flow: Status of the flow control Laser: Status of the Laser Filter: Status of the Filter See Chapter 5, "Troubleshooting," to resolve any of these error conditions.

Stats

The Stats button shows the statistics of the mass measurement. When the Stats button is pressed, the main mass reading will reduce in font size, and the measurement statistics will show on the right side of the screen.

Graphing

During sampling, pressing the **Graph** button displays current readings in graphical form.

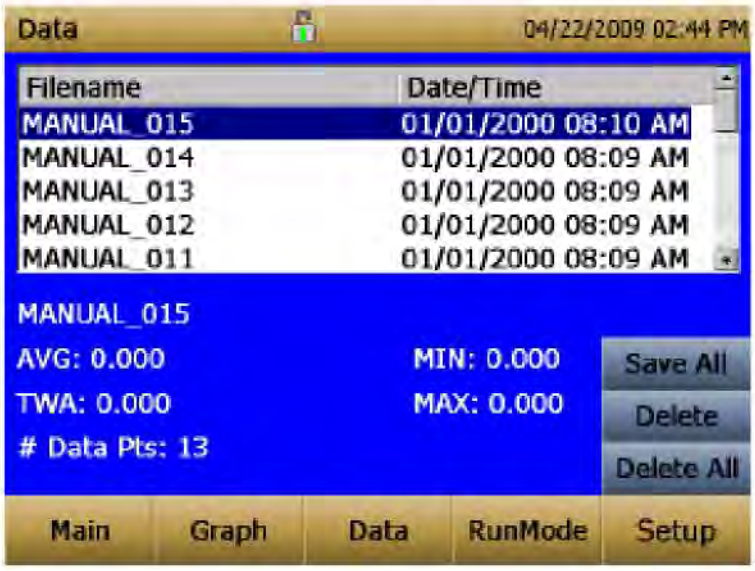
- During Survey Mode, five (5) minutes of running real-time data is displayed graphically.
- During Logging Mode, the entire log test time is displayed on the graph.

Time Display	Pressing the **Time** x-axis label on the graph screen switches between **Time (s)**, **Time (abs)**, and **Time (rel)**. **Time (s):** Elapsed time from first logged point (log interval) to the last logged point (test length). **Time (rel):** Relative time from zero to last logged point (test length – log interval). **Time (abs):** Absolute time from first logged point (test start + log interval) to last logged point (test stop).
Scale Display	Pressing in the Scale Display area will bring up a dialog that will allow changing between auto scaling and user scaling of the Y-axis.
Data Region	Pressing the data region will bring up a dialog to show TWA or Average lines. **TWA:** Will show a secondary line on the graph showing the time weighted average of the data. This line will not show if test time is less than 15 minutes. **Average:** Show a secondary line on the graph of the running average of the data.

In Graphing Mode, pressing **Main** returns the instrument to the Main Screen display.

Viewing Data

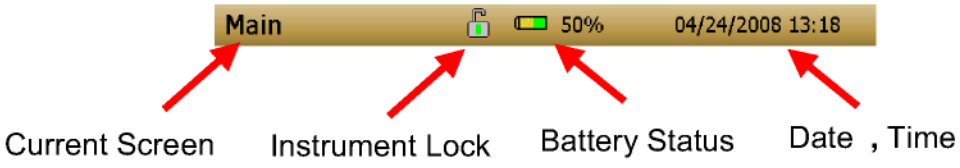
The **Data** button opens a list of data files for viewing.



Select File	Press the arrows on the right side of the screen to scroll up or down to the data file to be viewed.
Data Statistics	Statistics on the selected file ○ File Name ○ Sample Average ○ Sample TWA ○ Sample Maximum Reading ○ Sample Minimum Reading ○ Number of Data Points in the File
Save All Button	Downloads data to a USB thumb drive. The USB thumb drive must be attached to the USB host port. Data is saved as a .csv file that can be viewed in Microsoft® Excel® spreadsheet software.
Delete Button	Deletes the currently highlighted file.
Delete All Button	Deletes all the files stored on the instrument.
Graph Button	Data can also be viewed in graphical form by pressing the **Graph** button while the data file is highlighted.

Title Bar

The Title Bar shows common instrument information.



Current Screen	Title of the current screen that is being displayed.
Instrument Lock	Icon shows if the instrument touchscreen is in an unlocked or locked condition. Unlocked: Locked: To lock the touchscreen controls, touch the "lock" icon, immediately followed by three (3) quick touches on the current screen (**Main)** word along the top tool bar. Repeat the process to unlock the screen.
Battery Status	Show the current % life of the battery and show if the battery is currently being charged: Charging: (unfilled portion of the icon is filled yellow as well as animated to indicate that the charging is in progress) Not Charging: (unfilled portion of the icon transparent)
Date and Time	Indicates the instruments current date and time.
Alarm	If the instrument is in an alarm status, an alarm icon will appear in the title bar.

Chapter 4

Maintenance

The DustTrak II aerosol monitor can be maintained in the field using the instructions below. Additionally, TSI recommends that you return your DustTrak II monitor to the factory for annual calibration. For a reasonable fee, we will quickly clean and calibrate the unit and return it to you in "as new" working condition, along with a Certificate of Calibration. This "annual checkup" helps ensure that the DustTrak II monitor is always in good operating condition.

WARNING

There are no user-serviceable parts inside this instrument. The instrument should only be opened by TSI or a TSI approved service technician.

Maintenance Schedule

The DustTrak II Aerosol Monitor requires maintenance on a regular basis. Table 4–1 lists the factory recommended maintenance schedule.

Some maintenance items are required each time the DustTrak monitor is used or on an annual basis. Other items are scheduled according to how much aerosol is drawn through the instrument. For example, TSI recommends cleaning the inlet sample tube after 350 hours of sampling a 1 mg/m^3 concentration of aerosol. This recommendation should be pro-rated according to how the instrument is used. 350 hours at 1 mg/m^3 is the same amount of aerosol as 700 hours at 0.5 mg/m^3 or 175 hours at 2 mg/m^3, etc.

Table 4–1. Recommended Maintenance Schedule

Item	Frequency
Perform zero check	Before each use.
Clean inlet	350 hr. at 1 mg/m^3*
Clean 2.5 µm calibration impactor	Before every use.
Replace internal filters	350 hr. at 1 mg/m^3* or when indicated by the main screen filter error indicator.
Return to factory for cleaning and calibration (For 8530EP, TSI recommends that both the DustTrak and the External Pump Module be returned to TSI)	Annually
Replace the internal HEPA filters in the External Pump module	Annually

*Pro-rated, see discussion above.

The DustTrak monitor keeps track of the accumulated amount of aerosol drawn through it since its last cleaning. When the internal filter replacement is due, the filter error indicator will turn from green to red.

TSI recommends you perform a zero check prior to each use for the DustTrak monitor and certainly before running any extended tests, and after the instrument experiences a significant environmental change. Examples of significant environmental changes would be ambient temperature changes that exceed 15 °F (8 °C) or moving from locations with high aerosol concentrations to low concentrations.

Zeroing Instrument

1. Attach the zero filter to the inlet of the instrument.

Figure 4-1: Attach Zero Filter to Inlet

2. Follow zero calibration instructions detailed in the operations section of this manual.

Cleaning the Inlet

The inlet should be cleaned based on the schedule in Table 4–1.

1. Turn the DustTrak monitor off.
2. Unscrew the inlet nozzle from the instrument (Figure 4-2).

Figure 4-2: Unscrew Inlet Nozzle

3. Clean the inlet port. Use a cotton swab to clean the outside of the inlet port. You may dampen the swabs with water or a light solvent (e.g., isopropanol). Clean the inside of the sample tube by using a small brush, along with a light solvent. Dry the tube by blowing it out with compressed air, or let it air-dry thoroughly.

Note
Be *careful* not to blow particles into the DustTrak monitor inlet port.

Figure 4-3: Do NOT Blow into Instrument

4. Screw (hand-tighten) inlet back into instrument.

Cleaning and Oiling Impactors

The calibration impactor should be cleaned prior to every use, using it to perform a Standard Calibration (size correction) on the instrument, as described in the Operations section.

1. Unscrew Impactor. Check O-ring on the impactor base.
2. Clean outside and inside of Impactor and the impactor plate using a clean brush and a light solvent. Dry impactor parts by blowing it out with compressed air, or let it air-dry thoroughly.
3. Apply 2 drops of oil (included) to the impactor plate. **DO NOT** over-fill impaction plate.
4. Screw (hand-tighten) impactor back together.

Figure 4-4: Apply 2 Drops of Oil to Impactor Plate

Replacing the Internal Filters

Replace the internal filters based on the schedule in Table 4–1 or when the filter indicator on the main screen changes to red.

1. Turn the instrument off.
2. Remove old filters from the instrument.

Handheld Model

a. Use the enclosed filter removal tool (PN 801668) tool to unscrew the two filter caps located on the bottom of the instrument.

b. Pull the old filters out of the two filter wells. If filter wells are visibly dirty, blow out with compressed air.

Figure 4-5: Pull Filters Out of Two Filter Wells (Handheld Model)

c. Put two (2) new filters (P/N 801666) into the filter wells and screw filter caps back into place.

Note
Replacement filters were shipped with the new instrument. Order additional filters from TSI under PN 801666.

Desktop Model

a. Open filter access door on the back of the instrument.

b. Use the enclosed filter removal tool (PN 801668) to unscrew filter cap.

c. Pull out single cylindrical filter from filter well. If filter well is visibly dirty, blow out with compressed air.

Figure 4-6: Pull out Single Cylindrical Filter from Filter Well (Desktop Model)

d. Put new filer (P/N 801673) back into filter well and screw filter cap back into place.

e. Open blue retention clip by pinching ends inward and pushing down.

Figure 4-7: Open Blue Retention Clip

f. Remove 37-mm filter cassette by pulling downward and outward.

Figure 4-8: Remove 37-mm Filter Cassette

g. Open filter cassette using enclosed tool PN 7001303.

Figure 4-9: Open Filter using Enclosed Tool

h. Remove screen mesh from filter cassette and blow out using compressed air. Blow in reverse direction to remove captured particulate.

i. Replace mesh in filter cassette and press halves together. Make sure filter has been fully closed. The filter tool PN 7001303 can be used to ensure the filter is fully closed.

Figure 4-10: Replace Mesh in Filter Holder

j. Place filter cassette back into position and close blue retaining clip. Make sure retaining clip snaps back into place.

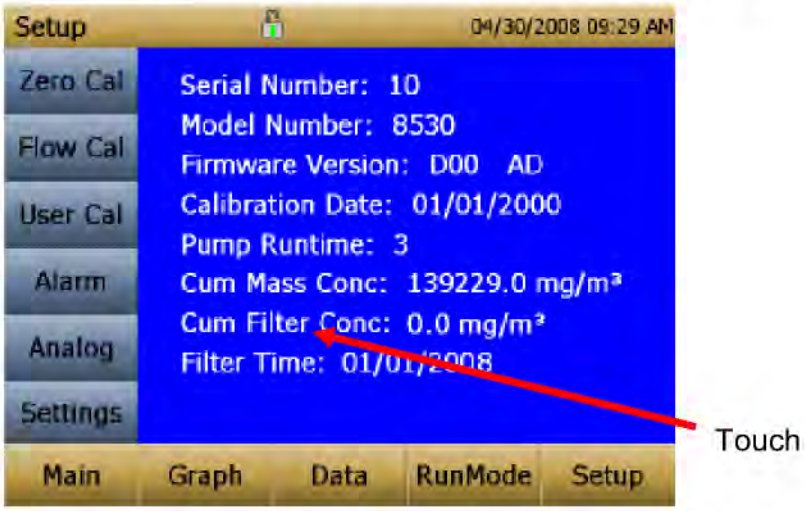
Notes
Replacement filters (HEPA and 37-mm Filter Cassette with mesh filter) were shipped with the new instrument. Order additional filters from TSI under PN 801673. TSI ***does not*** supply any filter media for the filter cassette. Any commercially available 37-mm filter media may be used with the DustTrak II or DRX desktop instruments to collect gravimetric reference samples.

3. **It is important to reset the instruments filter counter after replacing filters. Resetting the counter will clear the filter error condition shown on the main screen.** Reset the counters by the following:

   a. Turn on the instrument.

   b. Press the **Setup** button to go into the setup screen.

   c. Touch the **Cum Filter Conc:** (live key) to reset the aerosol mass.



   d. *Replace user serviceable filters?* Dialog will appear. Press **OK**.

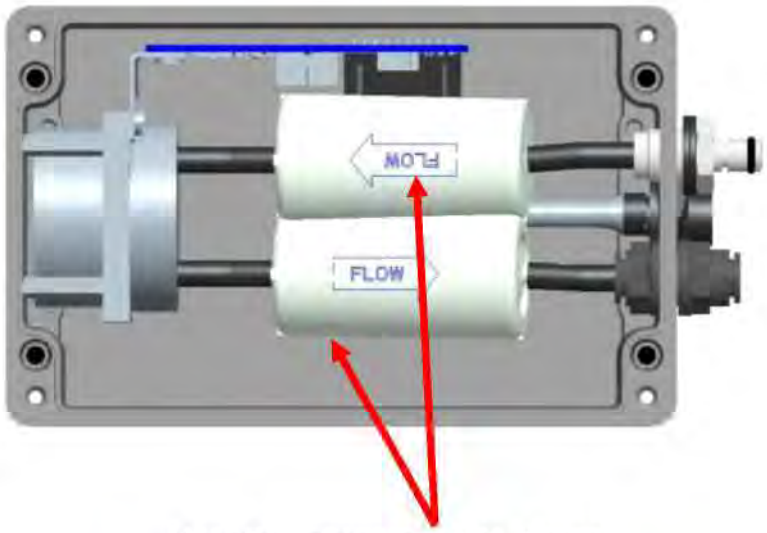
   e. *Reset filter concentration?* Dialog will appear. Press **Yes** to reset the cumulative filter concentration to zero.

   f. The Setup screen will now show zero for the **Cum Filter Concentration and** the current date for the **Filter Time**.

Replacing the Filters in the External Pump Module

The external pump module provided with Model 8530EP is designed to run continuously for about a year (8760 hours). There are two HEPA filters that protect the pump from contamination—one on the suction side of the pump and the other on the discharge side of the pump. The discharge side of the pump collects particles shedding from the vanes of the pump and will turn black over time. The HEPA filters will have to be replaced once a year.

To access the filters open the top cover of the pump module. The two HEPA filters are identified in the figure below. The two filters can be replaced by disconnecting the soft tubing between the filters, pump, and the casing connectors.



User Replaceable HEPA Filters

Caution

When replacing the HEPA filters, make sure they are oriented in the correction direction as shown in the picture above.

Storage Precautions

When storing the DustTrak monitor for more than 30 days, you should charge and remove the batteries. This prevents damage due to battery leakage.

This instrument must be stored in a location where the temperature remains between –20 and 60°C (–4 and 140°F).

Chapter 5

Troubleshooting

The table below lists the symptoms, possible causes, and recommended solutions for common problems encountered with the DustTrak II monitor.

Symptom	Possible Cause	Corrective Action
Erratic zero reading.	Leak	Check connections for leaks Replace zero filter
	Dirty inlet port and/or sample tube	Clean inlet port. Clean or replace tubing
	Internal filter(s) not installed properly (leaking)	Inspect internal filter wells to make certain the filters and O-rings are seated properly. Replace internal filters if necessary
DustTrak reading negative concentrations	Zero Drift	Perform Zero Cal
	Zero Cal was performed without the Zero Filter in-line	Perform Zero Cal again and make sure the Zero Filter is attached to the DustTrak inlet
Error completing Zero Cal	Too much light scatter in the optics chamber due to dust deposits	Clean the inlet nozzle. Attach the zero filter and sample for about 2 minutes. During sampling, pulse the flow going into the DustTrak monitor by intermittently plugging the zero filter. Any dust in the optics chamber will break loose during flow pulsations and will be cleared out by the pump Perform Zero Cal again. If the Zero Cal still cannot be performed, factory service may be required
Run Mode Error: The start time has passed	The selected Run Mode program has “Use Start Date” selected, but the start date is prior to the current date	Correct or change the run mode program

Symptom	Possible Cause	Corrective Action
Run Mode Error: The selected log mode will exceed the allowed number of samples	The selected Run Mode program is programmed to save more samples then is room in memory	Reduce the number of samples by reducing the test length or increasing the logging interval
Instrument runs slow	Large amount of data in memory	Large data files or many small data files will cause instrument to slow, due to need to read and display large amounts of data
No display	Unit not switched on	Switch unit on
	Low or dead batteries	Recharge the batteries or plug in the AC adapter
No touch - screen response	Instrument currently busy	The instrument will take time to open large data files and save configuration information. During this time, the instrument will not respond to additional touchscreen touches
	Instrument Touchscreen is locked	If the lock in the title bar is red, unlock the instrument following the instructions in the Chapter 3, Operation: Title Bar section of this manual
Analog output does not work	Cable/connector not correctly installed	Make sure cable connector is fully seated
	Output wired with reverse polarity	Make sure analog out (+) and analog ground (-) are wired correctly to data-logger
Analog output is not in proportion to display	Analog output range in DustTrak monitor may be set incorrectly	Check analog output setting in the Setup->Analog screen. Make sure the channel of interest is selected. Make sure that the correct output (0 to 5V, 4 to 20 mA) is selected
	Data logger scaling factor may be set incorrectly	Review the scaling factor set in the Setup-Analog screen
Alarm output does not work	Alarm function not turned on	Turn the alarm function on in the Settings->Alarm screen

Symptom	Possible Cause	Corrective Action
Alarm does not turn on correctly	Alarm setting incorrect	Check the alarm settings in the Settings->Alarm screen Make sure the logging interval and time constant are set as short as possible (30 seconds or lower)
	Alarm output wired with reverse polarity	Alarm wires are polarized. Voltage input must be wired to alarm input (+)
Instrument does not store new data	Memory is full	Delete or transfer historic data
	Instrument is in Survey mode	The instrument does not store data in survey mode. Can to manual or program log mode
Flow Error is indicated on front screen	If sampling from a duct, instrument may have problems overcoming pressure differences	Attach both the input and the exhaust port into the duct
	Flow obstruction	Remove obstruction if still present. Press any key to bypass
	Internal pump failing, indicated by inability to adjust flow rate to full range	Factory service may be required
	Filter Cassette clogged or has mass loading	Replace the filter cassette. See the maintenance section of the manual

Symptom	Possible Cause	Corrective Action
Flow Error is indicated on front screen	External pump module (for Model 8530EP only) is not connected to the DustTrak monitor	Make sure both the External Pump cable and the flow tubing connector are connected to the DustTrak monitor and the External pump module. Lock the External Pump Cable in place by rotating the connector clockwise until you hear it snap in place Make sure the tubing between the DustTrak monitor and the External pump module is not kinked and is free of any sharp bends Make sure the exhaust adapter is connected to the exhaust of the DustTrak monitor Make sure the External Pump module filters are not clogged. If found dirty, replace the two HEPA filters
Laser Error indicated on front screen	Laser background is too high	Remove and clean inlet nozzle. Pay close attention to the tip of the nozzle that is inserted into the instrument to ensure it is clear of any contamination
	Laser is failing	Factory service may be required
Filter Error indicated on front screen	Filters need to be replaced	Replaced the filters per instructions in the maintenance section of this manual. Make sure to reset the filter mass and date once the filters have been changed **Note** This is only a warning. The unit will continue to operate normally until the increase in pressure drop across the filter is so high that the pump can no longer maintain the set flow rate.

Symptom	Possible Cause	Corrective Action
System Error has Occurred!	The processor did not receive the input it expected. This can also happen if the optics chamber is saturated with light, or the External Pump Cable is accidentally disconnected during the middle of sampling	Reboot the instrument. If the error does not go away, factory service is required

(This page intentionally left blank)

Appendix A

Specifications

Specifications are subject to change without notice.

Sensor Type	90° light scattering
Range	8530 Desktop 0.001 to 400 mg/m^3 8532 Handheld 0.001 to 150 mg/m^3
Resolution	±0.1% of reading or 0.001 mg/m^3, whichever is greater
Zero Stability	±0.002 mg/m^3 24 hours at 10 sec time constant
Particle Size Range	Approximately 0.1 to 10 µm
Flow Rate	3.0 L/min set at factory 1.4 to 3.0 L/min adjustable
Flow Accuracy	±5% of factory set point Internal flow controlled
Temperature Coefficient	+0.001 mg/m^3 per °C
Operational Temp	0 to 50°C
Storage Temp	-20 to 60°C
Operational Humidity	0-95% RH, non-condensing
Time Constant	Adjustable 1 to 60 seconds
Data Logging	45 days at 1 minute samples
Log Interval	1 second to 1 hour
Physical Size (HWD)	Handheld: 4.9 x 4.75 x 12.45 in. Desktop: 5.3 x 8.5 x 8.8 in. External Pump: 4.0 x 7.5 x 3.5 in.
Weight	Handheld: 2.9 lb, 3.3 lb with battery Desktop: 3.45 lb, 4.45 lb – 1 battery, 5.45 lb – 2 batteries External Pump: 3.0 lb
Communications	8530: USB (Host and Device) and Ethernet. Stored data accessible using thumb drive 8532: USB (Host and Device). Stored dada accessible using thumb drive.
Power—DC	Handheld 12 VDC at 2A Desktop 24 VDC at 2.5A

Battery	8530: Up to 2 Removable Li-Ion External and Internal charging Life, 1 battery: >6.5 hours (9 hours typical for a new battery) for both internal and external pump Desktop DustTrak monitors Life, 2 battery: >13 hours 8532: 1 Removable Li-Ion External and Internal charging Life: 5 hours typical
Analog out	8530: User selectable output 0 to 5 V or 4 to 20 mA User selectable scaling
Alarm Out	8530: Relay or sound buzzer Relay No latching MOSFET User selectable set point 5% deadband Connector 4-pin, Mini-DIN connectors 8532: Sound buzzer
Screen	8530: 5.7” color touchscreen 8532: 3.5” color touchscreen
Gravimetric Sampling	8530: Removable 37-mm Cartridge
EMI/RF Immunity:	Complies with Emissions Directive Standard: EN50081-1:1992 Complies with Immunity Directive Standard: EN50082-1:1992*

*ESD Shock may require instrument reboot

Appendix B

Zero Module

The Zero Module (PN 801690) allows for automatic re-zeroing of the DustTrak Instrument during long sampling runs. The Zero Module works only with the 8530 desktop models.

Attach the AutoZero module to the main instrument in two steps.

1. Place the Zero module over the instrument's inlet and press down. The Zero module has an O-ring seal that will engage with the instrument's inlet.

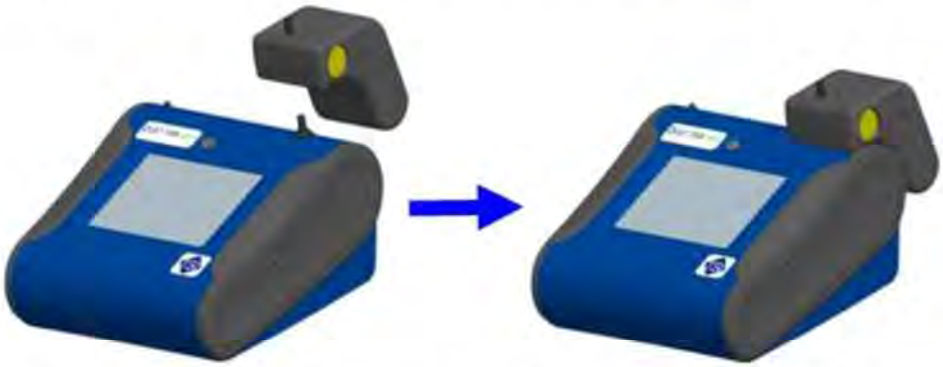


Figure B-1: Place Zero Module Over Inlet and Press Down

2. Attach the cable from the Zero module to the Zero module connector located on the back of the instrument.

Figure B-2: Zero Module Connector

The Zero Module can only be used in a program log mode. The Zero module function is controlled through these two program mode options:

Auto Zero Interval	Interval between re-zeroing the instrument using the Auto-Zero accessory.
Use Auto Zero	Select **Yes** to use the Zero Module. Select **No** to not use the Zero Module.

Important points on Zero Module operation:

- The Zero module will take one (1) minute to take a zero reading. The first 45 seconds of that period is used to clear the chamber of particles. Readings from last 15 second of the period, when the chamber is cleared of particles, will be averaged to determine the Zero offset.
- The log interval, when the Zero module is activated, must be two (2) minutes or greater. Data will not be recorded to the log file when the Zero module is activated.

Index

4

4-pin miniDIN connector, 17

A

AC adapter, 14
accessories
  8530-NA, 1
  optional, 7
advisory labels, vi
aerosol monitor
  maintenance, 47
  specifications, 61
  troubleshooting, 55
alarm, 30, 46
  audible, 31
  logging interval, 30
  survey mode, 30
  wiring, 18
alarm functioning, 30
alarm1
  relay, 31
  STEL, 31
  visible, 31
alarm1 setpoint, 31
alarm2 enable, 31
alarm2 setpoint, 31
analog, 33
  lower limit, 33
  out, 33
  output setting, 33
  size fraction, 33
  upper limit, 33
analog cable, 3
analog output
  wiring, 18
analog/alarm output
  connecting, 17
audible, 31
auto start on power up, 36
auto zero interval, 64

B

background, 34
battery
  charging, 14
  disposal, 11
battery charger, 7
battery installation, 11
  desktop unit, 11
  handheld unit, 12
battery label, vi
battery status
  charging, 46
  not charging, 46

C

calibration certificate, 3
calibration date, 22
calibration factor
  for specific aerosol, 28
calibration impactor
  cleaning and oiling, 49
charging battery, 14
Class I, v
cleaning
  inlet conditioner, 48
communication errors, 20
conductive tubing, 4
connect exhaust adapter to exhaust of DustTrak (8530EP), 13
connect power connector to DustTrak (8530EP), 13
connect pump end of quick connect to pump module (8530EP), 13
connecting
  analog/alarm output, 17
connecting computer, 16
current screen, 46

D

data, 45
  delete, 45
  delete all, 45
  save all button, 45
  select file, 45
  statistics, 45
delete, 45
delete all, 45
determining calibration factor for specific aerosol, 28
Dorr-Oliver cyclone, 4, 16
DustTrak 8530EP, 19
DustTrak 8533EP, 19

E

error indicator region, 42
error messages, 55
Ethernet port IP parameters, 34
external pump kit, 5, 7
external pump module, 9, 19, 20, 21
  connecting, 42

F

file name region, 42
filter cassette, 52, 53
  troubleshooting, 57
filter error, 58
filter opening tool, 4
filter removal tool, 4
filter time, 22
filter tool, 52
firmware version, 22
flow cal, 24
flow error, 57

G–H

graph, 43
  button, 45
  data region, 44
  scale display, 44
  time display, 44
gravimetric sample, 26

I–J–K

impactor oil, 5
inlet cap, 5, 15
inlet conditioner
  cleaning, 48
installing batteries, 11
instrument lock, 46
instrument setup, 16
internal filter, 4
  replacing, 50
internal filter element, 4
internal gravimetric filter, 29

L

laser error, 58
laser radiation label, vi
lock button, 39
lock feature, 39, 40
locking feature
  unlock, 40
log interval, 37, 38
log mode, 36, 38
  auto zero interval, 38
  log interval, 38
  log name, 38
  number of tests, 38
  start date, 38
  start time, 38
  test length, 38
  time between tests, 38
  time constant, 38
  use start date, 38
  use start time, 38
log modes, 36
log name, 38

M

maintenance, 47
  schedule, 47
manual log, 36
manual mode, 37
  log interval, 37
  test length, 37
  time constant, 37
mass concentration measurements, 41
mass reading, 42
model number, 22

N

name, 26
newcal, 29
number of tests, 38

O

optional accessories, 7

P–Q

packing list, 2
parts identification, 8, 9, 10
photometric, 26, 29
photometric calibration factor, 28
power supply, 5
pump run time, 22

R

relay, 31
replacing filters in the external pump module (8530EP), 54
replacing internal filter, 50
reusing and recycling, vii
run mode region, 42
runmode, 36

S

safety information, v
save all button, 45
screwdriver, 5
select file, 45
serial number, 22
serial number label, vi
service policy, ii
setting up, 11
  instrument, 16
settings, 33
  background, 34
  date time, 33
  display, 35
  IP, 34, 35
  touch cal, 34
setup menu, 22
  calibration date, 22
  cum filter conc, 22
  cum mass conc, 22
  filter time, 22
  firmware version, 22
  model number, 22
  pump run time, 22
  serial number, 22
size fraction, 33
size-selective impactors, 15
software
  installation, 16
spanner driver, 4
specifications, 61
start date, 38
start time, 38
start up, 19
START UP screen, 19
stats, 43
STEL, 31, 32
  alarm repeat, 32
  data, 32
  indicator, 32
storage precautions, 54
stylus, 5
supplying power, 11
survey mode, 36
  auto start on power up, 36
  time constant, 36
system error, 59

T

test length, 37
test progress region, 42
time between tests, 38
time constant, 36, 37, 38
title bar, 46
  alarm, 46
  battery status, 46
  current screen, 46
  date and time, 46
  instrument lock, 46
touch cal, 34
TrakPro™ software
  installation, 16
troubleshooting, 55

U

unlock, 40
unpacking, 1
USB cable, 3
USB port
  connector, 16
USB port IP address, 34
use auto zero, 64
use start date, 38
use start time, 38
user cal, 25, 26
  name, 26
  photometric, 26
user replaceable HEPA filters
  (8530EP), 54

V

visible, 31

W–X–Y

warning, v
warranty, i
wiring alarm, 18
wiring analog output, 18

Z

zero cal, 23
  error, 55
zero filter, 2, 48
zero module, 63
zeroing instrument, 48

(This page intentionally left blank)

UNDERSTANDING, ACCELERATED

TSI Incorporated – Visit our website **www.tsi.com** for more information.

USA	**Tel:** +1 800 680 1220	**India**	**Tel:** +91 80 67877200
UK	**Tel:** +44 149 4 459200	**China**	**Tel:** +86 10 8219 7688
France	**Tel:** +33 1 41 19 21 99	**Singapore**	**Tel:** +65 6595 6388
Germany	**Tel:** +49 241 523030		

P/N 6001893 Rev. S ©2019 TSI Incorporated Printed in U.S.A.

ATTACHMENT A-2

Air Monitoring Summary Sheet

Job:

Sampling Technician: Job #:

Weather: Date:

Time Start	Time End	Location	Wind Direction	Activity/Operation	Results				Notes/Additional Monitoring
					Background Readings	PID (ppm)	Background Readings	DUST (ug/m3)	

Additional Notes:

Action Levels Exceeded: ☐ YES ☒ NO

If YES, explain:

Daily Instrument Calibration Log

Date:	Sampling Technician:
Project #:	Project Name:

Instruments Used:

Station 1	PID 1	SN:
	Data Ram 1	SN:
Station 2	PID 2	SN:
	Data Ram 2	SN:
Station 3	PID 3	SN:
	Data Ram 3	SN:
Hand	PID Model 580	SN:
Held	Data Ram	SN:

Inspection Notes:

Pre-Calibration/Standardization:

PIDs:

	Zero		**Gas - 100 ppm**	
1	☐ YES	☐ NO	☐ YES	☐ NO
2	☐ YES	☐ NO	☐ YES	☐ NO
3	☐ YES	☐ NO	☐ YES	☐ NO
Hand Held	☐ YES	☐ NO	☐ YES	☐ NO

Repair Needed:

Data Rams:

	Zero	
1	☐ YES	☐ NO
2	☐ YES	☐ NO
3	☐ YES	☐ NO
Hand Held	☐ YES	☐ NO

Post-Shift Download:

PIDs:

Instrument:				Results/Comments:
1	☐ Data	☐ Avg	☐ Summary	
2	☐ Data	☐ Avg	☐ Summary	
3	☐ Data	☐ Avg	☐ Summary	

Data Rams:

1	☐ Data	
2	☐ Data	
3	☐ Data	

Weather Station: ☐ YES

Background Readings:

PID 1:		Data Ram 1:	
PID 2:		Data Ram 2:	
PID 3:		Data Ram 3:	

Note: "NA" indicates when an item or section is "Not Applicable".

GZA GeoEnvironmental of New York.

APPENDIX B

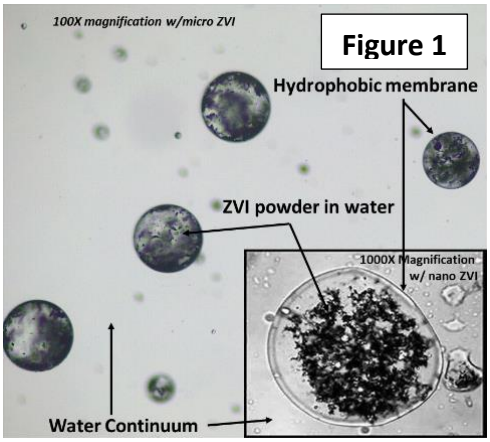
PROVECTUS PRODUCT SPECIFICATIONS

ADVANCED EZVI FORMULATIONS FOR THE REMEDIATION INDUSTRY

Provectus Environmental Products, Inc. offers the most advanced, cost efficient formulations of the NASA patented Emulsified Zero Valent Iron (EZVI) technology to the remediation industry. Millions of pounds of EZVI have been used successfully at locations throughout the United States (including Superfund sites) and in Canada, France and Australia (Reinhart, 2003; Su *et al*., 2017). Provectus' scientists have unmatched experience and expertise with practical formulation, manufacturing, design, and full-scale technology applications.

Provectus' EZVI formulations (**Figure 1**) uniquely contain:

- **Controlled methanogenesis** – safer, more efficient, more effective
- **Lower viscosity** formulations – maximizes subsurface distribution and contact
- **pH stabilized** formulations – optimizes emulsion stability and reactivity
- **Catalyzed ZVI** – enhances reactivity by augmenting electron transfer processes



Additional benefits of our EZVI product offerings include:

Technical

- Quality Assured Products
  - Emulsion structure, density, hydrophobicity
- Proven Effectiveness / Longevity
- Custom Formulations Available
- NASA Patents Recognized and Honored

Economic

- Competitive in situ DNAPL/source destruction technology
- Green & Sustainable product
- Made in the USA (FAR 52.225-11)

INTRODUCTION

The remediation of a dense non-aqueous phase liquid (DNAPL) is complicated by its physical and chemical properties (EPA, 2004). By definition, DNAPLs are compounds that have specific gravities greater than water (> 1 g/cm^3), low water solubility, and therefore, a hydrophobic physical chemistry. The presence of DNAPL at a site can act as an ongoing source of contaminant to groundwater for decades. Chlorinated solvents are present as DNAPLs at many superfund sites (EPA, 2004). The potential effectiveness of ZVI for remediation of groundwater impacted by chlorinated solvents has been documented since the early 1990s (Gillham, 1994). As described by Arnold and Roberts (1998), chemical transformation via ZVI occurs on particle surfaces and therefore involves at least three steps: (a) adsorption of the substrate to reactive sites on the ZVI particle surface, (b) reaction at the surface, and (c) desorption of the transformation product. In the absence of interspecies competition by catabolites, the kinetics of PCE transformation via α-

Provect-IR®, Provect-IRM®, Provect-OX®, ABC-CH4®, EZVI-CH4™, ERD-CH4™, AquaGate®-CH4™, Provect-CH4® , Provect-GS™ are trademarks of Provectus Environmental Products, Inc. and/or our affiliates. V2 – June5, 2017
Copyright © 2017 Provectus Environmental Products, Inc.

and/or β-elimination reactions (and, to a lesser degree, hydrogenolysis and hydrogenation reactions) is therefore directly related to reactive surface area.

The ZVI mediated transformation processes described above are relevant for dissolved phase contaminant destruction, as the ZVI requires a hydrogen donor (*e.g.* H_2O) for the abiotic reactions to proceed (Brown *et al*., 2009). Because DNAPL is not in the dissolved phase and has a hydrophobic physical chemistry, injection of ZVI slurries into source areas will not provide direct destruction of source material. The EZVI technology provides a solution to this problem, and is engineered to enable maximum contact with source materials, while including ZVI suspended within water (hydrogen donor) so that direct DNAPL destruction is possible using ZVI technology.

ZVI PLUS VEGETABLE OIL IS NOT EZVI

Emulsion Structure

EZVI combines food grade vegetable oil (VO) with a surfactant, elemental iron and water in a specific physical structure to enable direct DNAPL destruction utilizing a combination of abiotic and biotic processes. The key innovation surrounding the EZVI technology is the structure of the emulsion (Quinn *et al*., 2005, Su *et a*l., 2017). In order for the NASA patented technology to perform as designed, the emulsion structure, which is a water-in-oil type emulsification, must be in place (see **Figure 2**). The structure of the EZVI technology enables;

- Miscibility with DNAPLs in situ
- Continuous Sequestration (phase partitioning) of COI into outer VO membrane (decreased COI mass flux)
- Encapsulates ZVI so that it targets only COIs with hydrophobic physical chemistry
- Provides slow release hydrogen source for biostimulation downgradient of source area

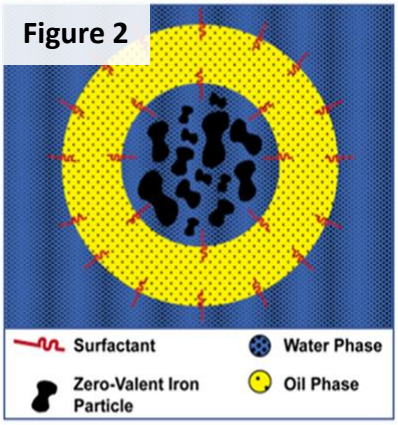


Figure 2

DNAPL treatment with EZVI proceeds via 3 primary steps;

- Sequestration (into outer lipophilic membrane)
- Dissolution (into interior aqueous phase)
- Reductive dehalogenation (utilizing abiotic and biotic processes)

Miscibility with DNAPLs

Due to the above structure, the EZVI technology is itself a DNAPL. The outer vegetable oil membrane provides matching hydrophobic physical chemistry such that the remedial emulsion is fully miscible with COI source material in situ (see **Figure 3**). This unique characteristic enables maximum contact with DNAPL materials in situ, which is critical to accomplish direct source material destruction.

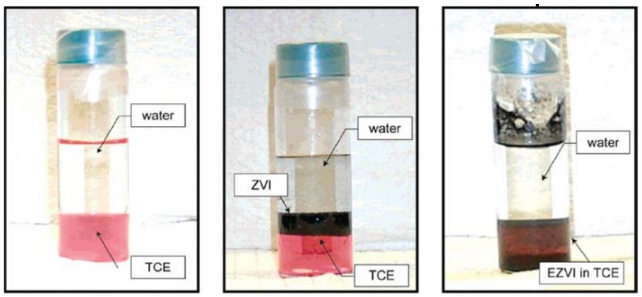


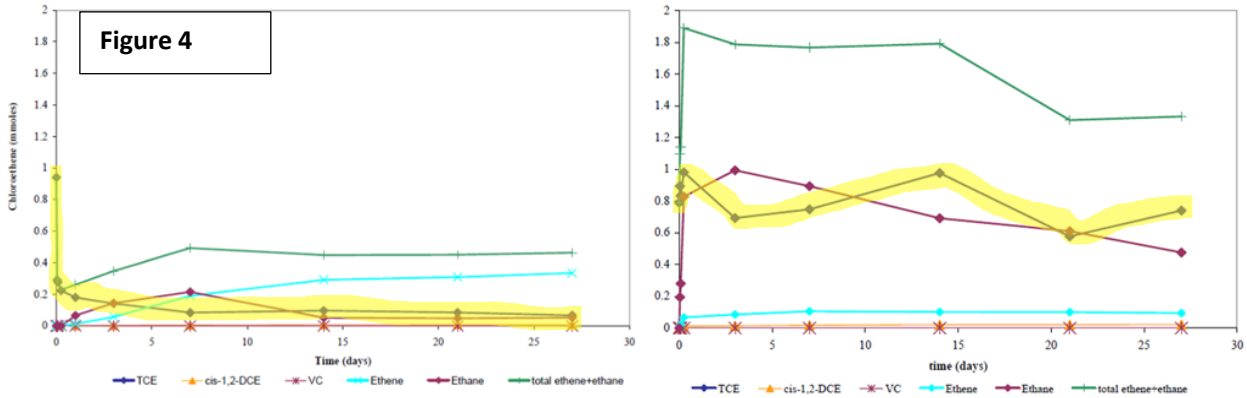
Figure 3 **Miscible with DNAPL**
Ref: Quinn *et al.,* 2009

Provect-IR®, Provect-IRM®, Provect-OX®, ABC-CH4®, EZVI-CH4™, ERD-CH4™, AquaGate®-CH4™, Provect-CH4® , Provect-GS™ are trademarks of Provectus Environmental Products, Inc. and/or our affiliates. V2 – June5, 2017
Copyright © 2017 Provectus Environmental Products, Inc.

Decreased Source Area Mass Flux

When the EZVI technology is implemented within a source area, the chemical equilibrium is disrupted and hydrophobic contaminants (*e.g.* chlorinated solvents) phase partition into the vegetable oil membrane of the emulsion. By emplacing this lipophilic membrane within the source area the water solubility of the hydrophobic contaminants is effectively decreased, see Figure 4, where the EZVI microcosm demonstrated a 90% decrease in dissolved TCE concentrations, while the ZVI microcosm showed little change in dissolved TCE concentrations. This is the result of rapid phase partitioning or sequestration of the DNAPL into the outer membrane of the emulsion, and results in dramatically reduced groundwater concentrations which in turn provide significant reduction in contaminant mass flux from an EZVI treated source area.

Figure 4



EZVI and KB-1 DNAPL

ZVI and KB-1 DNAPL

Ref: O'Hara et al., 2005

Combined Technologies Abiotic and Biotic Processes

Abiotic reductive dehalogenation processes primarily occur on the interior of the emulsion where the highly reactive ZVI powder is encapsulated with water. This creates a COI concentration gradient across the lipophilic membrane into the interior of the micelles, and continually pulls contaminant mass into the emulsion. The biologically mediated processes are primarily occurring on the outside (exterior) of the emulsion and downgradient (hydraulically) from the treated source area. The outer membrane is a fermentable substrate (vegetable oil) that provides hydrogen for the microbes to utilize, creating biostimulated conditions.

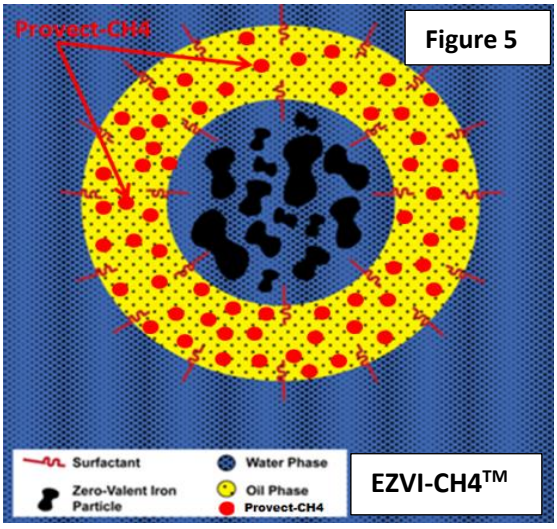
Provect-IR®, Provect-IRM®, Provect-OX®, ABC-CH4®, EZVI-CH4™, ERD-CH4™, AquaGate®-CH4™, Provect-CH4® , Provect-GS™ are trademarks of Provectus Environmental Products, Inc. and/or our affiliates. V2 – June5, 2017
Copyright © 2017 Provectus Environmental Products, Inc.

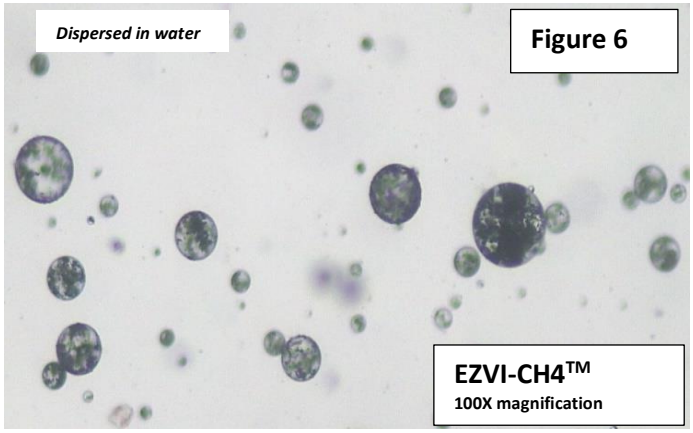
PROVECTUS' EZVI TECHNOLOGY ADVANCEMENTS

DNAPL Destruction with Controlled Methanogenesis - EZVI-CH4™

Chlorinated hydrocarbon source areas typically have microbial populations that are inhibited by high dissolved contaminant concentrations (Brown *et al*., 2009). When the EZVI technology is initially deployed the dissolved phase contaminant concentrations decrease dramatically and substantially (~ 90%) and enable the previously inhibited microbial communities to activate. Due to the ability of methanogens to multiply rapidly, they are typically the dominant hydrogenotrophs found in anaerobic biogeochemical conditions (Bates *et al*., 2011). Due to the decrease in dissolved phase contaminant concentrations that occurs when utilizing the EZVI technology, combined with the ability of methanogens to rapidly multiply, it is common to see elevated methane production in conjunction with EZVI treatments.

Therefore, Provectus' EZVI-CH4™ combines our patented antimethanogenic technologies (Provect-CH4™), with the EZVI technology to offer the only in situ DNAPL destruction technology with controlled methanogenesis. (Figure 5 & Figure 6). The antimethanogenic chemistry is combined into the fermentable carbon component of the emulsion, so that methanogens are inhibited as the vegetable oil is fermented to organic acids. Multiple types of methane inhibitors are utilized, including RYR extract and select essential oils/saponins. A micrograph image of the EZVI-CH4™ product in water is depicted in Figure 6.

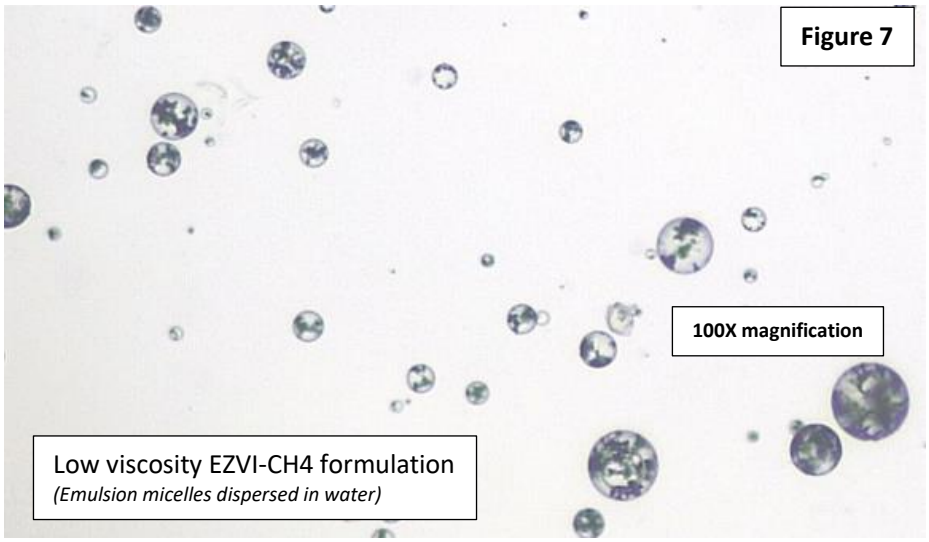




Provect-IR®, Provect-IRM®, Provect-OX®, ABC-CH4®, EZVI-CH4™, ERD-CH4™, AquaGate®-CH4™, Provect-CH4® , Provect-GS™ are trademarks of Provectus Environmental Products, Inc. and/or our affiliates. V2 – June5, 2017
Copyright © 2017 Provectus Environmental Products, Inc.

Decreased Viscosity Formulations

The NASA patented formulation for EZVI typically has a viscosity that ranges between 1,200 – 1,900 cP (Quinn et al., 2005). This level of viscosity has been problematic during implementation dependent on soil conditions and the implementation method (e.g. injection equipment). In order to maximize subsurface distribution, and therefore contact with source materials, Provectus has developed a lower viscosity formulation of the EZVI technology that retains the correct emulsion structure and stability (Figure 7). This new formulation has a viscosity that ranges from 700 - 900 cP.



pH Stabilized and Catalyzed Formulations

The reaction kinetics of unamended ZVI with chlorinated solvents is pH dependent and inversely correlated (Chen et al., 2001). As ZVI reacts with water the surface of the ZVI is passivated by the deposition of iron oxides and oxyhydro-oxides (Liu et al., 2006). Also, the pH of the water is increased due to the formation of hydroxyl ions. The increased pH conditions in turn enhances the rate of passivation of the iron surface due to formation of oxidized iron species. Additionally, the non-ionic surfactant used to manufacture the EZVI emulsion, is less stable with increasing pH conditions and could result in decreased emulsion stability under certain conditions in the aqueous phase of the emulsion (e.g. pH > 9.5).

Therefore, Provectus has formulated pH stabilized and catalyzed EZVI products which contain additives that will hydrolyze and provide acidity over time to the interior of the micelle. In addition, additives that will catalyze ZVI electron transfer processes, as well as, act to directly reduce iron oxides on the ZVI surfaces. These additives function to extend the duration of more optimal conditions for abiotic reductive dehalogenation reactions to occur, and prevents the potential destabilization of the emulsion due to elevated pH conditions.

Provect-IR®, Provect-IRM®, Provect-OX®, ABC-CH4®, EZVI-CH4™, ERD-CH4™, AquaGate®-CH4™, Provect-CH4® , Provect-GS™ are trademarks of Provectus Environmental Products, Inc. and/or our affiliates. V2 – June5, 2017
Copyright © 2017 Provectus Environmental Products, Inc.

KEY FEATURES

- Emulsion Structure: Water drops dispersed within vegetable oil (water-in-oil)
- Viscosity: Low Vis formulation ~ 800 cP; standard formulations ~ 1,500 cP
- ZVI particle size = sub-micron to <5 micron
- Custom Formulations Available (ZVI: 5 to 20%; VO: 35-40%; AMR varies; weight basis)
- Shipping sizes (55 USG drums, 275 USG totes)
- Injection ready: Product is injection ready when received, does not require dilution

CONCLUSIONS

The NASA patented EZVI technology is an elegant solution to the problem of *in situ* DNAPL destruction. However, the water-in-oil structure of the EZVI technology is **critical** for achieving direct DNAPL destruction via ISCR processes. Provectus EZVI products **are not** simply a mixture of emulsified vegetable oil (oil dispersed in water type emulsion) and ZVI. Rather, our EZVI products are the most advanced formulations of the NASA patented technology, and include;

- **CONTROLLED METHANOGENESIS** – EZVI-CH4™ is manufactured using Provectus' patented antimethanogenic reagents (AMR) technology incorporated into the fermentable component of the emulsion to inhibit excessive methanogenesis from occurring during initial fermentation of emulsion materials.
- **CATALYZED ZVI REACTIONS** – Our EZVI and EZVI-CH4™ can be provided with catalyzers to enhance and extend the reactivity of ZVI particles.
- **ENHANCED EMULSION STABILITY**- Our EZVI and EZVI-CH4 ™ can be provided with pH stabilization to maintain interior pH levels so that the emulsion structure has prolonged reactivity/stability in the subsurface.
- **LOWER VISCOSITY EMULSION** – PEP-EZVI and EZVI-CH4™ can be engineered, when appropriate, with decreased viscosity characteristics for enhanced installation (i.e. injectability).
- **CUSTOM EMULSION FORMULATION** – PEP-EZVI and EZVI-CH4™ is custom formulated for ZVI percentage, ZVI catalysis, AMR percentage, and viscosity, for each site. We will review your site information and work with you to develop a formula that is adapted for attaining your site-specific remediation goals.
- **EMULSION INTEGRITY** – Our EZVI products are manufactured per the NASA patent and quality checked during manufacturing to ensure emulsion structure is correct.

PROVECTUS ENVIRONMENTAL PRODUCTS, INC.
2871 West Forest Road, Suite 2 | Freeport, IL 61032
Tel: (815) 650-2230 | Fax: (815) 650-2232 | Email: info@ProvectusEnv.com

Turn-Key, Risk-Reward, Pay-for-Performance, Remedial Guarantees/Warranties

Provect-IR®, Provect-IRM®, Provect-OX®, ABC-CH4®, EZVI-CH4™, ERD-CH4™, AquaGate®-CH4™, Provect-CH4® , Provect-GS™ are trademarks of Provectus Environmental Products, Inc. and/or our affiliates. V2 – June5, 2017
Copyright © 2017 Provectus Environmental Products, Inc.

REFERENCES

Arnold, W.A. and A. L. Roberts. (1998). Pathways and Kinetics of Chlorinated Ethylene and Chlorinate Acetylene Reaction with Fe(0) Particles. Environ. Sci. Technol. 1998. http://www.provectusenvironmental.com/marketing/zvi/Pathways_of_Chlorinated_Ethylene_EST1998.pdf

Bates, S. T., Berg-Lyons, D., Caporaso, J., Walters, W., Knight, R., & Fierer, N. (2011). Examining the global distribution of dominant archaeal populations in soil. ISME Journal, 5, 908–917.

Brown, R.A., Mueller, J.G., Seech, A.G., Henderson, J.K. and Wilson, J.T. (2009) Interactions between biological and abiotic pathways in the reduction of chlorinated solvents. Remediation Journal 20(1), 9-20.

EPA. 2000. Engineered Approaches to In Situ Bioremediation of Chlorinated Solvents: Fundamentals and Field Applications. EPA 542-R-00-008.

Gillham, R.W. and S.F. O'Hannesin. (1994). Enhanced Degradation of Halogenated Aliphatics by Zero-Valent Iron. Ground Water, Vol 32., No. 6 pages 958 - 967. (http://www.provectusenvironmental.com/marketing/zvi/UW1994_Half-life_ZVI.pdf)

Kim, E-J., J-H Kim, Y-S-Chang, D. Ortega and P.G. Tratnyek. (2014) Effects of Metal Ions on the Reactivity and Corrosion Electrochemistry of Fe/FeS Nanoparticles. Environ. Sci. Technol. (http://www.provectusenvironmental.com/marketing/zvi/Tratnyek2014.pdf)

Liu, Y. and Lowry, G.V. (2006) Effect of particle age (Fe0 content) and solution pH on NZVI reactivity: H2 evolution and TCE dechlorination. Environ Sci Technol 40(19), 6085-6090.

O'Hara, S., Krug, T., Quinn, J., Clausen, C., and Geiger, C (2006) Field and Laboratory Evaluation of the Treatment of DNAPL Source Zones Using Emulsified Zero-Valent Iron. Remediation Journal March 2006.

O'Hara, S., Krug, T., Quinn, J., Clausen, C., and Geiger, C (2005) Field and Laboratory Evaluation of the Treatment of DNAPL Source Zones Using Emulsified Zero-Valent Iron. Presentation.

Quinn, J., Geiger, C., Clausen, C., Brooks, K., Coon, C., O'Hara, S., Krug, T., Major, D., Yoon, W.-S., Gavaskar, A. and Holdsworth, T. (2005) Field Demonstration of DNAPL Dehalogenation Using Emulsified Zero-Valent Iron. Environmental Science & Technology 39(5), 1309-1318.

Quinn, J., Clausen, C., Geiger, C., O'Hara, S., Krug, T., Watling, M., Ruiz, N., Su, C., Puls, R. (2009) Field Demonstration of DNAPL Dehalogenation Using Emulsified Zero-Valent Iron. Presentation

Reinhart, D., Clausen, C., Geiger, C., Quinn, J (2003) Zero-valent metal emulsion for reductive dehalogenation of DNAPLs. U.S. Patent 6,664,298 filed Oct. 2001 and issued Dec. 2003

Reinsch, B. C., B. Forsberg, R.L. Penn, C.S. Kim, and G. V. Lowry. (2010). Chemical transformations during aging of zero valent iron nanoparticles in the presence of common groundwater dissolved constituents. Environ. Sci. Technol. 2010, 44, 3455-3461

Su, C., Puls, R., Krug, T., Watling, M., O'Hara, S., Quinn, J. and Ruiz, N. (2017) Long-Term Performance Evaluation of Groundwater Chlorinated Solvents Remediation Using Nanoscale Emulsified Zerovalent Iron at a Superfund Site. In: *Applying Nanotechnology for Environmental Sustainability* DOI: 10.4018/978-1-5225-0585-3.ch005

Provect-IR®, Provect-IRM®, Provect-OX®, ABC-CH4®, EZVI-CH4™, ERD-CH4™, AquaGate®-CH4™, Provect-CH4® , Provect-GS™ are trademarks of Provectus Environmental Products, Inc. and/or our affiliates. V2 – June5, 2017
Copyright © 2017 Provectus Environmental Products, Inc.

Provect-IR® ISCR Reagent

Provect-IR® is a unique mixture of reagents combined into a single product that optimizes the *in situ* reductive dechlorination of chemicals present in soil, sediment, and groundwater. It acts by promoting synergistic interactions between:

- Natural antimethanogenic compounds
- Hydrophilic, nutrient rich organic carbon sources
- Zero-Valent Iron (ZVI)
- Chemical oxygen scavengers
- Vitamin and mineral sources

This distinctive, patented combination of natural and food-grade chemicals promotes *in situ* chemical reduction (ISCR) conditions for fast and effective destruction of targeted constituents of interest (COIs) such as chlorinated solvents, organochlorine pesticides, and other halogenated compounds (Brown *et al.*, 2009; Dolfing *et al.*, 2008; US Patent Office Scalzi *et al* 2012). Notably, Provect-IR® is the only ISCR reagent to simultaneously inhibit the production of methane during the requisite carbon fermentation processes (US Patent Office Scalzi *et al*, 2013, 2014). This promotes more efficient use of the hydrogen donor while avoiding negative issues associated with elevated methane (CH4) in groundwater, soil gas, and indoor air.

Current regulations for methane in groundwater vary from ca. 10 to 28 mg CH4/L (Indiana Department of Environmental Management, 2014). More State regulations are pending, with several enhanced reductive dechlorination (ERD) projects which intended to use liquid carbon (emulsified oils) sources failing to receive regulatory approval due to issues associated with excessive production of methane during previous technology applications (Personal Communication - State of California; State of Minnesota). Many remedial practitioners have subsequently been required to establish contingencies for conventional ERD/ISCR implementation if methane exceeds a threshold level ranging from 1 ppm to 10 ppm groundwater. These contingencies often entail expensive and extensive systems for capturing and treating methane in soil gas/vapor captured via SVE systems.

MODE OF ACTION – HOW DOES IT WORK?

What is a Methanogen? In the 1970s, Dr. Carl Woese (1928 to 2012) and his colleagues at the University of Illinois - Urbana studied prokaryotic relationships using DNA sequences and they found that microbes that produce methane – or methanogens - are Archaea (Woese and Fox, 1977). The identification of this new Domain of microorganism was very important for many reasons, but from our limited perspective herein this vast difference in genetic composition means that methanogens are significantly different from typical heterotrophic bacteria and eukaryotes. In other words, *Dehalococcoides* ethenogenes are as different from methanogens as you are.

Copyright © 2014 - 2022 Provectus Environmental Products, Inc.®

What is a Statin? A statin can be defined as "a class of lipid-lowering drugs that reduce serum cholesterol levels by inhibiting a key enzyme involved in the biosynthesis of cholesterol". Lovastatin is a widely known, potent statin used for decades to lower cholesterol in human blood by inhibiting 3-hydro-3-methylglutaryl-coenzyme A (HMG-CoA) reductase, which is a key enzyme in the cholesterol biosynthesis pathway (Alberts et al., 1980). It was the first statin approved by the United States Food and Drug Administration in 1987 as a hypercholesterolemic drug.

What is Red Yeast (Rice) Extract? The red yeast rice (RYR) extract that is component of Provect-IR® is a substance extracted from rice that has been fermented with a type of yeast called Monascus purpureus. Red yeast extract is used as a food coloring, food additive/preservative, and is widely consumed by humans. The RYR extract contains a number of monacolins - most importantly, Monacolin K, otherwise known as Lovastatin or Mevinolin. Monacolin K is the only naturally occurring statin compound. In addition to Monacolin K, RYR extract also contains mono-unsaturated fatty acids and other vitamins that will effectively stimulate anaerobic bacteria in the subsurface.

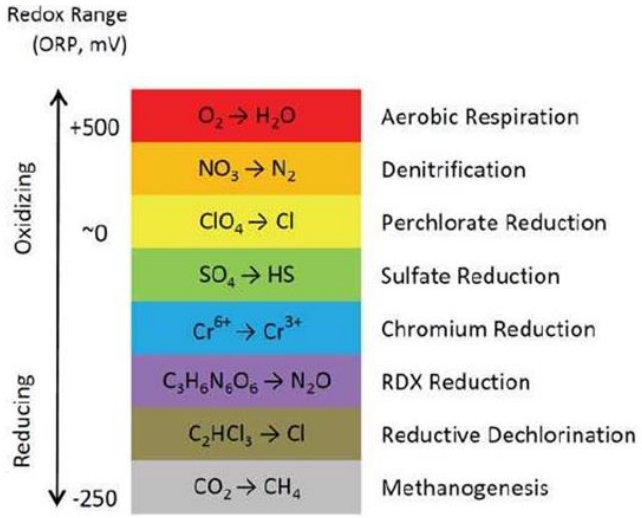
So - How Does a Statin Inhibit a Methanogen? Interestingly, Monacolin K is a potent inhibitor of methanogenic archaea because cell membrane production in archaea shares a similar pathway with cholesterol biosynthesis (Miller and Wolin, 2001). And since methanogens are so uniquely different than bacteria, the inhibitory effect is not observed in microbes that are typically associated with: i) catabolism of organic contaminants (such as pseudomonas species) and/or, ii) halo-respiration/biodegradation of chlorinated solvents (such as *Dehalococcoides* species). RYR has been used in the cattle industry for decades in efforts to manage rumen microbiology and control methane production in cows.

ATTENUATION PROCESSES – SAFER, MORE EFFICIENT ISCR TREATMENT

In situ chemical reduction as defined by Dolfing et al (2008) describes the combined effect of stimulated biological oxygen consumption (via fermentation of an organic carbon source), direct chemical reduction with ZVI or other reduced metals. The corresponding enhanced thermodynamic decomposition reactions that are realized at the lowered redox (Eh) conditions allow for more effective mineralization of many COIs.

Several ERD substrates and other accelerated anaerobic bioremediation technologies exist (e.g., emulsified oils, non-emulsified oils, carbon-based hydrogen release compounds, vegetable matter + ZVI amendments) that purportedly offer similar responses. However, the Provect-IR® antimethanogenic ISCR substrate is unique in its ability to yield Eh values most conducive to reductive dechlorination while simultaneously preventing methane production - which is a waste of the H being generated and potentially a safety issue under field conditions.

Copyright © 2014 - 2022 Provectus Environmental Products, Inc.®



Provect-IR® uniquely combines RYR extract with of a variety of specially selected reagents in order to induce genuine ISCR conditions and facilitate the destruction of targeted COIs in a safer, more efficacious manner. As outlined below, it can be used to manage environments impacted by chlorinated solvents, pesticides, heavy metals and other COIs.

Specially Selected Organic Hydrogen Donors: A variety of hydrophilic, nutrient rich organic carbon sources are incorporated in Provect-IR® that assist in promoting the ISCR process. The Provect-IR bioremediation amendments consist of slow, medium and long-term release carbon sources. Such a formulation is desirable because it provides both a rapidly utilized electron donor (calcium propionate), slow-release long-term electron donors (kelp meal and yeast extract) and long-term release carbon sources (other cellulose and hemi-cellulose carbon such as soy meal). More specifically,

- Calcium propionate and other readily biodegradable carbon sources: Following the addition of simple carbon sources such as lactate, formate, ethanol or glucose to an aquifer setting these compounds are often converted rapidly to hydrogen and acetate. Although this is the desired response, the process is sometimes too rapid, and this can result in aquifer acidification (due to rapid VFA production) and the liberation of too much hydrogen (which allows methanogens and sulfate reducers to compete effectively with dehalogenators, which tend to grow more slowly). Hence, calcium propionate is used as a readily biodegradable carbon source.
- Yeast extract: This supplement provides a variety of organic hydrogen donors that have slower release profiles (i.e., they are not fermented as rapidly as proprionate). Yeast extract also contains biological components that are very useful to anaerobes, but are not available through other carbon-only media. In particular, yeast extract provides an abundant source of priming ATPase along with trace nutrients and vitamin B complexes.

Copyright © 2014 - 2022 Provectus Environmental Products, Inc.®

- Kelp meal/Cellulose based carbon: These hydrogen sources are composed of a hydrophilic, solid and complex carbon that ferment more slowly and inherently generate less methane. The hydrophilic organic component of the kelp meal, for example, is composed of cellulose and hemicellulose and it may be treated during the manufacturing process so that some of the components more easily undergo hydrolysis to glucose while maintaining an overall longevity of 3 to 5+ years.

Chemical Oxygen Scavengers: The presence of chemical oxygen scavengers such as sodium sulfite helps minimize performance lag phases that are often observed following the injection of remedial amendments. This is due, in part, to the presence of oxygen that is introduced as a result of the field mixing and blending operations. It takes a certain amount of time and reagent consumption to remove that introduced oxygen and allow the ISCR reactions to proceed. Provect-IR is unique it that manages this impact chemically, which is a more effective, reliable manner thus allowing the ISCR process to be more effective.

Zero-Valent Iron: The presence of ZVI in Provect-IR® is critical to ISCR reactions. The ZVI is added as a reduced material that is oxidized during the reductive dechlorination reactions which use ZVI as the reducing agent. The beta-elimination reaction mainly produces (chloro)acetylene, ethane/ethane and chloride ions, without the accumulation of potentially problematic catabolites typical of microbiologically mediated sequential reductive dehalogenation processes (e.g., DCE "stall"). As the ZVI reacts, hydroxyl ions are released and pH increases which is useful in neutralizing the acidity generated during the fermentation of carbon, where acids are generated. Oxidized iron species are also produced, where are useful in alpha-elimination reactions and iron cycling. One limitation to ZVI reactions is that they are surface mediated which means that direct contact is required for direct COI destruction.

RYR Extract: Provect-IR® is the only ISCR amendment that will rapidly induce ISCR conditions while simultaneously preventing or significantly minimizing the production of methane. The benefits are notable:

- Safer: Methane is explosive with an LEL of 5% and an UEL of 15%. Production of methane will result from the addition of any conventional ERD or ISCR amendment: excessive and extended production of methane can result in elevated in groundwater concentrations (as high as 1,000 ppm have been reported) which can lead to accumulation in soil gas subsequently impacting indoor air. State specific regulations for methane in groundwater have been promulgated, with others pending for soil gas and indoor air.
- More Efficient = More Cost Effective: Production of methane is a direct indication that the hydrogen generated from the organic carbon amendments was used by methanogens and the amendment has been wasted because it was not utilized by acetogens or

Copyright © 2014 - 2022 Provectus Environmental Products, Inc.®

dehalorespiration. By inhibiting the growth and proliferation of methane producing Archaea, chlororespiring bacteria can become the more dominant bacterial populations.

PRIMARY FEATURES

- Effective: No accumulation of dead-end catabolic intermediates as a function of substrate addition (as is common with [emulsified] oils and sources of carbon only).
  - Does not rely on physical sorption/sequestration as a major "removal" mechanism (as is common with oils).
  - Inherently buffered for pH control – will not acidify an aquifer and liberate heavy metals as potential secondary COIs.
- Efficient: Significantly lower costs as a result more efficient amendment utilization and avoidance of contingencies for methane management. No need for additional buffers.
- Safe: Fewer health and safety concerns as compared with use of traditional ERD or ISCR reagents; Avoid issues associated with new and emerging methane regulations.
- Ease of Use: Green and sustainable. All components integrated in a single package. Logistics with no surprises.
- Longevity: Engineered profile of carbon sources for multi-year longevity estimated at 3 to 7 years based on site-specific hydrogeology. Reagent will stay in place and remain active which prevents rebound.
- Improved Performance: More efficient use of hydrogen donors (does not get wasted as methane).
- Adaptable Formulations for Heavy Metals: Will not mobilize arsenic or other heavy metals yielding secondary contaminants (as is common with [emulsified] oils and sources of carbon only). Can be formulated to manage environments that are co-impacted by various inorganic contaminants while simultaneously mineralizing the organic compounds.
- Patented Technologies: Technology end users and their clients are fully protected from all Patent and other legal issues

PHYSICAL PROPERTIES

Particle Size: ranges from ca. <5 to >100 micron (can be manufactured to specifications).

Dry Density: ranges from 0.4 to 0.5 g/cm3

29% Aqueous Slurry Density: ranges from 0.9 to 1.0 g/cm3

29% Aqueous Slurry Viscosity: ranges from 500 to 1,500 cP

Copyright © 2014 - 2022 Provectus Environmental Products, Inc.®

LITERATURE CITED:

Alberts, A., J. Chen, G. Kuron, V. Hunt, J. Huff, C. Hoffman, J. Rothrock, M. Lopez, H. Joshua, an E. Harris; 1980. Mevinolin: a Highly Potent Competitive Inhibitor of Hydroxymethylglutaryl-coenzyme A Reductase and a Cholesterol-Lowering Agent. Proceedings of the National Acadaemy of Sciences of the United States of America 77:3957-3961.

Brown, R., J. Mueller, A. Seech, J. Henderson and J. Wilson. 2009. Interactions between Biological and Abiotic Pathways in the Reduction of Chlorinated Solvents. Remediation Journal Winter 2009, pages 9-20.

Dolfing, J., M. Van Eekert, A. Seech, J. Vogan and J. Mueller. 2008. *In Situ* Chemical Reduction (ISCR) Technologies – Significance of Low Eh Reactions. International Journal Soil & Sediment Contamination 17 (1) : 63-74.

Miller, T.L. and M.J. Wolin. 2001. Inhibition of growth of Methane-Producing Bacteria of the Rumen Forestomach by HydroxymethylglutarylSCoA Reductase Inhibitors. J. Dairy Sci. 84:1445-1448.

Scalzi, M. and McGill, J. 2012. Method for the Treatment of Groundwater and Soils using Mixtures of Seaweed Kelp. US PTO No. 8,147,694 B2 (April 3, 2012).

Scalzi, M. and A. Karachalios. 2013 and 2014. Inhibition of Methane Production during Anaerobic Reductive Dechlorination. US PTO 13/ 785,840 and CIP 14/268,637

Woese, C.R. and G.E. Fox (1977). "Phylogenetic structure of the prokaryotic domain: the primary kingdoms". *Proceedings of the National Academy of Sciences of the United States of America* **74** (11): 5088–5090.

Copyright © 2014 - 2022 Provectus Environmental Products, Inc.®

PO Box 358
Freeport, Illinois 61032
(815) 650-2230

VIA EMAIL: victoria.whelan@gza.com; mark.hutson@gza.com; jackson.bogach@gza.com; stephen.kline@gza.com

December 11, 2024

Ms. Victoria Whelan
GZA
324 South Service Road, Suite 119
Melville, NY 11747
Telephone: (631) 793-8821

Subject: **Privileged and Confidential**
Treatment of CVOCs using Provect-IR® and EZVI
Clay Street Project – Brooklyn, New York
Provectus Proposal No. PEP24-0119_REV1

Dear Victoria:

Please find herewith a remedial design and cost proposal for employing a combined *in situ* remediation approach to address chlorinated volatile organic compounds (CVOCs) from saturated soil and groundwater at the 19-27 Clay Street and 60-62 Commercial Street sites located in Brooklyn, New York. We are recommending proven remediation technologies in conjunction with an implementation team that has over 100 combined years of *in situ* experience including the remediation of more than 250 sites utilizing the recommended technologies. Our proposed technologies combine chemical and biological remediation to ensure efficient destruction of the contaminants of interest (COIs). Specifically, we recommend *in situ* chemical reduction (ISCR) with Provect-IR® to address the elevated CVOC groundwater concentrations and emulsified zero valent iron (EZVI) to manage source and dissolved COIs. The EZVI amendment will be used in localized source treatment areas to directly address elevated trichloroethylene (TCE) concentrations including sorbed contaminant mass and potentially dense-non aqueous phase liquid (DNAPL). Furthermore, the amendments uniquely contain antimethanogenic (AMR) reagents (i.e., methane inhibition) to ensure an effective and safe remedial program. Additional information regarding the proposed technologies is outlined in our proposal.

In developing this proposal, Provectus Environmental Products, Inc. (Provectus) recognizes that we may have received sensitive data and confidential information. We maintained all information in confidence and have not shared site data with any unapproved party. We understand that GZA will provide general contractor oversight and consulting services including groundwater verification sampling and required New York State Department of Environmental Conservation

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

(NYSDEC) reporting, permitting, and application submittals. Provectus will provide project-specific technology and design information to develop the Work Plan and obtain the required remediation permits. We recognize the site treatment program goals are to significantly reduce overall contaminant mass across the entire Site. Based on this goal and recent correspondence with GZA, we developed a full-scale remedial approach for consideration. Our technology background, chemistry, conceptual design, and remediation costs are outlined below.

PROVECT-IR® TECHNOLOGY BACKGROUND

Provect-IR is a unique mixture of reagents combined into a single product that optimizes the *in situ* reductive dechlorination of chemicals present in soil, sediment, and groundwater. It acts by promoting synergistic interactions between:

- Multiple, hydrophilic, nutrient-rich organic carbon sources
- Zero-valent iron (ZVI)
- Chemical oxygen scavengers
- Vitamin and mineral sources
- Natural antimethanogenic compounds, where appropriate

This distinctive, patented combination of natural and food-grade chemicals promotes ISCR conditions for fast and effective destruction of targeted contaminants of interest such as chlorinated solvents, organochlorine pesticides, and other halogenated compounds.

PROVECT-IR® MODE OF ACTION

Provect-IR® is a solid material that can be injected into the subsurface environment in a variety of ways. Application methods include direct mixing, hydraulic emplacement, and traditional injection of slurries or liquids. Direct placement in trenches and excavations are also reliable application methods. Following placement of Provect-IR into the subsurface environment, a number of physical, chemical and microbiological processes combine to create very strong reducing conditions that stimulate rapid and complete dechlorination of organic solvents and other recalcitrant compounds. First, the organic components (fibrous land based plants and marine plants) are nutrient rich, hydrophilic compounds with high surface area that provides ideal support for growth of bacteria in the groundwater environment. As they grow on Provect IR particles surfaces, indigenous bacteria consume dissolved oxygen thereby reducing the redox potential in groundwater. In addition, as the bacteria grow on the organic particles, they ferment carbon and release a variety of volatile fatty acids (acetic, propionic, butyric), which diffuse from the site of fermentation into the groundwater plume and serve as electron donors for other bacteria, including dehalogenators and halorespiring species. Finally, the small ZVI particles (10 μm) provide substantial reactive surface area that stimulates direct chemical dechlorination and an additional drop in the redox potential of the groundwater via chemical oxygen scavenging.

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

These physical, chemical and biological processes combine to create an extremely reduced environment that stimulates chemical and microbiological dechlorination of otherwise persistent compounds. Redox potentials as low as –500 mV are commonly observed in groundwater under ISCR conditions. At these Eh levels, many organic contaminants are thermodynamically unstable, and they will readily degrade via pathways more typical of physical destruction processes (minimum production and no accumulation of typically recognized biodegradation intermediates). Hence, the ISCR technology is microbiologically based in that it relies on indigenous microbes to biodegrade the Provect-IR® carbon (refined plant, kelp and/or seaweed materials), but we do not require the presence or activity of special or otherwise unique bacteria for complete and effective remediation.

EZVI TECHNOLOGY BACKGROUND

Provectus offers the most advanced, cost-efficient formulations of the NASA patented EZVI technology to the remediation industry to address sorbed/dissolved phase mass and DNAPL level contaminant concentrations. Millions of pounds of EZVI have been used successfully at locations throughout the United States (including Superfund sites) and in Canada, France, and Australia (Reinhart, 2003; Su *et al*., 2017). Provectus' scientists have unmatched experience and expertise with practical formulation, manufacturing, design, and full-scale technology applications. Our EZVI provides:

- Provect-CH4™ methanogenic inhibitor (blended within fermentable H donor component of EZVI).
- Matching physical chemistry (hydrophobic) enables complete miscibility (contact) with sorbed mass and DNAPLs.
- Sequestration (phase partitioning) of hydrophobic contaminants (*e.g.,* halogenated hydrocarbons) into outer liquid oil membrane.
- Mass flux reduction from source areas due to dramatic decrease in water solubility of contaminants.
- Food grade oil as a slow release, long term H donor.
- Powdered, highly reactive ZVI (<10 um size distribution) encapsulated within water/vegetable oil micelles (not in direct contact with ground water) will only react with contaminants that are hydrophobic.
- Abiotic reactions primarily occur in the aqueous interior of emulsion where ZVI is suspended in water.
- Biotic reactions primarily occur on the exterior of the emulsion and downgradient (hydrologically) of the EZVI implementation zone.

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

PO Box 358
Freeport, Illinois 61032
(815) 650-2230

MODE OF ACTION – ISCR FOR CVOCs

It is critical to understand that the processes of COI destruction under ISCR conditions are different from the typical anaerobic pathways. The primary COI at the Site is TCE along with lower, sporadic concentrations of cis-1,2-dichloroethylene (DCE) and vinyl chloride (VC) which are recognized daughter products of reductive dehalogenation reactions that occur under normal anaerobic conditions. EZVI will yield rapid removal of TCE while minimizing accumulation of potentially problematic catabolites. This is because the processes of COI destruction under ISCR conditions are different from the typical pathways of sequential reductive dehalogenation (**Figure 1**). Under ISCR conditions (Eh <-550 mV), these pathways are avoided and terminal destruction / mineralization proceeds along the lines of the recognized *beta*-elimination pathways (**Figure 2**).

Figure 1: PCE/TCE Degradation Schematic – Sequential Reductive Dehalogenation under Typical Anaerobic Conditions.

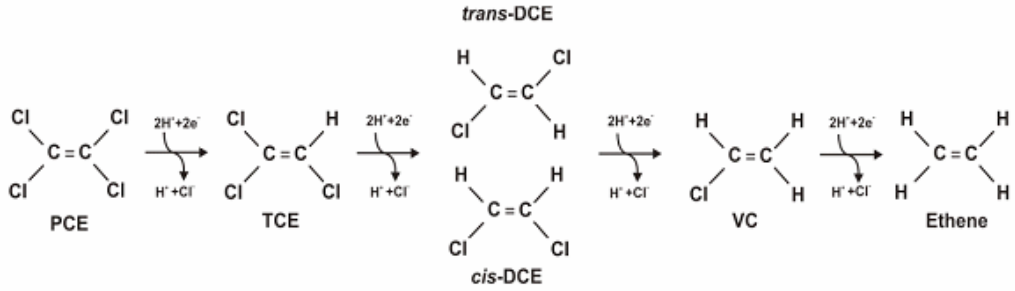
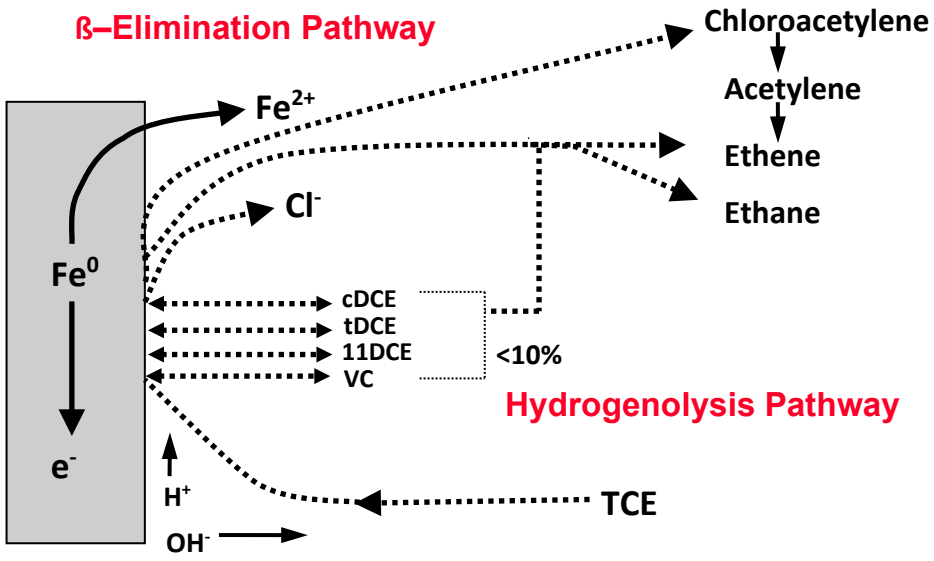


Figure 2: TCE Degradation Reactions for Mineralization under ISCR Conditions.



Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

ADVANTAGES OF USING PROVECTUS ANTIMETHANOGENIC TECHNOLOGY

The distinctive combination of reagents in Provect-IR® and EZVI-CH4™ uniquely yield antimethanogenic conditions, which offer powerful technical advantages over conventional EZVI, ERD (*e.g.*, [emulsified] oils/lecithin molasses or lactate-based substrates), traditional ISCR reagents, or only ZVI. These include:

- More Efficient: Significantly lower costs as a result of more efficient amendment utilization via controlled methanogenesis.
- More Effective: Reactions avoid accumulation of dead-end catabolic intermediates as a function of substrate addition (as is common with [emulsified] oils and sources of carbon only).
- Safer: Fewer health and safety concerns as compared with use of traditional ERD or ISCR reagents; avoid issues associated with new and emerging methane regulations.
- Ease of Use: Green and sustainable. All components integrated in a single package.
- Predictable Performance: More efficient use of hydrogen donors (does not get wasted as methane).
- Inherent Buffering: Presence of ZVI offers substantial pH buffering capacity.
- Accelerated Site Closure: EZVI rapidly removes COI mass via a combination of biogeochemical degradation processes without relying on physical sorption / sequestration as a major “removal” mechanism.
- Range of Applicability: ISCR demonstrated effective on a wide range of COIs, including chlorinated / halogenated solvents, Freon, pesticides, perchlorate and other energetic compounds (explosives).
- Supports Natural Attenuation: For all the reasons summarized above, our technologies enhance natural biological processes.

UNDERSTANDING SITE CONDITIONS AND REMEDIAL GOALS

The site is located at 19-27 and 29 Clay Street and 60-62 Commercial Street in Brooklyn, New York. Groundwater flow is generally to the southwest and is encountered at approximately 10-12 feet below ground surface (ft bgs). The target soil matrix is primarily sand, sandy silt and silt. The aquifer has DO levels primarily <2 mg/L, wide ranging ORPs (+/- mV), and slightly alkaline pH (August 2024 field readings). Due to an onsite source (29 Clay Street, Lot 53), saturated soil and groundwater have been impacted by chlorinated solvent VOCs, primarily TCE with concentrations >100,000 ug/L. Additional residual downgradient (19-27 Clay Street) and cross gradient (60-62 Commercial Street) CVOC plumes are adjacent to the primary TCE plume area. The primary remedial goal is onsite VOC mass destruction via *in situ* remediation within the sand and silt zones from approximately 10 to 40 ft bgs.

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

SITE-SPECIFIC REMEDIAL DESIGN

The *in situ* remedial design and implementation will consist of two phases of work. Source area injections will take place after DNAPL recovery during Phase 2 (potentially late March or early April 2025). Phase 1 injections will begin on the 19-27 Clay Street Lot (Lot 9) and 60-62 Commercial Street (Lot 10) at the locations shown on **Figure 3**. This will include EZVI-CH4™ ISCR injections at approximately 10-foot spacing at varying depth intervals bgs (i.e., 10-13', 15-18', 20-23', 25-28', 30-33', and 35-38') at the locations of MW-01 and MW-03. Phase 1 injections will also include Provect-IR® ISCR injections at approximately 20-foot spacing at the same depth intervals.

Phase 2 injections on 29 Clay Street (Lot 53) will not commence until satisfactory DNAPL removal has been achieved. The Phase 2 injection plan includes EZVI-CH4™ ISCR injections at approximately 10-12 foot spacing at varying depth intervals bgs, consistent with the Phase 1 injection plan, and Provect-IR® ISCR injections at approximately 20-foot spacing at the same depth intervals across the entire area.

For remedial design purposes, the Phase 1 implementation consists of two areas: Area 1 (60 Commercial Street: MW-05/M/D, SB-28, etc.) is approximately 3,900 square feet (ft^2) and Area 2 (19-27 Clay Street: MW-01, MW-02, MW-03, etc.) is approximately 6,900 ft^2. The vertical target depth at both treatment areas is from 10 to 40 ft bgs. A Provect-IR® formulation containing 60% ZVI weight basis (mixed grades; Provect-IR60) with AMRs and EZVI-CH4™ will be used to remediate the two treatment areas. The 60% ZVI content will help manage aquifer pH and help maintain remedial efficacy over an extended period of time (e.g., >5 to 7 years). The AMRs will reduce methanogenic activity and improve remedial efficacy.

Considering the CVOC concentrations in Area 1 along with other aquifer parameters (e.g., DO, pH, ORP, etc.), Provect-IR60 will be applied at *ca.* 0.20% to soil mass using an assumed soil bulk density of 110 lbs./cf. This yields a requisite 21,000 lbs. of Provect-IR60. The average loading rate ensures effective reagent distribution while overcoming the reagent demand for contaminant destruction. The Provect-IR60 reagent will be applied via an estimated 12 direct push (DPT) injection points spaced *ca.* 20 ft apart (**Figure 3**). The injection points will have six vertical target intervals from 10-13', 15-18', 20-23', 25-28', 30-33', and 35-38' bgs. Each injection point will receive 1,750 lbs. of Provect-IR60 with approximately 292 lbs. of reagent per vertical target interval. The Provect-IR60 will be mixed with 10,500 gallons of water to create an approximate 20% slurry.

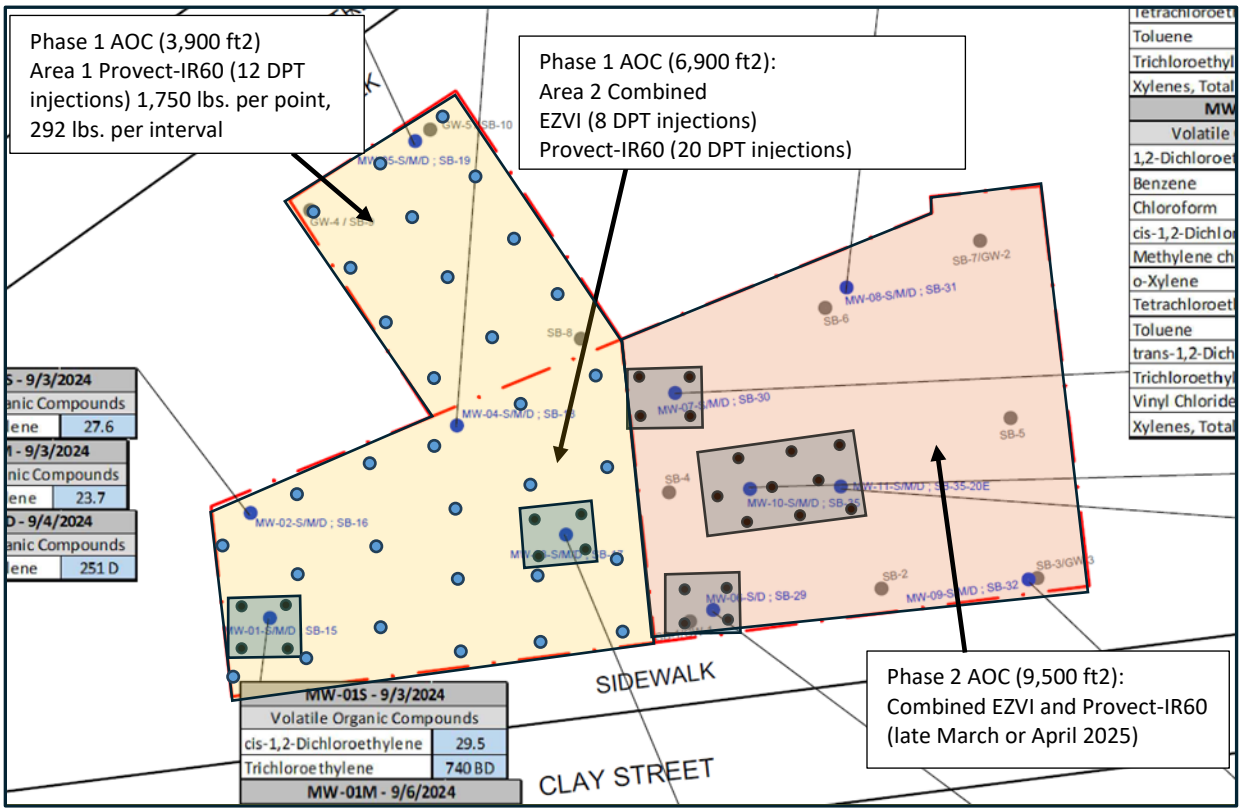
In Area 2, Provect-IR60 will be applied at *ca.* 0.30% to soil mass using an assumed soil bulk density of 110 lbs./cf. This yields a requisite 60,000 lbs. of Provect-IR60. The Provect-IR60 will be applied via an estimated 20 DPT injection points spaced *ca.* 20 ft apart (**Figure 3**). The injection points will have the same six vertical target intervals as Area 1. Each injection point will receive

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

3,000 lbs. of Provect-IR60 with approximately 500 lbs. of reagent per vertical target interval. The Provect-IR will be mixed with 30,000 gallons of water to create an approximate 20% slurry.

Two AOCs (MW-01 and MW-03) in Area 2 will be addressed via EZVI injections. Each AOC will be approximately 300 ft^2 in size for a combined area of 600 ft^2. EZVI will be applied at 4 DPT injection points spaced *ca.* 10 ft apart (**Figure 3**). A total of 4,000 USG will be injected between both AOCs. Each injection point will receive 500 USG of EZVI with approximately 84 USG per interval. The injection points will have six vertical target intervals as described in Area 1 above. We anticipate that the Phase 1 remedial program will require 33 to 36 field days, which includes reagent receipt, equipment mobilization, site setup, implementation, drilling, and demobilization.

Figure 3: Conceptual Treatment Area 1 and Area 2 with Injection Points



REMEDIAL CONTINGENCY PLAN

We understand that a remedial contingency plan utilizing screened injection wells in select accessible areas may be required depending on site response following the Provect-IR® and EZVI-CH4™ proposed scopes of work. Based on correspondence with GZA, we recommend that Provect-ERD CH4™ + dual valent iron (DVI) is evaluated for these future remedial efforts. The

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

PO Box 358
Freeport, Illinois 61032
(815) 650-2230

Provect-ERD CH4™ + DVI amendment is designed to reduce dissolved phase CVOCs via abiotic and biotic destruction pathways. Provect-ERD™ is an emulsified vegetable oil (EVO) designed to reduced dissolved phase CVOCs through the process of enhanced reductive dechlorination (ERD). Provect-ERD™ consists of 60% fermentable carbon as well as other hydrogen donor sources including glycerin. Provect-ERD™ also contains dipotassium phosphate for pH buffering.

The Provect-ERD™ is supplemented with a source of soluble, reduced iron (i.e., DVI) to support direct abiotic dechlorination. DVI reacts with CVOCs in an alpha-elimination reaction in which chlorine is removed from CVOCs and DVI is oxidized to trivalent iron. Ethene and reactive ferrous minerals are formed in the process. This dechlorination pathway can persist for many years if iron-reducing bacteria are present. Upon request, a conceptual Provect-ERD CH4™ + DVI scope of work can be provided.

DISTRIBUTION OF RESPONSIBILITIES

For field scale work at the Site, Provectus will provide environmental technology, design support, and field implementation services (e.g., drilling, injection, field crew, etc.) via an injection partner. GZA (Client) or others will be responsible for permitting, performance monitoring, water (minimum rate of 10 gallon per minute), and reporting. The distribution of responsibilities envisioned is as follows:

1. Provectus will provide and arrange delivery of reagents to the site.
2. Provectus will be responsible for remedial construction contracting (e.g., drilling, injection, crew, reagent management, etc.). GZA or others will be responsible for water.
3. Provectus will provide data interpretation and technical writing support to Client, upon request.
4. Client will be responsible for monitoring treatment performance (e.g., groundwater sampling). Along with VOCs, Provectus recommends that field data (e.g., pH, ORP, DO, etc.) and additional groundwater parameters including total iron, anions (e.g., chloride, sulfate, nitrate, and nitrite), total organic carbon (TOC), and dissolved gasses (e.g., ethane, and ethene) are collected to evaluate remedial progress.
5. Client will be responsible for access to the site. We assume our equipment can be staged onsite throughout the injection program.
6. Client will maintain overall project responsibility and will maintain all client contact and control of the site.
7. Client will be responsible for all health and safety, permitting and approvals, sampling and analytical costs along with all data management and reporting costs.

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

PO Box 358
Freeport, Illinois 61032
(815) 650-2230

VIA EMAIL: victoria.whelan@gza.com; mark.hutson@gza.com; jackson.bogach@gza.com; stephen.kline@gza.com

December 11, 2024

Ms. Victoria Whelan
GZA
324 South Service Road, Suite 119
Melville, NY 11747
Telephone: (631) 793-8821

Subject: **Privileged and Confidential**
Phase 2 - Treatment of CVOCs using Provect-IR® and EZVI
Clay Street Project – Brooklyn, New York
Provectus Proposal No. PEP24-0119_REV1

Dear Victoria:

Please find herewith a remedial design and cost proposal for employing a combined *in situ* remediation approach to address chlorinated volatile organic compounds (CVOCs) from saturated soil and groundwater at the 29 Clay Street (Lot 53) site located in Brooklyn, New York. We are recommending proven remediation technologies in conjunction with an implementation team that has over 100 combined years of *in situ* experience including the remediation of more than 250 sites utilizing the recommended technologies. Our proposed technologies combine chemical and biological remediation to ensure efficient destruction of the contaminants of interest (COIs). Specifically, we recommend *in situ* chemical reduction (ISCR) with Provect-IR® to address the elevated CVOC groundwater concentrations and emulsified zero valent iron (EZVI) to manage source and dissolved COIs. The EZVI amendment will be used in localized source treatment areas to directly address elevated trichloroethylene (TCE) concentrations including sorbed contaminant mass and potentially dense-non aqueous phase liquid (DNAPL). Furthermore, the amendments uniquely contain antimethanogenic (AMR) reagents (i.e., methane inhibition) to ensure an effective and safe remedial program. Additional information regarding the proposed technologies is outlined in our proposal.

In developing this proposal, Provectus Environmental Products, Inc. (Provectus) recognizes that we may have received sensitive data and confidential information. We maintained all information in confidence and have not shared site data with any unapproved party. We understand that GZA will provide general contractor oversight and consulting services including groundwater verification sampling and required New York State Department of Environmental Conservation (NYSDEC) reporting, permitting, and application submittals. Provectus will provide project-

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

specific technology and design information to develop the Work Plan and obtain the required remediation permits. We recognize the site treatment program goals are to significantly reduce overall contaminant mass across the entire Site. Based on this goal and recent correspondence with GZA, we developed a full-scale remedial approach for consideration. Our technology background, chemistry, conceptual design, and remediation costs are outlined below.

PROVECT-IR® TECHNOLOGY BACKGROUND

Provect-IR is a unique mixture of reagents combined into a single product that optimizes the *in situ* reductive dechlorination of chemicals present in soil, sediment, and groundwater. It acts by promoting synergistic interactions between:

- Multiple, hydrophilic, nutrient-rich organic carbon sources
- Zero-valent iron (ZVI)
- Chemical oxygen scavengers
- Vitamin and mineral sources
- Natural antimethanogenic compounds, where appropriate

This distinctive, patented combination of natural and food-grade chemicals promotes ISCR conditions for fast and effective destruction of targeted contaminants of interest such as chlorinated solvents, organochlorine pesticides, and other halogenated compounds.

PROVECT-IR® MODE OF ACTION

Provect-IR® is a solid material that can be injected into the subsurface environment in a variety of ways. Application methods include direct mixing, hydraulic emplacement, and traditional injection of slurries or liquids. Direct placement in trenches and excavations are also reliable application methods. Following placement of Provect-IR into the subsurface environment, a number of physical, chemical and microbiological processes combine to create very strong reducing conditions that stimulate rapid and complete dechlorination of organic solvents and other recalcitrant compounds. First, the organic components (fibrous land based plants and marine plants) are nutrient rich, hydrophilic compounds with high surface area that provides ideal support for growth of bacteria in the groundwater environment. As they grow on Provect IR particles surfaces, indigenous bacteria consume dissolved oxygen thereby reducing the redox potential in groundwater. In addition, as the bacteria grow on the organic particles, they ferment carbon and release a variety of volatile fatty acids (acetic, propionic, butyric), which diffuse from the site of fermentation into the groundwater plume and serve as electron donors for other bacteria, including dehalogenators and halorespiring species. Finally, the small ZVI particles (10 μm) provide substantial reactive surface area that stimulates direct chemical dechlorination and an additional drop in the redox potential of the groundwater via chemical oxygen scavenging.

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

These physical, chemical and biological processes combine to create an extremely reduced environment that stimulates chemical and microbiological dechlorination of otherwise persistent compounds. Redox potentials as low as –500 mV are commonly observed in groundwater under ISCR conditions. At these Eh levels, many organic contaminants are thermodynamically unstable, and they will readily degrade via pathways more typical of physical destruction processes (minimum production and no accumulation of typically recognized biodegradation intermediates). Hence, the ISCR technology is microbiologically based in that it relies on indigenous microbes to biodegrade the Provect-IR® carbon (refined plant, kelp and/or seaweed materials), but we do not require the presence or activity of special or otherwise unique bacteria for complete and effective remediation.

EZVI TECHNOLOGY BACKGROUND

Provectus offers the most advanced, cost-efficient formulations of the NASA patented EZVI technology to the remediation industry to address sorbed/dissolved phase mass and DNAPL level contaminant concentrations. Millions of pounds of EZVI have been used successfully at locations throughout the United States (including Superfund sites) and in Canada, France, and Australia (Reinhart, 2003; Su *et al*., 2017). Provectus' scientists have unmatched experience and expertise with practical formulation, manufacturing, design, and full-scale technology applications. Our EZVI provides:

- Provect-CH4™ methanogenic inhibitor (blended within fermentable H donor component of EZVI).
- Matching physical chemistry (hydrophobic) enables complete miscibility (contact) with sorbed mass and DNAPLs.
- Sequestration (phase partitioning) of hydrophobic contaminants (*e.g.,* halogenated hydrocarbons) into outer liquid oil membrane.
- Mass flux reduction from source areas due to dramatic decrease in water solubility of contaminants.
- Food grade oil as a slow release, long term H donor.
- Powdered, highly reactive ZVI (<10 um size distribution) encapsulated within water/vegetable oil micelles (not in direct contact with ground water) will only react with contaminants that are hydrophobic.
- Abiotic reactions primarily occur in the aqueous interior of emulsion where ZVI is suspended in water.
- Biotic reactions primarily occur on the exterior of the emulsion and downgradient (hydrologically) of the EZVI implementation zone.

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

PO Box 358
Freeport, Illinois 61032
(815) 650-2230

MODE OF ACTION – ISCR FOR CVOCs

It is critical to understand that the processes of COI destruction under ISCR conditions are different from the typical anaerobic pathways. The primary COI at the Site is TCE along with lower, sporadic concentrations of cis-1,2-dichloroethylene (DCE) and vinyl chloride (VC) which are recognized daughter products of reductive dehalogenation reactions that occur under normal anaerobic conditions. EZVI will yield rapid removal of TCE while minimizing accumulation of potentially problematic catabolites. This is because the processes of COI destruction under ISCR conditions are different from the typical pathways of sequential reductive dehalogenation (**Figure 1**). Under ISCR conditions (Eh <-550 mV), these pathways are avoided and terminal destruction / mineralization proceeds along the lines of the recognized *beta*-elimination pathways (**Figure 2**).

Figure 1: PCE/TCE Degradation Schematic – Sequential Reductive Dehalogenation under Typical Anaerobic Conditions.

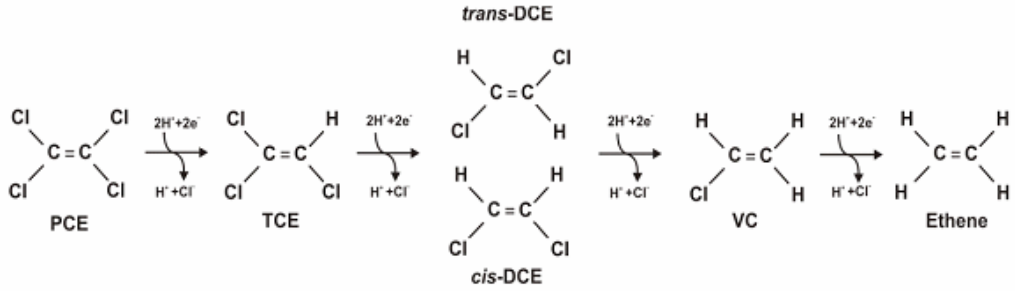
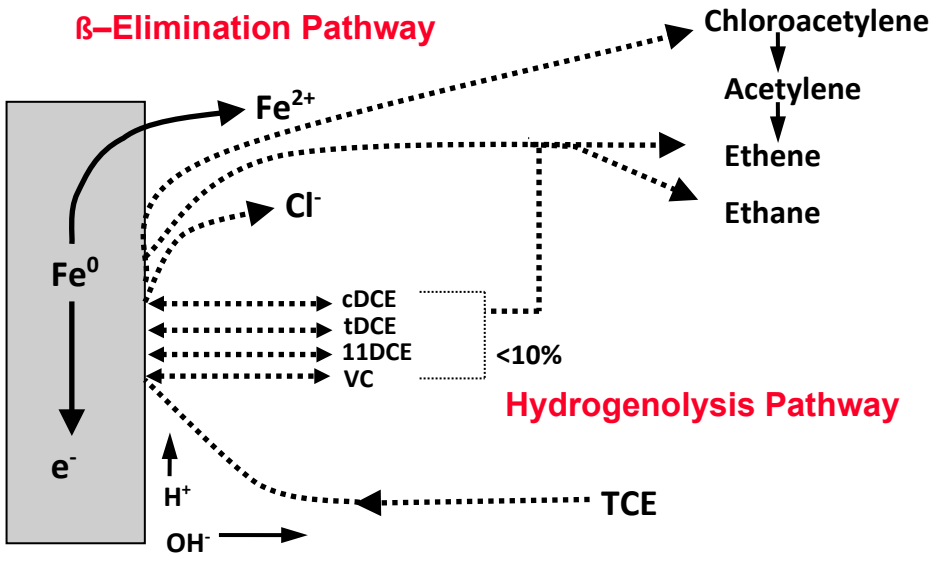


Figure 2: TCE Degradation Reactions for Mineralization under ISCR Conditions.



Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

ADVANTAGES OF USING PROVECTUS ANTIMETHANOGENIC TECHNOLOGY

The distinctive combination of reagents in Provect-IR® and EZVI-CH4™ uniquely yield antimethanogenic conditions, which offer powerful technical advantages over conventional EZVI, ERD (*e.g.*, [emulsified] oils/lecithin molasses or lactate-based substrates), traditional ISCR reagents, or only ZVI. These include:

- More Efficient: Significantly lower costs as a result of more efficient amendment utilization via controlled methanogenesis.
- More Effective: Reactions avoid accumulation of dead-end catabolic intermediates as a function of substrate addition (as is common with [emulsified] oils and sources of carbon only).
- Safer: Fewer health and safety concerns as compared with use of traditional ERD or ISCR reagents; avoid issues associated with new and emerging methane regulations.
- Ease of Use: Green and sustainable. All components integrated in a single package.
- Predictable Performance: More efficient use of hydrogen donors (does not get wasted as methane).
- Inherent Buffering: Presence of ZVI offers substantial pH buffering capacity.
- Accelerated Site Closure: EZVI rapidly removes COI mass via a combination of biogeochemical degradation processes without relying on physical sorption / sequestration as a major “removal” mechanism.
- Range of Applicability: ISCR demonstrated effective on a wide range of COIs, including chlorinated / halogenated solvents, Freon, pesticides, perchlorate and other energetic compounds (explosives).
- Supports Natural Attenuation: For all the reasons summarized above, our technologies enhance natural biological processes.

UNDERSTANDING SITE CONDITIONS AND REMEDIAL GOALS

The site is located at 29 Clay Street and is adjacent to 19-27 Clay Street and 60-62 Commercial Street in Brooklyn, New York. Groundwater flow is generally to the southwest and is encountered at approximately 10-12 feet below ground surface (ft bgs). The target soil matrix is primarily sand, sandy silt and silt. The aquifer has DO levels primarily <2 mg/L, wide ranging ORPs (+/- mV), and slightly alkaline pH (August 2024 field readings). Due to an onsite source saturated soil and groundwater have been impacted by chlorinated solvent VOCs, primarily TCE with concentrations >100,000 ug/L. Additional residual downgradient (19-27 Clay Street) and cross gradient (60-62 Commercial Street) CVOC plumes are adjacent to the primary TCE plume area. The primary remedial goal is onsite VOC mass destruction via *in situ* remediation within the sand and silt zones from approximately 10 to 40 ft bgs.

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

SITE-SPECIFIC REMEDIAL DESIGN

The *in situ* remedial design and implementation will consist of two phases of work. Provectus previously submitted a formal proposal with remedial design to GZA for the Phase 1 scope of work on November 26, 2024. Source area injections will take place after DNAPL recovery during Phase 2 (potentially late March or early April 2025). Phase 2 injections will begin at 29 Clay Street (Lot 53) at the locations shown on **Figure 3**. This will include EZVI-CH4™ ISCR injections at approximately 10 to 12-foot spacing at varying depth intervals bgs at the locations of MW-10/MW-11, MW-06 and MW-07. Phase 2 injections will also include Provect-IR® ISCR injections at approximately 20-foot spacing at the same depth intervals.

For remedial design purposes, the Phase 2 implementation consists of an area that is approximately 9,500 square feet (ft^2). The vertical target depth is from 10 to 40 ft bgs. A Provect-IR® formulation containing 60% ZVI weight basis (mixed grades; Provect-IR60) with AMRs and EZVI-CH4™ will be used to remediate the treatment area. The 60% ZVI content will help manage aquifer pH and help maintain remedial efficacy over an extended period of time (e.g., >5 to 7 years). The AMRs will reduce methanogenic activity and improve remedial efficacy.

Considering the CVOC concentrations along with other aquifer parameters (e.g., DO, pH, ORP, etc.), Provect-IR60 will be applied at *ca.* 0.30% to soil mass using an assumed soil bulk density of 110 lbs./cf. This yields a requisite 79,200 lbs. of Provect-IR60. The average loading rate ensures effective reagent distribution while overcoming the reagent demand for contaminant destruction. The Provect-IR60 reagent will be applied via an estimated 33 direct push (DPT) injection points spaced *ca.* 20 ft apart (**Figure 3**). The injection points will have six vertical target intervals from 10-13', 15-18', 20-23', 25-28', 30-33', and 35-38' bgs. Each injection point will receive 2,400 lbs. of Provect-IR60 with approximately 400 lbs. of reagent per vertical target interval. The Provect-IR60 will be mixed with 39,600 gallons of water to create an approximate 20% slurry.

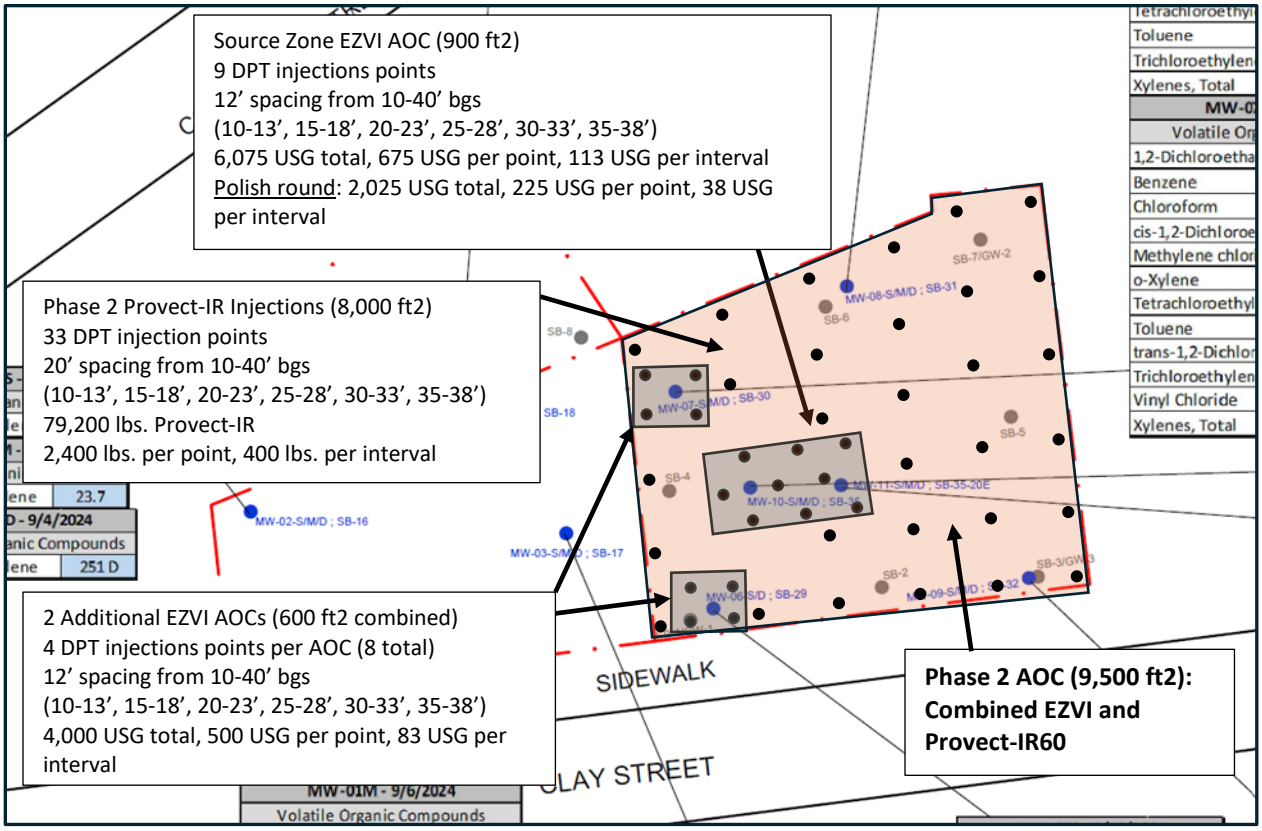
Three AOCs (MW-10/MW-11, MW-06 and MW-07) will be addressed via EZVI injections. The source area AOC (MW-10/MW-11) will be approximately 900 ft^2 in size and the remaining two AOCs will be approximately 300 ft^2 each (600 ft^2 combined) in size for a total area of 1,500 ft^2. In the source area, EZVI will be applied at nine (9) DPT injection points spaced *ca.* 12 ft apart (**Figure 3**). A total of 6,075 USG will be injected during the initial phase of injections to target MW-10/MW-11 AOC. Each injection point will receive 675 USG of EZVI with approximately 113 USG per interval. The injection points will have six vertical target intervals from 10-13', 15-18', 20-23', 25-28', 30-33', and 35-38' bgs.

The two additional AOCs (MW-06 and MW-07) will be approximately 300 ft^2 in size for a combined area of 600 ft^2. In each AOC, EZVI will be applied at 4 DPT injection points spaced *ca.* 10 ft apart (**Figure 3**). A total of 4,000 USG will be injected between both AOCs. Each injection point will

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

receive 500 USG of EZVI with approximately 84 USG per interval. The injection points will have six vertical target intervals as described in the source area above. We anticipate that the Phase 2 remedial program will require approximately 39 to 42 field days, which includes reagent receipt, equipment mobilization, site setup, implementation, drilling, and demobilization. Based on correspondence with GZA, Provectus has also included an EZVI polish scope of work that includes an additional 2,025 USG of EZVI that could be applied approximately 60 days following the initial injection to ensure effective destruction of the COIs to meet remediation goals. The polish remedial program will require an additional 4 to 5 field days.

Figure 3: Conceptual Treatment Area with Injection Points



REMEDIAL CONTINGENCY PLAN

We understand that a remedial contingency plan utilizing screened injection wells in select accessible areas may be required depending on site response following the Provect-IR® and EZVI-CH4™ proposed scopes of work. Based on correspondence with GZA, we recommend that Provect-ERD CH4™ + dual valent iron (DVI) is evaluated for these future remedial efforts. The Provect-ERD CH4™ + DVI amendment is designed to reduce dissolved phase CVOCs via abiotic and biotic destruction pathways. Provect-ERD™ is an emulsified vegetable oil (EVO) designed to

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

reduced dissolved phase CVOCs through the process of enhanced reductive dechlorination (ERD). Provect-ERD™ consists of 60% fermentable carbon as well as other hydrogen donor sources including glycerin. Provect-ERD™ also contains dipotassium phosphate for pH buffering.

The Provect-ERD™ is supplemented with a source of soluble, reduced iron (i.e., DVI) to support direct abiotic dechlorination. DVI reacts with CVOCs in an alpha-elimination reaction in which chlorine is removed from CVOCs and DVI is oxidized to trivalent iron. Ethene and reactive ferrous minerals are formed in the process. This dechlorination pathway can persist for many years if iron-reducing bacteria are present. Upon request, a conceptual Provect-ERD CH4™ + DVI scope of work can be provided.

DISTRIBUTION OF RESPONSIBILITIES

For field scale work at the Site, Provectus will provide environmental technology, design support, and field implementation services (e.g., drilling, injection, field crew, etc.) via an injection partner. GZA (Client) or others will be responsible for permitting, performance monitoring, water (minimum rate of 10 gallon per minute), and reporting. The distribution of responsibilities envisioned is as follows:

1. Provectus will provide and arrange delivery of reagents to the site.
2. Provectus will be responsible for remedial construction contracting (e.g., drilling, injection, crew, reagent management, etc.). GZA or others will be responsible for water.
3. Provectus will provide data interpretation and technical writing support to Client, upon request.
4. Client will be responsible for monitoring treatment performance (e.g., groundwater sampling). Along with VOCs, Provectus recommends that field data (e.g., pH, ORP, DO, etc.) and additional groundwater parameters including total iron, anions (e.g., chloride, sulfate, nitrate, and nitrite), total organic carbon (TOC), and dissolved gasses (e.g., ethane, and ethene) are collected to evaluate remedial progress.
5. Client will be responsible for access to the site. We assume our equipment can be staged onsite throughout the injection program.
6. Client will maintain overall project responsibility and will maintain all client contact and control of the site.
7. Client will be responsible for all health and safety, permitting and approvals, sampling and analytical costs along with all data management and reporting costs.

Copyright © 2014 - 2024 Provectus Environmental Products, Inc.®

APPENDIX C

QUALITY ASSURANCE PROJECT PLAN

Known for excellence.
Built on trust.

QUALITY ASSURANCE PROJECT PLAN (QAPP) / FIELD SAMPLING PLAN (FSP)

19-27 Clay Street, 29 Clay Street and 60-62 Commercial Street
Block 2482, Lots 9, 10, and 53
Brooklyn, New York
NYSDEC BCP Site No. C224390 & C224408

October 2024

PREPARED FOR:
Clay Properties, LLC
134 North 4th Street
Brooklyn, NY, 11249

PREPARED BY:
Goldberg Zoino Associates of New York, P.C.
d/b/a GZA GeoEnvironmental of New York
104 West 29th Street, 10th Floor
New York, NY 10001

File No. 41.0163279.00

An Equal Opportunity Employer M/F/V/H

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY 1

3.0 QA OBJECTIVES FOR DATA MANAGEMENT 2

4.0 SAMPLING PLAN 4

4.1. Utility Clearance 5
4.2. Test Pit Soil Sampling 5
4.3. Direct Push Drilling Soil Sampling 6
4.4. Sonic Drill Rig Soil Sampling 6
4.5. Temporary Well Point Installation and Sampling 8
4.6. Permanent Well Installation and Sampling 8
4.6.1. Well Installation/Construction 8
4.6.2. Well Development 9
4.6.3. Well Purging 9
4.6.4. Well Sampling 10
4.7. Borehole Abandonment 10
4.8. Monitoring Well Abandonment 10
4.9. Soil Reuse and Worker Health & Safety Sampling 11
4.10. Waste Characterization Sampling 11
4.10.1. Solid Waste 11
4.10.2. Liquid Waste 11
4.10.3. Grab versus Composite Sampling 12
4.11. Soil Gas Sampling 12
4.12. Ambient Air Sampling 13
4.13. QC Sample Collection 13
4.14. Sample Preservation and Containerization 14
4.15. Equipment Decontamination 14

5.0 DOCUMENTATION AND CHAIN-OF-CUSTODY 15

5.1. Sample Collection Documentation 15
5.1.1. Field Notes 15
5.1.2. Chain-of-Custody Records 16
5.1.3. Sample Labeling 16
5.2. Sample Custody 18
5.2.1. Field Custody Procedures 19
5.2.2. Laboratory Custody Procedures 20

6.0 CALIBRATION PROCEDURES 20

6.1. Field Instruments 20
6.2. Laboratory Instruments 21

7.0 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES 21

8.0 DATA REDUCTION, VALIDATION, AND REPORTING 21

8.1. DATA EVALUATION/VALIDATION 21

8.1.1. Field Data Evaluation 21

8.1.2. Data Usability 22

8.2. IDENTIFICATION AND TREATMENT OF OUTLIERS 22

9.0 INTERNAL QUALITY CONTROL 23

10.0 CORRECTIVE ACTION 23

10.1. IMMEDIATE CORRECTIVE ACTION 24

FIGURES

FIGURE 1 Site Location Plan

TABLE

TABLE 1A Soil Criteria Table
TABLE 1B Groundwater Criteria Table
TABLE 1C Soil Vapor Criteria Table
TABLE 2 Analytical Parameters, Methods, Preservation, Holding Time and Container Requirements
TABLE 3 Typical Laboratory Data Quality Objectives: Soil, Sediment and Solid Waste Samples
TABLE 4 Typical Laboratory Data Quality Objectives: Aqueous Samples
TABLE 5 Typical Laboratory Data Quality Objectives: Soil Gas Samples
TABLE 6 QC Sample Preservation and Container Requirements

ATTACHMENTS

ATTACHMENT A PFAS Technical Guidance
ATTACHMENT B Project Team Qualifications

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) presents the organization, objectives, planned activities, and specific quality assurance/quality control (QA/QC) procedures associated with the Remedial Investigation Work Plan (RIWP) at 19-27 Clay Street, 29 Clay Street and 60-62 Commercial Street, Brooklyn, New York (Site). **Figure 1** presents a Site location map.

This QAPP/FSP describes specific protocols for field sampling, sample handling and storage, chain-of-custody, laboratory analysis, and data handling and management. Preparation of the Plan was based on EPA Quality Assurance Project Plan guidance documents, including:

EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5, March 2001); and

Guidance for Quality Assurance Project Plans (EPA QA/G-5, December 2002).

The data generated from the analysis of samples will be used to determine the extent of contamination, identify impacted targets, and to compare the results of the remedial actions to site-specific cleanup goals. Potential parameters to be analyzed, including their respective quantitation limits (QLs), and data quality levels (DQLs), are provided in **Tables 1A through 1C**.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

A qualified person will coordinate and manage the Site sampling and analysis program, data reduction, QA/QC, data validation, analysis, and reporting. A Victoria Whalen, P.G. is a qualified environmental professional (QEP), as defined by the New York State Department of Environmental Conservation (NYSDEC) and will direct the sampling activities and coordinate laboratory and drilling activities. The intent of this QAPP/FSP is to be performed the RI in accordance with the technical guidance applicable to Technical Guidance for Site Investigation and Remediation (DER-10), and Sampling, Analysis and Assessment of Per- and Polyfluoroalykly Substances (PFAS) under NYSDEC's Part 375 Remedial Programs dated April 2023. A copy of the Technical Guidance is provided in **Attachment A**.

A qualified person will ensure that the QA/QC plan is implemented. GZA's Senior Technical Specialist, Dr. Chunhua Liu will provide oversight and technical support for the sampling and analytical procedures followed acting as the project QA Officer. This individual has the broad authority to approve or disapprove project plans, specific analyses, and final reports. The QEP is independent from the data generation activities. In general, the QA officer will be responsible for reviewing and advising on all QA/QC aspects of this program.

Laboratories used will be New York State Department of Health Environmental (NYSDOH) Laboratory Approval Program (ELAP) certified laboratories. The laboratories will communicate directly with the sampler regarding the analytical results and reporting and will be responsible for providing all labels, sample containers, field blank water, trip blanks, shipping coolers, and laboratory documentation. Qualifications of the QA officer are provided in **Attachment B.**

3.0 QA OBJECTIVES FOR DATA MANAGEMENT

The analytical data will be provided by the laboratory using the NYSDEC Category B deliverable format. Analytical data collected for disposal characteristics that may be requested by off-site soil or wastewater disposal facilities will be provided in the format that the facility requests.

All analytical measurements will be made so that the results are representative of the media sampled and the conditions measured. Data will be reported in consistent dry weight units for solid samples [i.e., micrograms per kilogram (µg/kg) and/or milligram per kilogram (mg/kg), micrograms per liter (µg/L) or milligrams per liter (mg/L) for aqueous samples and in micrograms per cubic meter (µg/m^3) for soil vapor and air samples. **Table 2** presents the proposed samples, sampling and analytical parameters, analytical methods, sample preservation requirements and containers.

Quantitation Limits (QLs) are laboratory-specific and reflect those values achievable by the laboratory performing the analyses. Data Quality Levels (DQLs) are those reporting limits required to meet the objectives of the program (i.e., program action levels, cleanup standards, etc.). Data Quality Objectives (DQOs) define the quality of data and documentation required to support decisions made in the various phases of the data collection activities. The DQOs are dependent on the end uses of the data to be collected and are also expressed in terms of objectives for precision, accuracy, representativeness, completeness, and comparability.

The analytical methods to be used at this Site provide the highest level of data quality and can be used for purposes of risk assessment, evaluation of remedial alternatives and verification that cleanup standards have been met. However, in order to ensure that the analytical methodologies are capable of achieving the DQOs, measurement performance criteria have been set for the analytical measurements in terms of accuracy, precision, and completeness.

The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting which will provide results that are scientifically valid, and the levels of which are sufficient to meet DQOs. Specific procedures for sampling, chain of custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, and corrective action are described in other sections of this QAPP/FSP.

Tables 3, **4**, and **5** present the precision and accuracy requirements for each parameter to be analyzed. For quantitation limits for parameters associated with soil, sediment, and solid waste samples, the laboratory will be required to attempt to meet or surpass the parameter-specific limits listed in 6 NYCRR Part 375.

For quantitation limits for parameters associated with groundwater samples, the laboratory will be required to attempt to meet or surpass the parameter-specific limits for groundwater from the Division of Water Technical and Operational Guidance Series (TOGS 1.1.1) Ambient Water Quality Standards and Guidance Values. In certain instances, if the TOGS criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limit.

For quantitation limits for parameters associated with soil gas samples, the laboratory will be required to meet the parameter-specific limits from EPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), Table 3c-SG:

Question 5 Soil Gas Screening Levels for Scenario-Specific Vapor Attenuation Factors (**α=**$2H10^{-3}$), November 2002. In certain instances, if these criteria are not achievable due to analytical limitations, the laboratory will report the lowest possible quantitation limits (see **Tables 1A through 1C** for affected analytes).

The QA objectives are defined as follows:

Accuracy is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the reference value includes components of both systematic error (bias) and random error.

Accuracy in the field is assessed through the adherence to all field instrument calibration procedures, sample handling, preservation, and holding time requirements, and through the collection of equipment blanks prior to the collection of samples for each type of equipment being used (e.g., split spoons, groundwater sampling pumps).

The laboratory will assess the overall accuracy of their instruments and analytical methods (independent of sample or matrix effects) through the measurement of "standards," materials of accepted reference value. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy will be measured in terms of blank results, the percent recovery (%R) of surrogate compounds in organic analyses, or %R of spiked compounds in matrix spikes (MSs), matrix spike duplicates (MSDs) and/or laboratory control samples (LCSs). This gives an indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds. **Tables 3**, **4**, and **5** summarize the laboratory accuracy requirements.

Precision is the agreement among a set of replicate measurements without consideration of the "true" or accurate value: i.e., variability between measurements of the same material for the same analyte. Precision is measured in a variety of ways including statistically, such as calculating variance or standard deviation.

Precision in the field is assessed through the collection and measurement of field duplicates (one extra sample in addition to the original field sample). Field duplicates will be collected at a frequency of one per twenty investigative samples per matrix per analytical parameter, with the exception of the Toxicity Characteristic Leaching Procedure (TCLP) parameters and parameters associated with wastewater samples. Precision will be measured through the calculation of relative percent differences (RPDs). The resulting information will be used to assess sampling and analytical variability. Field duplicate RPDs must be $\leq$ 50 for soil samples and $\leq$ 30 for aqueous samples. These criteria apply only if the sample and/or duplicate results are >5x the quantitation limit; if both results are $\leq$ 5x the quantitation limit, the criterion will be doubled. Due to the uncertainty of available representative soil gas volume, field duplicates will not be collected for this matrix.

Precision in the laboratory is assessed through the calculation of RPD for duplicate samples. For organic soil, sediment and water analyses, laboratory precision will be assessed through the analysis of MS/MSD samples and field duplicates. For the inorganic analyses, laboratory precision will be assessed through the analysis of matrix duplicates and field duplicates. For soil gas analyses, laboratory precision will be assessed through the analysis of matrix duplicates. MS/MSD samples

or matrix duplicates will be performed at a frequency of one per twenty investigative samples per matrix per parameter. **Tables 3**, **4**, and **5** summarize the laboratory precision requirements.

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. "Normal conditions" are defined as the conditions expected if the sampling plan was implemented as planned.

Field completeness is a measure of the amount of (1) valid measurements obtained from all the measurements taken in the project and (2) valid samples collected. The field completeness objective is greater than 90 percent.

Laboratory completeness is a measure of the amount of valid measurements obtained from all valid samples submitted to the laboratory. The laboratory completeness objective is greater than 95 percent.

Representativeness is a qualitative parameter that expresses the degree to which data accurately and precisely represent either a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. To ensure representativeness, the sampling locations have been selected to provide coverage over a wide area and to highlight potential trends in the data. In addition, field duplicate samples will provide an additional measure of representativeness at a given location.

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and QAPP are followed, and that proper sampling, sample handling, and sample preservation techniques are used.

Representativeness in the laboratory is ensured by using the proper analytical procedures, appropriate methods, and meeting sample holding times.

Comparability expresses the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Work Plans and QAPP are followed and that proper sampling techniques are used. Maximization of comparability with previous data sets is expected because the sampling design and field protocols are consistent with those previously used.

Comparability is dependent on the use of recognized EPA or equivalent analytical methods and the reporting of data in standardized units. Laboratory procedures are consistent with those used for previous sampling efforts.

4.0 SAMPLING PLAN

Environmental sampling may include soil, groundwater, soil vapor and sediment sampling. Additionally, wastes generated during remediation or development will be sampled and tested for characterization for disposal. Direct push drilling (GeoProbe®), sonic drilling, and/or test pit excavations will be the preferred methods for obtaining subsurface soil samples. However, other drilling methods including mud rotary and drive and wash may also be used if warranted by site conditions. Hand auger and/or hand-held sampling equipment will be the preferred method for collecting surficial and/or shallow soil

samples. Groundwater samples will be collected using bailers or peristaltic, bladder or submersible pumps. Soil vapor samples will be collected in SUMMA® canisters. Performing grab or composite sampling using appropriate hand-held sampling equipment will be the preferred method for waste characterization sampling.

4.1. Utility Clearance

New York State law requires that New York 811 be notified at least three working days prior to subsurface work is conducted to initiate the utility locating activities. Companies with subsurface utilities present will locate and mark out subsurface utility lines. However, New York 811 contractors will only locate utilities on public property and rights-of-way.

During the recent, subsurface investigations, GZA contracted for underground utilities within the Site, including electric lines, gas lines, storm and sanitary sewers, and communication lines will need to be to be located by survey and geophysical survey. If additional subsurface utility locating is considered necessary, a private locating company will be contracted to locate on-site utilities that have not been identified by New York 811 contractors or the Owner.

4.2. Test Pit Soil Sampling

Test pitting and/or excavating may be conducted during the RI, if necessary. Test pits will allow for visual characterization of subsurface soil conditions and the collection of grab soil samples. Prior to soil sample collection, headspace screening will be conducted to evaluate whether analysis of soil samples is warranted, and if so, which soils should be collected.

Prior to completing a test pit or excavation, underground utilities should be identified as discussed in **Section 4.1**. Should active, underground utilities be located in the vicinity of the intended excavation, hand or vacuum excavation methods should be employed, as appropriate, to confirm the location and depth prior to initiating the excavation.

The size and type of excavator used to complete the test pits will be selected based on the anticipated depth and overall size of the excavation required to meet the project objectives. At no time will field personnel enter a test pit/excavation unless it has been deemed safe to enter by an Excavation Competent person based on training and experience required by 29CFR 1926.652.

Grab soil/solid samples will be collected from the material or interval in question by retrieving a volume for analysis using a clean stainless steel, aluminum, or mild steel/ disposable scoop, trowel, spoon, or bucket auger and placing the soil in a cleaned stainless steel pan for homogenization before inserting into the sample container. Samples collected for analysis for volatile organic compounds and total organic halides will not be homogenized. Samples for volatile organics analysis and total organic halides will be placed directly into the sample container.

Composite samples will be collected in the same manner described above, except that the discrete sample volumes will be placed in a clean stainless steel pan and mixed to form the composite. Composite sampling will be performed for the following objectives:

- Waste characterization;
- Determination of the suitability of the soil for on-site re-use; and
- Evaluation of health and safety requirements for workers that will disturb the soil during subsequent construction work.

4.3. Direct Push Drilling Soil Sampling

This drilling method is typically used to collect shallow overburden soils and create boreholes for temporary monitoring well installations, or soil vapor sampling points. Sampling will be performed using four or five-foot-long acetate sleeves that will be advanced continuously to the desired depth below the surface. Soil samples from each sleeve will be screened using a photoionization detector (PID) to detect possible organic vapors. Organic vapor screening will be performed by slicing open the acetate sleeve, making a small slice in the soil column with a clean knife or sampling tool, inserting the PID probe and pushing the slice closed, and monitoring the soil for approximately 5 to 10 seconds. This procedure will be repeated at intervals along the soil column at the field geologist's discretion.

The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.). Samples for laboratory analysis will be collected from the six-inch interval most likely to be contaminated, based on PID readings, discoloration, staining, and the field geologist's judgment (field conditions may require a section longer than six inches to make sufficient sample; however, this decision will be field-based).

The samples will be collected by cutting the soil in two places with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenized in a decontaminated stainless steel pan before being placed in the sample bottles. Samples collected for analysis for VOCs and total organic halides will be placed directly into the sample containers without homogenization (as per EPA sampling method 5035A). Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Clean metal/disposable instruments will be used to transfer samples. If there is insufficient soil volume in the spoon, then this will be made up by attempting a second direct push sleeve at the same depth, or by using the next immediate sample interval above or below this depth, if appropriate. If there is no recovery, then the sample depth will be skipped, and drilling will progress to the next depth interval.

Soil samples will be collected in laboratory provided containers and transported to York Analytical Laboratories, a NYSDOH ELAP certified laboratory, under proper chain of custody procedures for analysis. Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at below 4^{o}C.

4.4. Sonic Drill Rig Soil Sampling

The sonic drilling system employs simultaneous high frequency vibration and low speed rotational motion along with down pressure to advance the cutting shoes of the drill string. This technique provides a continuous soil core and generates minimal cuttings. Due to the continuous sampling of the system,

accurate depictions of the stratigraphy and lithology of the overburden are obtained (minimal sloughing). Additionally, few cuttings are mobilized to the surface. Most of the formation material enters the core barrel, except small amounts, which are pushed into the borehole wall.

Drilling operations take place from the drill platform, which is about 4 feet above ground. Steel drill casing and core barrel are connected to the head from the work platform/support truck and are then hoisted to vertical in the derrick. Tool joints are connected and broken by a hydraulic vise/wrench that is in the base of the derrick. The sonic head is able to pivot 90 degrees to facilitate connection of the drilling rods.

The sonic drilling system uses an override core barrel system and can create a 4- or 6-inch diameter borehole. This is followed by the override casing drilled to the same depth as the core barrel cutting shoe. The core barrel is then removed, and cores are extruded into plastic sleeves. The outer casing prevents cross contamination and formation mixing and allows for a very controlled placement of wells.

GZA proposes to use a track-mounted sonic drill rig collecting soil continuously from either five-foot long or 10-foot long cores. Samples will be extruded from the core barrel into polyethylene sleeves. Once the plastic sleeve is cut open, soil will be screened using a PID to detect possible organic vapors. Organic vapor screening will be performed by making a small slice in the soil column with a clean knife or sampling tool, inserting the PID probe and pushing the slice closed, and monitoring the soil for approximately 5 to 10 seconds. This procedure will be repeated at intervals along the soil column at the field geologist's discretion.

The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.) Samples for laboratory analysis will be collected from the six-inch interval most likely to be contaminated, based on PID readings, discoloration, staining, and the field geologist's judgment (field conditions may require a section longer than six inches to make sufficient sample; however, this decision will be field-based).

The samples will be collected by cutting the soil in two places with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenized in a decontaminated stainless steel pan before being placed in the sample bottles. Samples collected for analysis for VOCs and total organic halides will be placed directly into the sample containers without homogenization (as per EPA sampling method 5035A). Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Clean metal/disposable instruments will be used to transfer samples. If there is insufficient soil volume in the spoon, then this will be made up by attempting a second direct push sleeve at the same depth, or by using the next immediate sample interval above or below this depth, if appropriate. If there is no recovery, then the sample depth will be skipped, and drilling will progress to the next depth interval.

Soil samples will be collected in laboratory provided containers and transported to York Analytical Laboratories, a NYSDOH ELAP certified laboratory, under proper chain of custody procedures for

analysis. Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at below 4°C.

4.5. Temporary Well Point Installation and Sampling

If proposed for site characterization, temporary well points will be immediately installed in drilled soil direct-push soil borings by placing a one-inch diameter PVC screen and riser pipe directly into the borehole. No additional materials will be placed around the annual space. The screen will be set so as to straddle the water table. Temporary wells will not be purged prior to sample collection. Depth to water will be measured in each well point to provide data to approximate groundwater flow direction.

Groundwater samples will be collected from the temporary well point using a dedicated microbailer. The samples will be collected in sample bottles (pre-preserved, if appropriate), placed in iced coolers and removed from light immediately after collection. In addition, all sample bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter. Samples for dissolved metals will be collected in unpreserved containers and will be filtered and preserved at the laboratory within 24 hours of sampling. Samples will be transported to York Analytical Laboratories, a NYSDOH ELAP certified laboratory under proper chain of custody procedures for analysis.

Screen and riser pipes will be removed from the borehole and the borehole will be backfilled.

4.6. Permanent Well Installation and Sampling

Groundwater sampling of permanent monitoring wells is described according to the following distinct phases of this work: well installation/construction, well development, well purging, and well sampling.

4.6.1. *Well Installation/Construction*

To collect representative groundwater samples, soil borings drilled with the sonic drilling method will be converted into permanent two-inch diameter monitoring wells. Groundwater monitoring wells will be constructed of threaded two-inch diameter PVC well casing and 20-slot well screen (to investigate the potential of floating product). The 10-foot screen will be set seven feet below the measured water table. Clean silica sand, Morie No. 1 or equivalent, will be placed in the annular space around the well to a minimum of one foot above the top of the well screen, two feet being optimal. Solid PVC riser, attached to the well screen, will extend to grade or above if the well is a stick-up. For a two-inch diameter well, the annular space for the filter pack should be 4 inches thick. A two-foot thick bentonite seal will then be placed above the sand pack and moistened with potable water for a minimum of 15 minutes before backfilling the remaining space with a cement-bentonite grout. If warranted by depth, filling will be completed using a tremie pipe placed below the surface of the grout. A stick-up or flush-mount protective casing with a locking well cap will then be installed, and a measuring point marked on each PVC well riser. Well construction diagrams will be prepared for each well.

4.6.2. Well Development

Following installation, the groundwater monitoring wells will be developed using a two-inch diameter submersible pump(s) (or equivalent) until the water is reasonably free of turbidity and field readings (pH, conductivity, temperature, and dissolved oxygen) sufficiently stabilize. Fifty nephelometric turbidity units (NTUs) or less will be the turbidity goal but not an absolute value. The wells will be developed aggressively to remove fines from the formation and sand pack. The wells will be allowed to equilibrate for seven days prior to sampling. The volume of water removed, the well development time, and field instrument readings will be recorded in the logbook.

4.6.3. Well Purging

The objective is to purge monitoring wells until turbidity stabilizes to a level as low as possible and this parameter will be given the greatest weight in determining when groundwater sampling may begin. With this objective in mind, a low-flow pump will be used to avoid entrainment of particulates within the well or from the formation. Groundwater from each well will be purged until parameters have stabilized. A turbidity level of fifty NTUs or less is the well purging goal, but not an absolute value before sampling. Other field parameters including temperature, conductivity, pH, and dissolved oxygen (DO) will also be monitored. As practical, all field measurements will be taken from the flow cell and will be recorded during and after purging, and before sampling. Field parameters should generally be within ±10 percent for three consecutive readings, one minute apart, prior to sampling.

Upon opening each monitoring well and point, the concentration of VOCs in the headspace will be measured using a PID and water level measurements will be recorded using an electronic interface probe. The depth to product (if present), depth to water, and the total depth will be measured from the top of the marked PVC casings. Water level and free product measurements will first be made and the volume of water in the well determined. The volume of water in the well will be calculated so that the number of well volumes purged and an estimate of the time required to purge the well can be made. Before sampling, the wells will be purged utilizing a low-flow submersible stainless steel pump using dedicated Teflon® or Teflon®-lined polyethylene tubing connected to a flow cell. Very low purging rates are proposed, on the order of 100 ml/minute to 500 ml/minute, to minimize suspension of particulate matter in the well.

Purging will be done with the pump intake placed at the midpoint of the well screen or the midpoint of the water column (to be determined based on the depth and length of the screen interval) to ensure that all stagnant water in the well is removed, while not stirring up sediment that may have accumulated on the bottom of the well. Equipment will be lowered into the well very carefully to prevent suspension of bottom sediment and subsequent entrainment onto sampling equipment. Surging will be avoided. Tubing will be replaced between each well. Pumps must be carefully cleaned between wells according to the procedures specified in **Section 4.15,** below. It is anticipated that no more than three well volumes will be purged in order for turbidity to reach a minimum and the other parameters to stabilize. Ideally,

pumping rates will be at a rate so that no drawdown of the groundwater level occurs (i.e., pumping rate is less than recharge rate). During purging, the sampler will actively monitor and track the volume of water purged and the field parameter readings. Data will be recorded in the field logbook. For example, the sampler will record the running total volume purged from each well and note the readings for the corresponding field parameters.

4.6.4. Well Sampling

Once groundwater conditions have stabilized and groundwater levels have recovered, samples will be collected from the flow cell outlet (connected to the low-flow submersible pump). All non-disposable/non-dedicated (re-usable) sampling equipment will be cleaned according to the procedures specified in **Section 4.15**.

Sampling will be performed with the pump intake at the same location used for purging. Pumping rates for withdrawing the samples will be similar to those followed for well purging.

The samples will be collected in sample bottles (pre-preserved, if appropriate), placed in iced coolers and removed from light immediately after collection. In addition, all sample bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter. Samples will be transported to York Analytical Laboratories, a NYSDOH ELAP certified laboratory under proper chain of custody procedures for analysis. Samples for dissolved metals will be collected in unpreserved containers and will be filtered and preserved at the laboratory within 24 hours of sampling.

4.7. Borehole Abandonment

Soils extracted during the advancement of the borings will be used to backfill the borings, provided that the borings are not to be used for installation of permanent monitoring wells. However, soils that exhibit "gross" contamination, as evidenced by staining or free-phase product, or any visual, olfactory, or PID readings greater than 100 ppm above background, will be managed in accordance with **Section 9**. In this event, bentonite chips or pellets to within 0.5 feet below ground surface. The ground surface will be restored to a similar condition as the surrounding grade (e.g., topsoil, asphalt, or concrete).

4.8. Monitoring Well Abandonment

There may be occasions when monitoring wells will require abandonment. For temporary monitoring wells, the approach will be to pull the PVC well materials from the borehole and backfill the remaining open portion of the borehole with cement/bentonite grout to approximately 0.5 feet below the ground surface. The ground surface will be restored to a similar condition as the surrounding grade (e.g., topsoil, asphalt, or concrete). For permanent overburden and bedrock monitoring wells, depending on the site-specific subsurface geologic conditions and nature of contamination, the abandonment approach will be in accordance with NYSDEC Policy CP-43 – Groundwater Monitoring Well Decommissioning Policy.

4.9. Soil Reuse and Worker Health & Safety Sampling

Soil reuse sampling may be performed to determine whether the soil can be reused elsewhere on the Site, or to determine whether contaminant levels in the soil would warrant OSHA 40-hour HAZWOPER training for workers disturbing the soil during post-remediation construction activities. This sampling would consist of compositing discrete soil samples from borings advanced by direct push (see **Section 4.3**), or during test pits following the procedures outlined in **Section 4.2**.

4.10. Waste Characterization Sampling

Waste classification sampling may be conducted to characterize soil, liquids and/or groundwater for the purpose of proper off-site waste disposal. Specific methods for sampling liquid and solid wastes are briefly discussed below.

4.10.1. Solid Waste

Solid sampling methods include utilizing dedicated stainless steel or Teflon® scoops/shovels, triers, and thiefs. Scoops and shovels are the preferred method for sampling solids from piles or containers. Stainless steel triers are similar to a scoop and are used for the collection of a core sample of a solid material.

4.10.2. Liquid Waste

Liquid sampling methods include utilizing dedicated dippers, glass tube samplers, pump and tubing, kemmerer bottles, and Bacon Bomb samplers. Dippers are used to collect samples from the surface of the liquid and are appropriate for wastes that are homogeneous. Glass tube samplers consist of glass tubes of varying length and diameter used to collect a full-depth liquid sample from a drum or similar container. Pump and tubing (e.g., bladder pump or peristaltic pump) are used to collect liquid samples from a depth (up to approximately 20 feet below grade), and are typically relied upon for sampling subsurface structures, such as underground storage tanks. To minimize the loss of volatile organic components in the liquid, the lowest achievable flow rate is utilized for collecting the sample by this method. Kemmerer bottles and Bacon Bomb samplers are discrete-depth samplers. These samplers are lowered into the liquid and opened to collect a sample at a desired depth.

4.10.3. Grab versus Composite Sampling

Waste characterization of a liquid or a solid can involve grab or composite sampling depending upon the homogeneity and the volume of the waste. Grab sampling consists of collecting a discrete sample or samples of a material and submitting each sample for separate analysis. Grab sampling is appropriate for characterizing small quantities of waste as well as waste streams of varying content (e.g., drums of different contents). Composite sampling consists of taking discrete grab samples of a material and combining them into a smaller number of samples for analysis. Composite sampling generally is appropriate for large volumes of a homogenous waste material, such as a pile of soil or construction debris. The specific number of composite and grab samples largely will depend upon the size and nature of the waste pile (i.e., cubic yards) as well as the analysis required for characterization of the waste.

4.11. Soil Gas Sampling

A direct-push drill rig will be utilized to drive rods with a decontaminated stainless steel probe to the desired sample depth, which will be a minimum of 5 feet bgs or two feet above the water table if groundwater is present at 5 feet. The soil gas probe will then be purged at a flow rate not greater than 0.2 liters/minute to evacuate one to three volumes using a photoionization detector (PID) with an integrated vacuum pump (MiniRAE 3000 or appropriate alternate). Peak and stabilized PID readings will be recorded prior to sample collection. Following the stabilization period, each probe will be connected to an evacuated laboratory-supplied 6-liter SUMMA® canister. SUMMA® canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laborer. After connecting the SUMMA® canister to the soil gas probe, a regulator valve on the canister will be opened and the vacuum will slowly draw the sample into the canister over a period of 20 minutes. The samples will not be drawn at greater than 0.2 liters per minute. Quantitation limits for all analytes range between 1.6 ppbV and 4.0 ppbV, depending on the compound. After collecting the soil gas sample, the valve will be closed and disconnected from the soil gas probe. The soil-gas samples will be transported to York Analytical Laboratories, a NYSDOH ELAP certified laboratory for TO-15 analysis.

Prior to sample collection, helium will be used as a tracer gas to evaluate the potential for infiltration of outdoor air into the sample. Subsequent rounds of soil gas sampling would include the use of tracer gas only if the initial round of sampling indicates that outdoor air has the potential to influence soil gas sample results.

When soil vapor samples are collected, the following conditions that may influence the interpretation of results will be documented:

- Identification of any nearby commercial or industrial buildings that likely uses volatile organic compounds;
- A sketch of the Site, showing streets, neighboring commercial or industrial facilities (with estimated distances to the Site, and soil-gas sampling locations);

- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

4.12. Ambient Air Sampling

Ambient air samples will be collected with an evacuated laboratory-supplied 6-liter SUMMA® canister. SUMMA® canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laborer. The sample will be set at an elevation of approximately 4 to 5 feet above grade, to represent breathing zone air quality conditions. The samples will not be drawn at greater than 0.2 liters per minute. After collecting the ambient air sample, the valve will be closed, and the canister will be labeled with the necessary information. The soil-gas samples will be transported to York Analytical Laboratories, a NYSDOH ELAP certified laboratory for TO-15 analysis.

When ambient air samples are collected, the following conditions that may influence the interpretation of results will be documented:

- Identification of any nearby commercial or industrial buildings that likely uses volatile organic compounds;
- A sketch of the Site, showing streets, neighboring commercial or industrial facilities (with estimated distances to the Site, and soil-gas sampling locations);
- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

4.13. QC Sample Collection

QC samples will include equipment blanks, trip blanks, field duplicates and MS/MSDs.

Equipment blanks will consist of distilled water and will be used to check for potential contamination of the equipment that may cause sample contamination. Equipment blanks will be collected by routing the distilled water through the sampling equipment prior to sample collection. Equipment blanks will be submitted to the laboratory at a frequency of one per day per matrix per type of equipment being used per parameter. Equipment blanks will not be collected with samples for analysis for TCLP parameters, parameters associated with wastewater samples, samples collected for disposal purposes, soil gas samples, chip samples, wipe samples and samples collected for grain size analyses.

Trip blanks will consist of distilled water (supplied by the laboratory) and will be used to assess the potential for volatile organic compound contamination of groundwater samples due to contaminant

migration during sample shipment and storage. Trip blanks will be transported to the site unopened, stored with the investigative samples, and kept closed until analyzed by the laboratory. Trip blanks will be submitted to the laboratory at a frequency of one per cooler that contains groundwater samples for analysis for VOCs.

Field duplicates are an additional aliquot of the same sample submitted for the same parameters as the original sample. Field duplicates will be used to assess the sampling and analytical reproducibility. Field duplicates will be collected by alternately filling sample bottles from the source being sampled. Field duplicates will be submitted at a frequency of one per 20 samples for all matrices and all parameters with the exception of TCLP parameters, parameters associated with wastewater samples, samples collected for waste characterization purposes, chip samples, wipe samples and samples collected for grain size analyses. Soil gas field duplicates will be obtained by using a tubing a T-splitter.

MSs and MSDs are two additional aliquots of the same sample submitted for the same parameters as the original sample. However, the additional aliquots are spiked with the compounds of concern. Matrix spikes provide information about the effect of the sample matrix on the measurement methodology. MS/MSDs will be submitted at a frequency of one per 20 investigative samples per matrix for organic parameters for soil, sediment, and groundwater. MSs will be submitted at a frequency of one per 20 investigative samples per matrix for inorganic parameters.

4.14. Sample Preservation and Containerization

The analytical laboratory will supply the sample containers for the chemical samples. These containers will be cleaned by the manufacturer to meet or exceed all analyte specifications established in the latest U.S. EPA's *Specifications and Guidance for Contaminant-Free Sample Containers*. Certificates of analysis are provided with each bottle lot and maintained on file to document conformance to EPA specifications. The containers will be pre-preserved, where appropriate (see **Table 2**).

Table 6 presents a summary of QC sample preservation and container requirements.

4.15. Equipment Decontamination

Re-usable Teflon®, stainless steel, and aluminum sampling equipment shall be cleaned between each use in the following manner:

- Wash/scrub with a biodegradable degreaser ("Simple Green") if there is oily residue on equipment surface
- Tap water rinse
- Wash and scrub with Alconox and water mixture
- Tap water rinse
- Distilled/deionized water rinse

- Air dry

Cleaned equipment shall be wrapped in aluminum foil if not used immediately after air-drying.

Groundwater sampling pumps will be cleaned by washing and scrubbing with an Alconox/water mixture, rinsing with tap water and irrigating with distilled/deionized water.

5.0 DOCUMENTATION AND CHAIN-OF-CUSTODY

5.1. Sample Collection Documentation

5.1.1. Field Notes

Field team members will keep a field logbook to document all field activities. Field logbooks will provide the means of recording the chronology of data collection activities performed during the remediation. As such, entries will be described in as much detail as possible so that a particular situation could be reconstructed without reliance on memory.

The logbook will be a bound notebook with water-resistant pages. Logbook entries will be dated, legible, and contain accurate and inclusive documentation of the activity. The title page of each logbook should contain the following:

- Person to whom the logbook is assigned
- The logbook number
- Project name and number
- Site name and location
- Project start date
- End date

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, and names of sampling team members present will be entered. Each page of the logbook will be signed and dated by the person making the entry. All entries will be made in permanent ink, signed, and dated and no erasures or obliterations will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark that is signed and dated by the sampler. The correction shall be written adjacent to the error.

Field activities will be fully documented. Information included in the logbook should include, but may not be limited to, the following:

- Chronology of activities, including entry and exit times
- Names of all people involved in sampling activities
- Level of personal protection used

- Any changes made to planned protocol
- Names of visitors to the site during sampling and reason for their visit
- Sample location and identification
- Changes in weather conditions
- Dates (month/day/year) and times (military) of sample collection
- Measurement equipment identification (model/manufacturer) and calibration information
- Sample collection methods and equipment
- Sample depths
- Whether grab or composite sample collected
- How sample composited, if applicable
- Sample description (color, odor, texture, etc.)
- Sample identification code
- Tests or analyses to be performed
- Sample preservation and storage conditions
- Equipment decontamination procedures
- QC sample collection
- Unusual observations
- Record of photographs
- Sketches or diagrams
- Signature of person recording the information

Field logbooks will be reviewed on a daily basis by the Field Team Leader. Logbooks will be supported by standardized forms.

5.1.2. Chain-of-Custody Records

On a regular basis (daily or on such a basis that all holding times will be met), samples will be transferred to the custody of the respective laboratories, via third-party commercial carriers or via laboratory courier service.

Chain-of-custody records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signatures of samplers; (3) the sample number, date and time of collection, and whether the sample is grab or composite; (4) signatures of individuals involved in sampling; and (5) if applicable, air bill or other shipping number. Sample receipt and log-in procedures at the laboratory are described in **Section 5.2.2** of this Plan.

5.1.3. Sample Labeling

Immediately upon collection, each sample will be labeled with a pre-printed adhesive label, which includes the date and time of collection, sampler's initials, tests to be performed, preservative (if applicable), and a unique identifier.

A. The following identification scheme will be used:

Soil borings will be assigned sequential numbers. For soil samples collected from soil borings, sample numbers will be assigned as follows:

GZ-#(sampling interval)

Example:
Sample GZ-4(4-6') = soil sample collected from soil boring #4 at a depth of 5-6' below grade.

Groundwater wells will be assigned sequential numbers. Groundwater samples will be identified by the well that the sample was collected from.

Examples:
GMW-01 = groundwater sample collected from permanent well point #1

Sub-slab soil vapor/soil vapor/ambient air will be assigned numbers coordinating with the adjacent soil boring or a sequential number due to sample names being identical to a previous Site sampling event. Vapor samples will be identified by the soil gas point that the sample was collected from.

Examples:
GSV-01 = Soil vapor sample collected from the soil gas point
OA-01 = Outdoor ambient air sample

Duplicate samples will be labeled as blind duplicates by giving them sample numbers indistinguishable from a normal sample.

Blanks should be spelled out and identify the associated matrix, e.g., Equipment Blank, Soil

MS/MSDs will be noted in the Comments column of the COC.

B. The analysis required will be indicated for each sample.

Example: SVOC

C. Date taken will be the date the sample was collected, using the format: MM-DD-YY.

Example: 04-22-22

D. Time will be the time the sample was collected, using military time.

Example: 14:30

E. The sampler's name will be printed in the "Sampled By" section.

F. Other information relevant to the sample.

Example: Equipment Blank

An example sample label is presented below:

Job No:	XXXXXXXXX
Client:	Name
Sample No:	GZ-01(5-5.5')
Matrix:	Soil
Date Taken:	5/22/24
Time Taken:	14:30
Sampler:	B. Smith
Analysis:	SVOC

Job No. _____
Client: _____
Sample Number _____
Date _____ Sample Time _____
Sample Matrix _____
Grab or Composite (explain) _____
Preservatives _____
Analyses _____
Sampler Signature _____

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing from the field personnel collecting samples or the QEP.

5.2. Sample Custody

Custody is one of several factors that are necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files.

A sample or evidence file is considered to be under a person's custody if

- the item is in the actual possession of a person

- the item is in the view of the person after being in actual possession of the person
- the item was in the actual physical possession of the person but is locked up to prevent tampering
- the item is in a designated and identified secure area

5.2.1. Field Custody Procedures

Samples will be collected following the sampling procedures documented in **Section 4.0** of this Plan. Documentation of sample collection is described in **Section 5.1** of this Plan. Sample chain-of-custody and packaging procedures are summarized below. These procedures are intended to ensure that the samples will arrive at the laboratory with the chain-of-custody intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.

- All bottles will be identified by the use of sample labels with sample numbers, sampling locations, date/time of collection, and type of analysis.

- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample label because the pen would not function in wet weather.

- Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage location.

- All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files.

- Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. If third party commercial carriers are used for transfer to the laboratory, shipping containers will be secured with strapping tape and custody seals prior to shipment. The custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. The cooler will be strapped shut with strapping tape in at least two locations.

- If the samples are sent by third party commercial carrier, the air bill will be used. Air bills will be retained as part of the permanent documentation. Commercial carriers are not required to sign off

on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.

- Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory courier or sample custodian, and signature of the laboratory courier or sample custodian on chain-of-custody document as receiving the samples and signature of sampler as relinquishing samples.

5.2.2. Laboratory Custody Procedures

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will

- Examine the shipping containers to verify that the custody tape is intact,
- Examine all sample containers for damage,
- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the chain-of-custody records,
- Compare samples received against those listed on the chain-of-custody,
- Verify that sample holding times have not been exceeded,
- Examine all shipping records for accuracy and completeness,
- Determine sample pH (if applicable) and record on chain-of-custody forms,
- Sign and date the chain-of-custody immediately (if shipment is accepted) and attach the air bill,
- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the Laboratory Project Manager, who will be responsible for contacting the QEP,
- Attach laboratory sample container labels with unique laboratory identification and test, and
- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field ID provided by field personnel.
- The Laboratory Project Manager will be notified of sample arrival.
- The completed chain-of-custody, air bills, and any additional documentation will be placed in the final evidence file.

6.0 CALIBRATION PROCEDURES

6.1. Field Instruments

Field instruments will be calibrated according to the manufacturer's specifications. Calibration procedures performed will be documented in the field logbook and will include the date/time of

calibration, name of person performing the calibration, reference standard used, temperature at which the readings were taken, and the readings.

6.2. Laboratory Instruments

Calibration procedures for a specific laboratory instrument will consist of initial calibrations, initial calibration verifications, and/or continuing calibration verification. Detailed descriptions of the calibration procedures for a specific laboratory instrument are included in the laboratory's standard operating procedures (SOPs), which describe the calibration procedures, their frequency, acceptance criteria, and the conditions that will require recalibration. These procedures are as required in the respective analytical methodologies (summarized in **Table 2** of this Plan). The initial calibration associated with all analyses must contain a low-level calibration standard which is less than or equal to the quantitation limit.

7.0 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

No field analyses are anticipated for this program. If site conditions were to warrant field analysis, the responsible contractor will prepare an addendum establishing the field analytical procedures. Analyses of all samples will be performed by York Analytical Laboratories, a NYSDOH ELAP certified laboratory. **Table 2** summarizes the analytical methods to be used during the remediation.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

Appropriate QC measures will be used to ensure the generation of reliable data from sampling and analysis activities. Proper collection and organization of accurate information followed by clear and concise reporting of the data is a primary goal in this project. Complete data packages suitable for data validation will be provided by the analytical laboratory.

For all analyses, the laboratory will report results that are below the laboratory's reporting limit; these results will be qualified as estimated (J) by the laboratory. The laboratory may be required to report tentatively identified compounds (TICs) for the VOC and SVOC analyses; this will be requested by the sampler on an as-needed basis. A Data Usability Summary Report (DUSR) will be prepared and will be included in the Construction Completion Report (CCR). The DUSR for this project is Ms. Christin Camardella. Qualifications of the DUSR preparer can be found in **Attachment A.**

8.1. Data Evaluation/Validation

8.1.1. Field Data Evaluation

Measurements and sample collection information will be transcribed directly into the field logbook or onto standardized forms. If errors are made, results will be legibly crossed out, initialed and dated by

the person recording the data, and corrected in a space adjacent to the original (erroneous) entry. Daily reviews of the field records by the Field Team Leader will ensure that:

- Logbooks and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed.
- Records are legible and in accordance with good record keeping procedures, i.e., entries are signed and dated, data are not obliterated, changes are initialed, dated, and explained.
- Sample collection, handling, preservation, and storage procedures were conducted in accordance with the protocols described in the Plan, and that any deviations were documented and approved by the appropriate personnel.

8.1.2. Data Usability

A Data Usability Summary Report (DUSR) will be prepared in accordance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

The data usability evaluation will include reviewing the quality assurance/quality control (QA/QC) information including: (1) chain-of-custody; (2) the summary QA/QC information provided by the laboratory; and (3) the project narrative.

For each data package the following questions will be evaluated:

- Is the data package complete as defined under the requirements for the NYSDEC ASP Category B, USEPA CLP deliverables or other standards/guidance?
- Have all holding times and preservation requirements been met?
- Do the quality control (QC) data fall within the laboratory and project established limits and specifications?

8.2. Identification and Treatment of Outliers

Any data point which deviates markedly from others in its set of measurements will be investigated; however, the suspected outlier will be recorded and retained in the data set. One or both of the following tests will be used to identify outliers.

Dixon's test for extreme observations is an easily computed procedure for determining whether a single very large or very small value is consistent with the remaining data. The one-tailed t-test for difference may also be used in this case. It should be noted that these tests are designed for testing a single value. If more than one outlier is suspected in the same data set, other statistical sources may be consulted and the most appropriate test of hypothesis will be used and documented, if warranted.

Since an outlier may result from unique circumstances at the time of sample analysis or data collection, those persons involved in the analysis and data reduction will be consulted. This may provide an experimental reason for the outlier. Further statistical analysis may be performed with and without the outlier to determine its effect on the conclusions. In many cases, two data sets may be reported, one including, and one excluding the outlier.

In summary, every effort will be made to include the outlying values in the reported data. If the value is rejected, it will be identified as an outlier, reported with its data set and its omission noted.

9.0 INTERNAL QUALITY CONTROL

The subcontracting laboratories' Quality Assurance Project Plans will identify the supplemental internal analytical quality control procedures to be used. At a minimum, this will include:

- Matrix spike and/or matrix spike duplicate samples
- Matrix duplicate analyses
- Laboratory control samples
- Instrument calibrations
- Instrument tunes for SW-846 8260B and 8270C and EPA Method TO-15 analyses
- Method and/or instrument blanks
- Surrogate spikes for organic analyses
- Internal standard spikes for SW-846 8260B and 8270C and EPA Method TO-15 analyses
- Quantitation limit determination and confirmation by analysis of low-level calibration standard

As outline on **Table 5** and summarized in **Section 4.13**, field quality control samples will include:

- Equipment blanks
- Field duplicate samples
- Trip blanks
- MS/MSDs

10.0 CORRECTIVE ACTION

The entire sampling program will be under the direction of the QEP. The emphasis in this program is on preventing problems by identifying potential errors, discrepancies, and gaps in the data-collection-laboratory-analysis-interpretation process. Any problems identified will be promptly resolved. Likewise, follow-up corrective action is always an option in the event that preventative corrective actions are not totally effective.

The acceptance limits for the sampling and analyses to be conducted in this program will be those stated in the method or defined by other means in the Plan. Corrective actions are likely to be immediate in nature and most often will be implemented by the contracted laboratory analyst or the Program Manager. The corrective action will usually involve recalculation, reanalysis, or resampling.

10.1. Immediate Corrective Action

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the Plan), or when sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. The field team may identify the need for corrective action. The Field Team Leader will approve the corrective action and notify the Program Manager. The Program Manager will approve the corrective measure. The Field Team Leader will ensure that the corrective measure is implemented by the field team.

Corrective actions will be implemented and documented in the field logbook. Documentation will include:

- A description of the circumstances that initiated the corrective action,
- The action taken in response,
- The final resolution, and
- Any necessary approvals

No staff member will initiate corrective action without prior communication of findings through the proper channels.

Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample containers, omissions or discrepancies with chain-of-custody documentation, low/high pH readings, and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with laboratory analysts and Laboratory Section Leaders, it may be necessary for the Laboratory QA Manager to approve the implementation of corrective action. The laboratory SOPs specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain QC criteria are not met, loss of sample through breakage or spillage, etc.

The analyst may identify the need for corrective action. The Laboratory Section Leader, in consultation with the staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA Manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, the QEP will be notified. The QEP will notify the Program Manager, who in turn will contact all levels of project management for concurrence with the proposed corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files, and the narrative data report sent from the laboratory to the Program Manager. If the corrective action does not rectify the situation,

the laboratory will contact the Program Manager, who will determine the action to be taken and inform the appropriate personnel.

If potential problems are not solved as an immediate corrective action, the contractor will apply formalized long-term corrective action, if necessary.

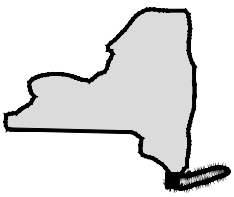
FIGURES

TABLES

ATTACHMENTS

FIGURES

NEW YORK



QUADRANGLE LOCATION

SOURCE:

USGS TOPOGRAPHIC MAPS: BROOKLYN, NY, NJ (2023). CONTOUR INTERVAL 10FT., NAVD-1988, ORIGINAL SCALE 1:24,000 (1IN.=2,000FT.).

N
W E
S

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

NYSDEC BCP SITE NO. C224390
19-27 and 29 CLAY ST AND 60-62 COMMERCIAL ST
BROOKLYN, NY 11222

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
CLAY PROPERTIES, LLC

SITE LOCATION MAP

PROJ MGR: MH	REVIEWED BY: MH	CHECKED BY: VW	FIGURE
DESIGNED BY: SG	DRAWN BY: SG	SCALE: 1"=2000'	1
DATE: JUNE 2024	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO. 1 OF 1

© 2022 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\41.0163279.00 Figures 1,2,3,6.dwg [FIG 1 8.5x11] June 19, 2024 – 10:17am Selia.Gupta

TABLES

Table 1 A
Soil Criteria Table

19-27 and 29 Clay Street and 60-62 Commercial Street
Brooklyn, New York
BCP Site No. C224390
QAPP/FSP

Contaminant	Protection of Public Health					Protection of Ecological Resources[n]	Protection of Groundwater
	Unrestricted Use	Residential	Restricted-Residential	Commercial	Industrial		
All soil cleanup objectives (SCOs) are in parts per million (ppm); approximately equivalent to mg/kg.							
Metals							
Arsenic	13[m]	16[f]	17[f]	18[f]	19[f]	13[f]	16[f]
Barium	350[m]	350[f]	400	400	10,000[d]	433	820
Beryllium	7.2	14	72	590	2,700	10	47
Cadmium	2.5[m]	2.5[f]	4.3	9.3	60	4	7.5
Chromium, hexavalent[h]	1[l]	22	110	400	800	1[e]	19
Chromium, trivalent[h]	30[m]	36	180	1,500	6,800	41	NS
Copper	50	270	270	270	10,000[d]	50	1,720
Total Cyanide[h]	27	27	27	27	10,000[d]	NS	40
Lead	63[m]	400	400	1,000	3,900	63[f]	450
Manganese	1600[m]	2,000[f]	2,000[f]	10,000[d]	10,000[d]	1600[f]	2,000[f]
Total Mercury	0.18[m]	0.81[j]	0.81[j]	2.8[j]	5.7[j]	0.18[f]	0.73
Nickel	30	140	310	310	10,000[d]	30	130
Selenium	3.9[m]	36	180	1,500	6,800	3.9[f]	4[f]
Silver	2	36	180	1,500	6,800	2	8.3
Zinc	109[m]	2200	10,000[d]	10,000[d]	10,000[d]	109[f]	2,480
PCBs/Pesticides							
2,4,5-TP Acid (Silvex)	3.8	58	100[a]	500[b]	1,000[c]	NS	3.8
4,4'-DDE	0.0033[l]	1.8	8.9	62	120	0.0033[e]	17
4,4'-DDT	0.0033[l]	1.7	7.9	47	94	0.0033[e]	136
4,4'-DDD	0.0033[l]	2.6	13	92	180	0.0033[e]	14
Aldrin	0.005[m]	0.019	0.097	0.68	1.4	0.14	0.19
alpha-BHC	0.02	0.097	0.48	3.4	6.8	0.04[g]	0.02
beta-BHC	0.036	0.072	0.36	3	14	0.6	0.09
Chlordane (alpha)	0.094	0.91	4.2	24	47	1.3	2.9
delta-BHC	0.04	100[a]	100[a]	500[b]	1,000[c]	0.04[g]	0.25
Dibenzofuran	7	14	59	350	1,000[c]	NS	210
Dieldrin	0.005[m]	0.039	0.2	1.4	2.8	0.006	0.1
Endosulfan I	2.4	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan II	2.4	4.8[i]	24[i]	200[i]	920[i]	NS	102
Endosulfan sulfate	2.4	4.8[i]	24[i]	200[i]	920[i]	NS	1,000[c]
Endrin	0.014	2.2	11	89	410	0.014	0.06
Heptachlor	0.042	0.42	2.1	15	29	0.14	0.38
Lindane	0.1	0.28	1.3	9.2	23	6	0.1
Polychlorinated biphenyls	0.1	1	1	1	25	1	3.2
Semivolatiles							
Acenaphthene	20	100[a]	100[a]	500[b]	1,000[c]	20	98
Acenapthylene	100[k]	100[a]	100[a]	501[b]	1,000[c]	NS	107
Anthracene	100[k]	100[a]	100[a]	502[b]	1,000[c]	NS	1,000[c]
Benz(a)anthracene	1[m]	1[f]	1[f]	5.6	11	NS	1[f]
Benzo(a)pyrene	1[m]	1[f]	1[f]	1[f]	1.1	2.6	22
Benzo(b)fluoranthene	1[m]	1[f]	1[f]	5.6	11	NS	1.7
Benzo(g,h,i)perylene	100	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Benzo(k)fluoranthene	0.8[m]	1	3.9	56	110	NS	1.7
Chrysene	1[m]	1[f]	3.9	56	110	NS	1[f]
Dibenz(a,h)anthracene	0.33[l]	0.33[e]	0.33[e]	0.56	1.1	NS	1,000[c]
Fluoranthene	100[k]	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Fluorene	30	100[a]	100[a]	500[b]	1,000[c]	30	386
Indeno(1,2,3-cd)pyrene	0.5[m]	0.5[f]	0.5[f]	5.6	11	NS	8.2
m-Cresol	0.33[l]	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
Naphthalene	12	100[a]	100[a]	500[b]	1,000[c]	NS	12
o-Cresol	0.33[l]	100[a]	100[a]	500[b]	1,000[c]	NS	0.33[e]
p-Cresol	0.33[l]	34	100[a]	500[b]	1,000[c]	NS	0.33[e]
Pentachlorophenol	0.8[i]	2.4	6.7	6.7	55	0.8[e]	0.8[e]
Phenanthrene	100	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]
Phenol	0.33[l]	100[a]	100[a]	500[b]	1,000[c]	30	0.33[e]
Pyrene	100	100[a]	100[a]	500[b]	1,000[c]	NS	1,000[c]

Table 1 A
Soil Criteria Table

19-27 and 29 Clay Street and 60-62 Commercial Street
Brooklyn, New York
BCP Site No. C224390
QAPP/FSP

Contaminant	Protection of Public Health					Protection of Ecological Resources[n]	Protection of Groundwater
	Unrestricted Use	Residential	Restricted-Residential	Commercial	Industrial		
All soil cleanup objectives (SCOs) are in parts per million (ppm); approximately equivalent to mg/kg.							
Volatiles							
1,1,1-Trichloroethane	0.68	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	0.68
1,1-Dichloroethane	0.27	19	26	240	480	NS	0.27
1,1-Dichloroethene	0.33	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	0.33
1,2-Dichlorobenzene	1.1	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	1.1
1,2-Dichloroethane	0.02 [m]	2.3	3.1	30	60	10	0.02 [f]
cis-1,2-Dichloroethene	0.25	59	100 [a]	500 [b]	1,000 [c]	NS	0.25
trans-1,2-Dichloroethene	0.19	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	0.19
1,3-Dichlorobenzene	2.4	17	49	280	560	NS	2.4
1,4-Dichlorobenzene	1.8	9.8	13	130	250	20	1.8
1,4-Dioxane	0.1 [l]	9.8	13	130	250	0.1 [e]	0.1 [e]
Acetone	0.05	100[a]	100[b]	500 [b]	1,000 [c]	2.2	0.05
Benzene	0.06	2.9	4.8	44	89	70	0.06
Butylbenzene	12	100[a]	100[a]	500 [b]	1,000 [c]	NS	12
Carbon tetrachloride	0.76	1.4	2.4	22	44	NS	0.76
Chlorobenzene	1.1	100[a]	100[a]	500 [b]	1,000 [c]	40	1.1
Chloroform	0.37	10	49	350	700	12	0.37
Ethylbenzene	1	30	41	390	780	NS	1
Hexachlorobenzene	0.33 [l]	0.33[e]	1.2	6	12	NS	3.2
Methyl ethyl ketone	0.12	100 [a]	100 [a]	500 [b]	1,000 [c]	100 [a]	0.12
Methyl tert-butyl ether	0.93	62	100 [a]	500 [b]	1,000 [c]	NS	0.93
Methylene chloride	0.05	51	100 [a]	500 [b]	1,000 [c]	12	0.05
n-Propylbenzene	3.9	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	3.9
sec-Butylbenzene	11	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	11
tert-Butylbenzene	5.9	100 [a]	100 [a]	500 [b]	1,000 [c]	NS	5.9
Tetrachloroethene	1.3	5.5	19	150	300	2	1.3
Toluene	0.7	100 [a]	100 [a]	500 [b]	1,000 [c]	36	0.7
Trichloroethene	0.47	10	21	200	400	2	0.47
1,2,4-Trimethylbenzene	3.6	47	52	190	380	NS	3.6
1,3,5- Trimethylbenzene	8.4	47	52	190	380	NS	8.4
Vinyl chloride	0.02	0.21	0.9	13	27	NS	0.02
Xylene (mixed)	0.26	100 [a]	100 [a]	500 [b]	1,000 [c]	0.26	1.6
Per-and Polyfluoroalkyl Substances (PFAs)[o]							
PFOA	0.00066	0.0066	0.033	0.5	0.6	NS	0.0011
PFOS	0.00088	0.0088	0.044	0.44	0.44	NS	0.0037

Notes:
[a] The SCOs for residential, restricted-residential and ecological resources use were capped at a maximum value of 100 ppm
[b] The SCOs for commercial use were capped at a maximum value of 500 ppm
[c] The SCOs for industrial use and the protection of groundwater were capped at a maximum value of 1000 ppm
[d] The SCOs for metals were capped at a maximum value of 10,000 ppm.
[e] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the SCO value
[f] For constituents where the calculated SCO was lower than the rural soil background concentration as determined by the Department and Department of Health rural soi survey, the rural soil background concentration is used as the Track 2 SCO value for this use of the site.
[g] This SCO is derived from data on mixed isomers of BHC.

[h] The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.
[i] This SCO is for the sum of endosulfan I, endosulfan II, and endosulfan sulfate
[j] This SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts)
[k] The SCOs for unrestricted use were capped at a maximum value of 100 ppm.
[l] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value
[m] For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and Department of Health rura soil survey, the rural soil background concentration is used as the Track 1 SCO value for this use of the site.
[n] Protection of ecological resources SCOs were not developed for contaminants identified in Table 375-6.8(b) with "NS". Where such contaminants appear in Table 375 6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources SCO according to the TSD.
[o] SCOs for PFAs are taken from the NYSDEC Sampling, Analysis, and Assessment of Per-and-Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs, dated April 2023.

Table 1B
Groundwater Criteria Table
19-27 and 29 Clay Street and 60-62 Commercial Street
Brooklyn, New York
BCP Site No. C224390

Contaminant	Aqueous Water Quality Standards[1], ug/L
Metals	
Antimony	3
Arsenic	---
Arsenic	25
Barium	1,000
Beryllium	3
Cadmium	5
Chromium, hexavalent	---
Chromium, trivalent	50
Copper	200
Cyanide	---
Iron	300
Lead	25
Magnesium	35,000
Manganese	300
Mercury	0.7
Nickel	100
Selenium	10
Silver	50
Sodium	20,000
Thallium	0.5
Zinc	2000
PCBs/Pesticides	
alpha-BHC	0.01
2,4,5-TP Acid (Silvex)	---
4,4'-DDD	0.3
4,4'-DDE	0.2
4,4'-DDT	0.2
Aldrin	---
beta-BHC	0.04
Chlordane (alpha)	---
Dibenzofuran	---
Dieldrin	0.004
Endosulfan I	0.12
Endosulfan II	0.12
Endosulfan sulfate	0.12
Endrin	---
Endrin aldehyde	5
Endrin ketone	5
gamma-BHC (Lindane)	0.05

Table 1B
Groundwater Criteria Table
19-27 and 29 Clay Street and 60-62 Commervial Street
Brooklyn, New York
BCP Site No. C224390

Contaminant	Aqueous Water Quality Standards[1], ug/L
PCBs/Pesticides, Con't.	
gamma-Chlordane	0.12
Heptachlor	0.04
Heptachlor epoxide	0.03
Lindane	---
Methoxychlor	35
Polychlorinated biphenyls	---
Toxaphene	0.06
Semivolatiles	
1,1'-Biphenyl	5
2,2'-oxybis(1-Chloropropane)	5
2,4,5-Trichlorophenol	1
2,4-Dichlorophenol	1
2,4-Dimethylphenol	50
2,4-Dinitrophenol	10
2,4-Dinitrotoluene	5
2,6-Dinitrotoluene	5
2-Chloronaphthalene	10
2-Chlorophenol	1
2-Methylnaphthalene	502
2-Methylphenol	1
2-Nitroaniline	5
2-Nitrophenol	1
3,3'-Dichlorobenzidine	5
3-Nitroaniline	5
4-Chloro-3-methylphenol	1
4-Chloroaniline	5
4-Methylphenol	1
4-Nitroaniline	5
4-Nitrophenol	1
Acenaphthene	20
Acenapthylene	202
Anthracene	50
Atrazine	7.5
Benz(a)anthracene	0.002
Benzo(a)pyrene	---
Benzo(b)fluoranthene	0.002
Benzo(g,h,i)perylene	52
Benzo(k)fluoranthene	0.002
bis(2-Chloroethoxy)methane	5

Table 1B
Groundwater Criteria Table
19-27 and 29 Clay Street and 60-62 Commercial Street
Brooklyn, New York
BCP Site No. C224390

Contaminant	Aqueous Water Quality Standards[1], ug/L
Semivolatiles, Con't.	
Bis(2-Chloroethyl)ether	1
bis(2-Ethylhexyl)phthalate	5
Butylbenzylphthalate	50
Chrysene	0.002
Dibenz(a,h)anthracene	502
Dibenzofuran	52
Diethylphthalate	50
Dimethylphthalate	50
Di-n-butylphthalate	50
Di-n-octylphthalate	50
Fluoranthene	50
Fluorene	50
Hexachlorobenzene	0.04
Hexachlorobutadiene	0.5
Hexachlorocyclopentadiene	5
Hexachloroethane	5
Indeno(1,2,3-cd)pyrene	0.002
Isophorone	50
m-Cresol	---
Naphthalene	10
Nitrobenzene	0.4
N-Nitrosodiphenylamine	50
o-Cresol	---
p-Cresol	---
Pentachlorophenol	1
Phenanthrene	50
Phenol	1
Pyrene	50
Volatiles	
1,1,1-Trichloroethane	5
1,1,2,2-Tetrachloroethane	5
1,1,2-Trichloro-1,2,2-trifluoroethane	5
1,1,2-Trichloroethane	1
1,1-Dichloroethane	5
1,1-Dichloroethene	5
1,1-Dichloroethylene	---
1,2,4-Trichlorobenzene	---

Table 1B
Groundwater Criteria Table
19-27 and 29 Clay Street and 60-62 Commercial Street
Brooklyn, New York
BCP Site No. C224390

Contaminant	Aqueous Water Quality Standards[1], ug/L
Volatiles, Con't.	
1,2,4-Trimethylbenzene	5
1,2-Dibromo-3-chloropropane	0.04
1,2-Dibromoethane	0.0006
1,2-Dichlorobenzene	3
1,2-Dichloroethane	0.6
1,2-Dichloropropane	1
1,3,5- Trimethylbenzene	---
1,3-Butadiene	---
1,3-Dichlorobenzene	3
1,3-Dichlorobenzene	---
1,4-Dichlorobenzene	3
1,4-Dichlorobenzene	---
1,4-Dioxane	1[2]
2-Butanone	50
2-Hexanone	50
4-Methyl-2-pentanone	502
Acetone	50
Benzene	1
Bromodichloromethane	50
Bromoform	50
Bromomethane	5
Butylbenzene	---
Carbon Disulfide	60
Carbon tetrachloride	5
Chlorobenzene	5
Chloroethane	5
Chloroform	7
Chloromethane	5
Cis- 1,3-Dichloropropene	0.4
cis-1,2-Dichloroethene	5
cis-1,2-Dichloroethylene	---
Cyclohexane	---
Dibromochloromethane	50
Dichlorodifluoromethane	5
Ethyl Acetate	---
Ethylbenzene	5
Freon 113	---
Hexachlorobenzene	---

Table 1B
Groundwater Criteria Table
19-27 and 29 Clay Street and 60-62 Commervial Street
Brooklyn, New York
BCP Site No. C224390

Contaminant	Aqueous Water Quality Standards[1], ug/L
Volatiles, Con't.	
Hexachlorobutadiene	---
Hexane	---
Isopropylbenzene	5
m,p-Xylene	---
m-Dichlorobenzene	---
Methyl Acetate	NS
Methyl ethyl ketone	---
Methyl Isobutyl Ketone	---
Methyl tert-butyl ether	10
Methylcyclohexane	---
Methylene chloride	5
n-Propylbenzene	---
o-Dichlorobenzene	---
o-Xylene	---
p-Dichlorobenzene	---
sec-Butylbenzene	---
Styrene	5
tert-Butylbenzene	---
Tertiary Butyl Alcohol	---
Tetrachloroethene	5
Toluene	5
trans-1,2-Dichloroethene	5
trans-l,3-Dichloropropene	0.4
Trichloroethene	5
Trichlorofluoromethane	5
Vinyl Acetate	---
Vinyl Chloride	2
Xylene (mixed)	5
Per- and Polyfluoroalkyl Substances (PFAS)	
PFOA	0.01[2]
PFOS	0.01[2]

Notes:

[1] - Division of Water Technical and Operational Guidance Values (TOGS) Ambient Water Quality Standards and Guidance Values (AWQS), ug/L

[2] - Guidance value for 1,4-Dioxane, PFOA, and PFOS is from the NYSDEC Guidance to Regulate PFOA, PFOS, and 1,4-Dioxane in State Waters, dated October 5, 2021

ug/L - micro gram per liter

Table 1C
Soil Vapor Criteria Table
19-27 and 29 Clay Street 60-62 Comercial Street
Brooklyn, NY
NYSDEC BCP No. C224390

Volatile Organics in Air	CAS No.	NYSDOH Soil Vapor Intrusion Guidance Criteria				Toxicity	Decision Matrix
		1	2	3	4		
1,1,1-Trichloroethane	71556	2.5	20.6	-	-	L	B
1,1,2,2-Tetrachloroethane	79345	0.4	-	-	-	M	TD
1,1,2-Trichloroethane	79005	0.4	<1.5	-	-	H	TD
1,1-Dichloroethane	75343	0.4	<0.7	-	-	L	TD
1,1-Dichloroethene	75354	0.4	<1.4	-	-	M	B
1,2,4-Trichlorobenzene	120821	0.5	<6.8	-	-	NA	TD
1,2,4-Trimethylbenzene	95636	9.8	9.5	-	-	NA	D
1,2-Dibromoethane	106934	0.4	<1.5	-	-	H	TD
1,2-Dichlorobenzene	95501	0.5	<1.2	-	-	M	TD
1,2-Dichloroethane	107062	0.4	<0.9	-	-	H	TD
1,2-Dichloropropane	78875	0.4	<1.6	-	-	M	TD
1,3,5-Trimethybenzene	108678	3.9	3.7	-	-	M	D
1,3-Butadiene	106990	-	<3.0	-	-	H	TD
1,3-Dichlorobenzene	541731	0.5	<2.4	-	-	M	TD
1,4-Dichlorobenzene	106467	1.2	5.5	344	-	M	TD
1,4-Dioxane	123911	-	-	-	-	M	TD
2,2,4-Trimethylpentane	540841	5	-	-	-	M	D
2-Butanone	78933	16	12	-	-	M	TD
2-Hexanone	591786	-	-	-	-	NA	TD
3-Chloropropene	107051	-	-	-	-	M	TD
4-Ethyltoluene	622968	-	3.6	-	-	NA	TD
4-Methyl-2-pentanone	108101	1.9	6	-	-	M	TD
Acetone	67641	115	98.9	45.8	-	L	TD
Benzene	71432	13	9.4	10	-	H	D
Benzyl chloride	100447	-	<6.8	-	-	H	TD
Bromodichloromethane	75274	-	-	-	-	M	TD
Bromoform	75252	-	-	-	-	M	TD
Bromomethane	74839	0.5	<1.7	-	-	M	TD
Carbon disulfide	75150	-	4.2	-	-	M	TD
Carbon tetrachloride	56235	1.3	<1.3	1.1	-	H	A
Chlorobenzene	108907	0.4	<0.9	-	-	M	TD
Chloroethane	75003	0.4	<1.1	-	-	L	TD
Chloroform	67663	1.2	1.1	6.34	-	H	TD
Chloromethane	74873	4.2	3.7	-	-	M	TD
cis-1,2-Dichloroethene	156592	0.4	<1.9	-	-	M	B
cis-1,3-Dichloropropene	10061015	0.4	<2.3	-	-	NA	TD
Cyclohexane	110827	6.3	-	-	-	L	D

Table 1C
Soil Vapor Criteria Table
19-27 and 29 Clay Street 60-62 Comercial Street
Brooklyn, NY
NYSDEC BCP No. C224390

Volatile Organics in Air	CAS No.	NYSDOH Soil Vapor Intrusion Guidance Criteria				Toxicity	Decision Matrix
		1	2	3	4		
Dibromochloromethane	124481	-	-	-	-	NA	TD
Dichlorodifluoromethane	75718	10	16.5	-	-	NA	TD
Ethanol	64175	1300	210	-	-	L	TD
Ethyl Acetate	141786	-	5.4	-	-	M	TD
Ethylbenzene	100414	6.4	5.7	7.62	-	M	D
Freon-113	76131	2.5	3.5	-	-	L	TD
Freon-114	76142	0.4	<6.8	-	-	NA	TD
Heptane	142825	18	-	-	-	M	E
Hexachlorobutadiene	87683	0.5	<6.8	-	-	M	TD
Isopropanol	67630	-	-	-	-	M	TD
Methyl tert butyl ether	1634044	14	11.5	36	-	M	TD
Methylene chloride	75092	16	10	7.5	60	NA	TD
n-Hexane	110543	14	10.2	-	-	M	E
o-Xylene	95476	7.1	7.9	7.24	-	M	D
p/m-Xylene	179601231	11	22.2	22.2	-	M	E
Styrene	100-42-5	1.4	1.9	5.13	-	M	TD
Tertiary butyl Alcohol	75-65-0	-	-	-	-	NA	TD
Tetrachloroethene (PCE)	127184	2.5	15.9	6.01	30	H	B
Tetrahydrofuran	109999	0.8	-	-	-	M	TD
Toluene	108883	57	43	39.8	-	L	F
trans-1,2-Dichloroethene	156605	-	-	-	-	NA	TD
trans-1,3-Dichloropropene	10061026	NC	<1.3	-	-	NA	TD
Trichloroethene	79016	0.5	4.2	1.36	2	H	A
Trichlorofluoromethane	75694	12	18.1	-	-	L	TD
Vinyl bromide	593602	-	-	-	-	H	TD
Vinyl chloride	75014	0.4	<1.9	-	-	H	A

Notes
Decision Criteria used:
Martix A: Sub-Slab >5, Indoor Air >5
Martix B: Sub-Slab >100, Indoor Air >30
Toxicities from DAR-1 Appendix C/SCG/ACG
(H) HIGH Toxicity Contaminant.
(M) MODERATE Toxicity Contaminant.
(L) LOW Toxicity Contaminant.

ND - Non-detect
NA - Not applicable
NFA - No further action
TD - To be determined based on the NYSDOH VI Decision
easonable - Take reasonable/practical actions to identify source/reduce exposure

NYSDOH Soil Vapor Intrusion Guidance Criteria
1 - Table C-1 2003 Upper Fence Study of Volatile Organic Chemicals in air of Fuel Oil Heated Homes for Indoor Ai
2 - Table C-2 2001 USEPA BASE 90th Percentile for Indoor Air
3 -Table C-5 2005 Health Effects Institute 95th Percentile for Indoor Air
4 -NYSDOH Air Guidance Value
NYSDOH Specific Compounds for Matrix Eval

Table 2
Typical Analytical Parameters, Methods, Preservation, Holding Time and Container Requirements
19 Clay Street and 60-62 Commercial Street, Brooklyn NY
NYSDEC BCP Site No. C224390

Sample Matrix	Analytical Parameter	Numer of Samples[1]	EPA Analytical Method	Sample Preservation	Holding Time[2]	Sample Container[3]
Soil	VOCs (TCL)	21	SW-846 Method 8260C/5035	1 - Methanol, 2 - Water; Cool to 4° C; no headspace	14 days to analysis	(3) Vial
Soil	PCBs	21	SW-846 Method 8082A	Cool to 4^0 C	365 days to analysis	(1) 250 mL amber glass jar
Soil	Pesticides (TCL)	21	SW-846 Method 8081A	Cool to 4^0 C	14 days to extraction	(1) 250 mL amber glass jar
Soil	SVOCs (TCL)	21	SW-846 Method 8270D	Cool to 4° C	14 days to extraction	(1) 250 mL amber glass jar
Soil	1,4-Dioxane	21	SW-846 Method 8270D	Cool to 4° C	7 days to extraction	(2) 250 mL amber glass jars
Soil	Metals	21	SW-846 Method 6010DSeries	Cool to 4^0 C	180 days to analysis	(1) 60 mL glass jar
Soil	Mercury	21	SW-846 Method 7471B	Cool to 4^0 C	28 days to analysis	(1) 60 mL glass jar
Soil	Cyanide	21	SW-846 Method 9010C/9012B	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Soil	Herbicides	21	SW-846 Method 8151A	Cool to 4^0 C	14 days to extraction	(1) 250 mL amber glass jar
Soil	PFAs	21	EPA Method 1633	Cool to 4^0 C	14 Days	(1) 250 mL plastic container
Groundwater	VOCs (TCL)	10	SW-846 Method 8260C	HCl; Cool to 4^0 C; no headspace	14 days to analysis	(3) Vial
Groundwater	VOCs with TICs, including 1,4-Dioxane (TCL)	10	SW-846 Method 8260C	HCl; Cool to 4^0 C; no headspace	14 days to analysis	(3) Vial
Groundwater	1,4-Dioxane	10	SW-846 Method 8270D	Cool to 4^0 C	7 days to analysis	(2) 250 mL amber glass jar
Groundwater	SVOCs (TCL)	10	SW-846 Method 8270D	Cool to 4^0 C	7 days to extraction	(2) 250 mL amber glass jar
Groundwater	SVOCs with TICs (TCL)	10	SW-846 Method 8270D	Cool to 4^0 C	7 days to extraction	(2) 250 mL amber glass jar
Groundwater	Metals- total (TAL)	10	SW-846 Method 6020B/7470A Series	HNO_3; Cool to 4° C	28 days to analysis for Hg; 180 days to analysis for other	(1) 500 mL plastic container
Groundwater	Metals-dissolved (TAL)	10	SW-846 Method 6020B/7470A Series	HNO3; Cool to 4° C	28 days to analysis for Hg; 180 days to analysis for other metals	(1) 500 mL plastic container
Groundwater	Pesticides (TCL)	10	SW-846 Method 8081B	Cool to 4^0 C	7 days to extraction	(2) 120 mL amber glass jar
Groundwater	Herbicides (TCL)	10	SW-846 Method 8151A	Cool to 4^0 C	7 days to extraction	(2) 1000 mL amber glass jar
Groundwater	PCBs	10	SW-846 Method 8082A	Cool to 4^0 C	365 days to analysis	(1) 250 mL amber glass jar
Groundwater	Cyanide	10	SW-846 Method 9012A	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Groundwater	Mercury	10	SW-846 Method 7470 A	HNO3; Cool to 4° C	28 days to analysis	(1) 250 mL plastic container
Groundwater	PFAs	10	EPA Method 1633	Cool to 4^0 C	14 Days	(1) 250 mL plastic container
Soil Gas	VOCs	9	EPA Method TO-15	None	14 days to analysis	(1) Evacuated 6-Liter SUMMA® canister

Notes:
[1] Actual number of samples may vary depending on field conditions, sample material availability, and field observations. See RIWP for estimates.

[2] Holding times listed are method holding time calculated from time of collection and not NYSDEC ASP holding times.
[3] MS/MSDs require duplicate volume for all parameters for solid matrices; MS/MSDs require triplicate volume for organic parameters for aqueous matrices and duplicate volume for inorganic parameters for aqueous matrices

Table 3
Typical Laboratory Data Quality Objectives
Soil Samples
19-27 and 29 Clay St. 60-62 Commercial St., Brooklyn, NY
NYCDEC BCP Site No. C224490

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
VOCs (TCL)	SW-846 Methods 8260B/5035	Soil	Surrogates % Rec. 1,2-Dichloroethane-d4 70-130 4-Bromofluorobenzene 70-130 Dibromofluoromethane 70-130 Toluene-d8 70-130 2-Chloroethoxyethane 70-130 Matrix Spikes 30-151% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 30 per matrix type	Field Duplicates RPD <30 MS/MSDs (RPD) RPD <30	Field Duplicates: One per 20 per soils MS/MSDs: One per 30 per matrix type
VOCs with Tentatively Identified Compounds (TICs)	SW-846 Method 8260C	Soil	Surrogates % Rec. 1,2-Dichloroethane-d4 70-130 4-Bromofluorobenzene 70-130 Dibromofluoromethane 70-130 Toluene-d8 70-130 Matrix Spikes 36-162 % recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <30 MS/MSDs RPD RPD<30	Field Duplicates: One per 20 MS/MSDs: One per 20
PCBs	SW-846 Method 8082A	Soil	Surrogates % Rec. 2,4,5,6-Tetrachloro-m-xylene 30-150 Decachlorobiphenyl 30-150 Matrix Spikes 40-140% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <50 MS/MSDs (RPD) RPD<50	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
SVOCs	SW-846 Method 8270D	Soil	Surrogates % Rec. Phenol-d6 10-120 2-Fluorophenol 25-120 2,4,6-Tribromophenol 10-136 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 30-120 4-Terphenyl-d14 18-120 Matrix Spikes 14-144% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 50 per matrix type	Field Duplicates RPD <50 MS/MSDs (RPD)	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
SVOCs with TICs	SW-846 Method 8270D	Soil	Surrogates % Rec. Phenol-d5 10-120 2-Fluorophenol 21-120 2,4,6-Tribromophenol 10-120 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 15-120 4-Terphenyl-d14 41-149 Matrix Spikes 14-144%	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <50 MS/MSDs RPD RPD<50	Field Duplicates: One per 20 MS/MSDs: One per 20
1,4-Dioxane	SW-846 Method 8270D	Soil	Surrogates % Rec. 1,4-Dioxane-d8 15-110 Matrix Spikes 40-140% recovery	Surrogates: All samples, standards, QC samples	Field Duplicates RPD <30 MS/MSDs (RPD) RPD<30	Field Duplicates: One per 20 per soils MS/MSDs: One per 20
Pesticides (TCL)	SW-846 Method 8081A	Soil	Surrogates % Rec. Decachlorobiphenyl 30-150 Tetrachloro-m-xylene 30-150 Matrix Spikes 30-150% Recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <50 MS/MSDs (RPD) RPD<50	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
Total Petroleum Hydrocarbons	SW-846 Method 8015B	Soil	Surrogates % Rec. o-Terphenyl 27-153 Tetracosane-d50 28-148 5α-androstane 27-148 TPH-DRO 10-149	Surrogates: All samples, standards, QC samples One per 20 per matrix type	Field Duplicates RPD <50 TPH-DRO 44	Field Duplicates: One per 20 per soils One per 20 per matrix type
Herbicides	SW-846 Method 8151A	Soil	Surrogates % Rec. 2,4-DCAA 30-150 Matrix Spikes 30-150% Recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <50 MS/MSDs (RPD) RPD<50	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
Metals (TAL)	SW-846 Method 6010D	Soil	Surrogates % Rec. Matrix Spikes 75-125% recovery	Surrogates: Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <20 MS/MSDs (RPD) RPD <20	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type

Table 3
Typical Laboratory Data Quality Objectives
Soil Samples
19-27 and 29 Clay St. 60-62 Commercial St., Brooklyn, NY
NYCDEC BCP Site No. C224490

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
PFAs	LCMSMS- Isotope Dilution	Soil	Surrogates % Rec. Perfluoro[13C4]Butanoic Acid (MPFBA) 61-135 Perfluoro[13C4]Butanoic Acid (MPFBA) 58-132 Perfluoro[13C5]Pentanoic Acid (M5PFPEA) 62-163 Perfluoro[13C5]Pentanoic Acid (M5PFPEA) 58-150 Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) 70-131 Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) 74-139 Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) 57-129 Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) 66-128 Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) 60-129 Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) 71-129 Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) 71-134 Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) 78-139 Perfluoro[13C8]Octanoic Acid (M8PFOA) 62-129 Perfluoro[13C8]Octanoic Acid (M8PFOA) 75-130 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) 14-147 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) 20-154 Perfluoro[13C9]Nonanoic Acid (M9PFNA) 59-139 Perfluoro[13C9]Nonanoic Acid (M9PFNA) 72-140 Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) 79-136 Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) 69-131 Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) 75-130 Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) 62-124 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) 19-175 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) 10-162 N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) 24-116 N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) 31-134 Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) 61-155 Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) 55-137 Perfluoro[13C8]Octanesulfonamide (M8FOSA) 10-112 Perfluoro[13C8]Octanesulfonamide (M8FOSA) 10-117 N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) 34-137 N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) 27-126 Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) 48-131 Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) 54-150 Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) 22-136 Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) 24-159 Matrix Spikes 46-182% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <30 MS/MSDs (RPD) RPD <30	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
Mercury	SW-846 Method 7471B	Soil	Surrogates % Rec. Matrix Spikes 80-125% recovery	Surrogates: Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <20 MS/MSDs (RPD) RPD <20	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type
Cyanide	SW-846 Method 9012A	Soil	Surrogates % Rec. Matrix Spikes 75-125% Recovery	Surrogates: Matrix Spikes: One per 35 per matrix type	Field Duplicates RPD <35 MS/MSDs (RPD) RPD <35	Field Duplicates: One per 20 per soils MS/MSDs: One per 20 per matrix type

Recovery criteria for laboratory control samples must be at least as stringent as MS/MSD criteria.
Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis.

Table 4
Typical Laboratory Data Quality Objectives
Groundwater Samples
19-27 and 29 Clay St. 60-62 Commercial St., Brooklyn, NY
NYSDEC BCP Site No. C224390

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
VOCs (TCL)	SW-846 Method 8260C	Groundwater	Surrogates % Rec. 1,2-Dichloroethane-d4 70-130 4-Bromofluorobenzene 70-130 Dibromofluoromethane 70-130 Toluene-d8 70-130 Matrix Spikes 36-162 % recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <20 MS/MSDs RPD RPD <20	Field Duplicates: One per 20 MS/MSDs: One per 20
VOCs with Tentatively Identified Compounds (TICs)	SW-846 Method 8260C	Groundwater	Surrogates % Rec. 1,2-Dichloroethane-d4 70-130 4-Bromofluorobenzene 70-130 Dibromofluoromethane 70-130 Toluene-d8 70-130 Matrix Spikes 36-162 % recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <20 MS/MSDs RPD RPD <20	Field Duplicates: One per 20 MS/MSDs: One per 20
SVOCs TCL	SW-846 Method 8270D	Groundwater	Surrogates % Rec Phenol-d5 10-120 2-Fluorophenol 21-120 2,4,6-Tribromophenol 10-120 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 15-120 4-Terphenyl-d14 41-149 Matrix Spikes 14-144%	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <50 MS/MSDs RPD RPD <50	Field Duplicates: One per 20 MS/MSDs: One per 20
SVOCs with TICs	SW-846 Method 8270D	Groundwater	Surrogates % Rec. Phenol-d5 10-120 2-Fluorophenol 21-120 2,4,6-Tribromophenol 10-120 Nitrobenzene-d5 23-120 2-Fluorobiphenyl 15-120 4-Terphenyl-d14 41-149 Matrix Spikes 14-144%	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates: RPD <50 MS/MSDs RPD RPD <50	Field Duplicates: One per 20 MS/MSDs: One per 20
1,4-Dioxane	SW-846 Method 8270D	Groundwater	Surrogates % Rec 1,4-Dioxane-d8 15-110 Matrix Spikes 40-140% recovery	Surrogates: All samples, standards, QC samples	Field Duplicates RPD <30 Matrix Duplicates RPD<30	Field Duplicates: One per 20 per soils MS/MSDs: One per 20
Metals (Total and Dissolved)	SW-846 Methods 6020B	Groundwater	Matrix Spikes 75-125% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <20 Matrix Duplicates RPD <20	Field Duplicates: One per 20 MS/MSDs: One per 20
Mercury (Total and Dissolved)	SW-846 Methods 7470A	Groundwater	Matrix Spikes 75-125% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <35 (dissolved) RPD<20 (Total) Matrix Duplicates RPD <35 (dissolved) RPD<20 (Total)	Field Duplicates: One per 20 MS/MSDs: One per 20
PCBs	SW-846 Method 8082A	Groundwater	Surrogates % Rec. 2,4,5,6-Tetrachloro-m-xylene 30-150 Decachlorobiphenyl 30-150 Matrix Spikes 40-140% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <50 MS/MSDs (RPD) RPD<50	Field Duplicates: One per 20 MS/MSDs: One per 20 per matrix type
Herbicides	SW-846 Method 8151A	Groundwater	Surrogates % Rec. 2,4-DCAA 30-150 Matrix Spikes 30-150% Recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates: RPD <50 MS/MSDs (RPD) RPD<50	Field Duplicates: One per 20 MS/MSDs: One per 20 per matrix type

Table 4
Typical Laboratory Data Quality Objectives
Groundwater Samples
19-27 and 29 Clay St. 60-62 Commercial St., Brooklyn, NY
NYSDEC BCP Site No. C224390

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
Pesticides (TCL)	SW-846 Method 8081B	Groundwater	Surrogates % Rec. Decachlorobiphenyl 15-142 2,4,5,6-Tetrachloro-m-xylene 36-126 Matrix Spikes 30-150% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20	Field Duplicates RPD <30 MS/MSDs RPD RPD <30	Field Duplicates: One per 20 MS/MSDs: One per 20
PFAs	EPA Method 1633	Grounwater	Surrogates Perfluoro[13C4]Butanoic Acid (MPFBA) Perfluoro[13C4]Butanoic Acid (MPFBA) Perfluoro[13C5]Pentanoic Acid (M5PFPEA) Perfluoro[13C5]Pentanoic Acid (M5PFPEA) Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) Perfluoro[13C8]Octanoic Acid (M8PFOA) Perfluoro[13C8]Octanoic Acid (M8PFOA) 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2- 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2- Perfluoro[13C9]Nonanoic Acid (M9PFNA) Perfluoro[13C9]Nonanoic Acid (M9PFNA) Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2- 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2- N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) Perfluoro[13C8]Octanesulfonamide (M8FOSA) Perfluoro[13C8]Octanesulfonamide (M8FOSA) N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5- N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5- Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) Matrix Spikes 46-182% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 20 per matrix type	Field Duplicates RPD <30 MS/MSDs (RPD) RPD <30	Field Duplicates: One per 20 MS/MSDs: One per 20 per matrix
Cyanide	EPA Method 9012B	Groundwater	 Matrix Spikes 75-125% recovery	Surrogates: All samples, standards, QC samples Matrix Spikes: One per 35	Field Duplicates RPD <35 Matrix Duplicates RPD <35	Field Duplicates: One per 20 Matrix Duplicates: One per 20

Recovery criteria for laboratory control samples must be at least as stringent as MS/MSD criteria.

Laboratory control limits are periodically updated. The latest control limits will be utilized at the time of sample analysis.

Table 5
Typical Laboratory Data Quality Objectives
Soil Gas Samples
19-27 and 29 Clay St. 60-62 Commercial St., Brooklyn, NY
NYSDEC BCP Site No, C224390

Parameter	Method	Matrix	Accuracy Control Limits	Accuracy Frequency Requirements	Precision (RPD) Control Limits	Precision Frequency Requirements
VOCs	EPA Method TO-15	Soil Gas	Surrogates % Rec. 4-Bromofluorobenzene 78-124	Surrogates: All samples, standards, QC samples	Matrix Duplicates RPD £30	Matrix Duplicates One per 20

Table 6

QC Sample Preservation and Container Requirements

19-27 Clay St, 29 Clay St. 60-62 Commercial St., Brooklyn, NY

NYSDEC BCP Site No. C224390 & C224408

Sample Matrix	Analytical Parameter	No. of Samples	EPA Analytical Method	Sample Preservation	Holding Time[1]	Sample Container
Soil	VOCs (TCL)	2	SW-846 Method 8260C/5035	1 - Methanol, 2 - Water; Cool to 4° C; no headspace	14 days to analysis	(3) Vial Preserved
Soil	PCBs	2	SW-846 Method 8082A	Cool to 4^0 C	365 days to analysis	(1) 250 mL amber glass jar
Soil	SVOCs (TCL)	2	SW-846 Method 8270D	Cool to 4° C	14 days to extraction	(1) 250 mL amber glass jar
Soil	1,4-Dioxane	2	SW-846 Method 8270D	Cool to 4° C	7 days to extraction	(2) 250 mL amber glass jars
Soil	Metals (TAL)	2	SW-846 Method 6010DSeries	Cool to 4^0 C	180 days to analysis	(1) 60 mL glass jar
Soil	Mercury	2	SW-846 Method 7471B	Cool to 4^0 C	28 days to analysis	(1) 60 mL glass jar
Soil	Cyanide	2	SW-846 Method 9010C/9012B	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Soil	Herbicides	2	SW-846 Method 8151A	Cool to 4^0 C	14 days to extraction	(1) 250 mL amber glass jar
Soil	Pesticides	2	SW-846 Method 8141A[6]	Cool to 4^0 C	14 days to extraction	(1) 300 mL amber glass jar
Soil	PFAs	2	EPA Method 1633	Cool to 4^0 C	14 Days	(1) 250 mL plastic container

Table 6

QC Sample Preservation and Container Requirements
19-27 Clay St, 29 Clay St. 60-62 Commercial St., Brooklyn, NY
NYSDEC BCP Site No. C224390 & C224408

Groundwater	VOCs (TCL)	1	SW-846 Method 8260C	HCl; Cool to 4^0 C; no headspace	14 days to analysis	(3) Vial
Groundwater	1,4-Dioxane	1	SW-846 Method 8270D	Cool to 4^0 C	7 days to analysis	(2) 250 mL amber glass jar
Groundwater	SVOCs (TCL)	1	SW-846 Method 8270D	Cool to 4^0 C	7 days to extraction	(2) 250 mL amber glass jar
Groundwater	Metals- total (TAL)	1	SW-846 Method 6020B/7470A Series	HNO_3; Cool to 4° C	28 days to analysis for Hg; 180 days to analysis for other metals	(1) 500 mL plastic container
Groundwater	Metals-dissolved (TAL)	1	SW-846 Method 6020B/7470A Series	HNO3; Cool to 4° C	28 days to analysis for Hg; 180 days to analysis for other metals	(1) 500 mL plastic container
Groundwater	Pesticides (TCL)	1	SW-846 Method 8081B	Cool to 4^0 C	7 days to extraction	(2) 120 mL amber glass jar
Groundwater	Herbicides (TCL)	1	SW-846 Method 8151A	Cool to 4^0 C	7 days to extraction	(2) 1000 mL amber glass jar
Groundwater	PCBs	1	SW-846 Method 8082A	Cool to 4^0 C	365 days to analysis	(1) 250 mL amber glass jar
Groundwater	Cyanide	1	SW-846 Method 9012A	Cool to 4^0 C	14 days to analysis	(1) 250 mL amber glass jar
Groundwater	Mercury	1	SW-846 Method 7470 A	HNO3; Cool to 4° C	28 days to analysis	(1) 250 mL plastic container
Groundwater	PFAs	1	EPA Method 1633	Cool to 4^0 C	14 Days	(1) 250 mL plastic container
Soil Gas	VOCs	1	EPA Method TO-15	None	14 days to analysis	(1) Evacuated 6-Liter SUMMA® canister

Notes:
1 Holding times listed are method holding time calculated from time of collection and not NYSDEC ASP holding times.

ATTACHMENTS

ATTACHMENT A

NEW YORK STATE OF OPPORTUNITY.

Department of Environmental Conservation

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Under NYSDEC's Part 375 Remedial Programs

April 2023

Table of Contents

Objective 1
Applicability 1
Field Sampling Procedures 1
Analysis and Reporting 2
Routine Analysis 2
Additional Analysis 2
Data Assessment and Application to Site Cleanup 3
Water Sample Results 3
Soil Sample Results 3
Testing for Imported Soil 4
Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS 5
Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids 6
Appendix C - Sampling Protocols for PFAS in Monitoring Wells 8
Appendix D - Sampling Protocols for PFAS in Surface Water 10
Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells 12
Appendix F - Sampling Protocols for PFAS in Fish 14
Appendix G - PFAS Analyte List 22
Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids 24

ERRATA SHEET for

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) Under NYSDEC's Part 375 Remedial Programs Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Data Assessment and Application to Site Cleanup Page 3	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	3/28/2023
Water Sample Results Page 3	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below.	NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt).Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.	3/28/2023
Soil Sample Results Page 3	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values:	NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:	3/28/2023
Protection of Groundwater Page 3	PFOA (ppb) 1.1 PFOS (ppb) 3.7	PFOA (ppb) 0.8 PFOS (ppb) 1.0	3/28/2023

Citation and Page Number	Current Text	Corrected Text	Date
Footnote 2 Page 3	The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	3/28/2023
Testing for Imported Soil Page 4	If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.	If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.	3/28/2023
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…) If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Soil Sample Results, page 10	"The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase."	"Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. " [Interim SCO Table] "PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP. As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. "	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Testing for Imported Soil Page 11	Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs. If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable. PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil…	In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil…	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021
Water Sample Results Page 9	"In addition, further assessment of water may be warranted if either of the following screening levels are met: a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L"	Deleted	6/15/2021

Citation and Page Number	Current Text	Corrected Text	Date
Routine Analysis, Page XX	Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids).	Deleted	5/31/2022
Analysis and Reporting, Page XX	As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.	Deleted	5/31/2022
Routine Analysis, Page XX	LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.	EPA Method 1633 is the procedure to use for environmental samples.	
Soil Sample Results, Page XX	Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6	
Appendix A	"Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1"	"Include in the text ….EPA Method 1633"	
Appendix A	"Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101"	Deleted	
Appendix B	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	

Citation and Page Number	Current Text	Corrected Text	Date
Appendix C	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix D	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix G		Updated to include all forty PFAS analytes in EPA Method 533	
Appendix H		Deleted	
Appendix I	Appendix I	Appendix H	
Appendix H	"These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report."	"These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER)."	
Appendix H	"The holding time is 14 days…"	"The holding time is 28 days…"	
Appendix H, Initial Calibration	"The initial calibration should contain a minimum of five standards for linear fit…"	"The initial calibration should contain a minimum of six standards for linear fit…"	
Appendix H, Initial Calibration	Linear fit calibration curves should have an R^2 value greater than 0.990.	Deleted	
Appendix H, Initial Calibration Verification	Initial Calibration Verification Section	Deleted	
Appendix H	secondary Ion Monitoring Section	Deleted	
Appendix H	Branched and Linear Isomers Section	Deleted	

Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis, reporting, and assessment of PFAS, DER has developed this document which summarizes currently accepted procedures and updates previous DER technical guidance pertaining to PFAS.

Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments, or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

Analysis and Reporting

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third-party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix G) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay).

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

Data Assessment and Application to Site Cleanup

Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	0.8	1.0

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

[2] The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP certified lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an "Analytical Methods/Quality Assurance Summary Table" specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
-
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix D - Sampling Protocols for PFAS in Surface Water

General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., washroom sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled "General Fish Handling Procedures for Contaminant Analysis" (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

Purpose: This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

Organization: Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

Version: 8

Previous Version Date: 21 March 2018

Summary of Changes to this Version: Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

Quality Assurance Officer and Approval Date: Jesse Becker, 26 April 2019

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

   1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

   2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

   3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

   1. Project and Site Name.

   2. DEC Region.

   3. All personnel (and affiliation) involved in the collection.

   4. Method of collection (gill net, hook and line, etc.)

   5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

   1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

   2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

   3. Date collected.

   4. Sample location (waterway and nearest prominent identifiable landmark).

   5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with

the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

No materials containing Teflon.
No Post-it notes.
No ice packs; only water ice or dry ice.
Any gloves worn must be powder free nitrile.
No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
Wash hands after handling any food containers or packages as these may contain PFCs.
Keep pre-wrapped food containers and wrappers isolated from fish handling.
Wear clothing washed at least six times since purchase.
Wear clothing washed without fabric softener.
Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

Sampling Method: □Electrofishing □Gill netting □Trap netting □Trawling □Seining □Angling □Other _____

Preservation Method: □Freezing □Other _____ Notes (SWFDB survey number): _____

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, _____, of _____ collected the
(Print Name) (Print Business Address)

following on _____, 20____ from _____
(Date) (Water Body)

in the vicinity of _____
(Landmark, Village, Road, etc.)

Town of _____, in _____ County.

Item(s) _____

_____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on _____, 20_____.

_____ _____
Signature Date

I, _____, received the above mentioned sample(s) on the date specified and assigned identification number(s) _____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_____ _____
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2

Group	Chemical Name	Abbreviation	CAS Number
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

ATTACHMENT B

Mark Hutson, P.G.

Senior Project Manager

Summary of Experience

Mark Hutson is a New York State professional geologist with extensive experience in environmental consulting. His expertise includes hazardous material assessments, environmental due diligence (Phase I and Phase II ESAs), site characterization, sub-surface investigations, soil and ground water remediation, remedial design and implementation, data management and interpretation, regulatory compliance and reporting, stakeholder management, cost to incident closure estimates and insurance claim investigations. He has considerable leadership and supervisory experience. Mark has worked on environmental projects in New York, New Jersey, Connecticut, Arizona, California, and Nevada.

Education

B.I.S., Geological Sciences and Applied Biological Sciences,
Arizona State University, 2006

Licenses & Registrations

Professional Geologist – NYS #00190-1

Areas of Specialization

- Site Investigation and Remediation
- Brownfield Redevelopment
- Environmental Due Diligence
- Hazardous Materials Assessments

Relevant Project Experience

NYSDEC Brownfield Cleanup Program, Former Chemical Factory, Queens, New York. Served as project manager for three separate NYSDEC Brownfield Cleanup Program sites associated with the redevelopment of a 3-acre parcel. Responsibilities included direct oversight and management of day-to-day field activities, implementation and execution of the remedial program, coordination with construction mangers, remedial contractors and several local and state agencies including NYSDEC, NYCOER, NYSDOH, and NYCTA. Remediation included the removal of over 115,000 tons of impacted soil, In-situ Soil Stabilization, NAPL recovery, collection of over 400 soil samples. Mr. Hutson's authority included directing all field efforts and acted as the primary contact for the project. Additional responsibilities included the coordination and preparation of all final reports including SMPs and FERs. Certificates of Completion (COCs) were received for all three sites in August and September of 2016.

NYSDEC Brownfield Cleanup Program, Former Industrial Site, Queens, New York. Served as project manager and primary point of contact for a NYSDEC Brownfield Cleanup Program site with high levels of chlorinated solvents and dense non-aqueous phase liquids (DNAPL) under an active commercial-use building. Responsibilities included direct oversight of all field activities, implementation and execution of the Remedial Action Work Plan, direct interface with client, environmental counsel and third-party stakeholders. Remediation included implementation of an electrical resistance heating (ERH) system and application of enhanced biological remediation. Responsible for the preparation of all final reports including the SMP and FER.

NYSDEC Spills Program, Redevelopment Site, Long Island City New York. Oversaw the preparation and development of a Phase I ESA which led to a Phase II investigation and recording of a NYSDEC Spill at a former taxicab depot and garage. Developed the Phase II work plan to delineate the nature and extent of contamination. Prepared the Remedial Action Work Plan to treat onsite contamination of petroleum hydrocarbon and metals contamination in both soil and groundwater. Developed and assisted with the design of engineering controls to protect the public and the environment from contact with residual contamination.

NYSDEC Inactive Hazardous Waste Site, Maspeth, New York. Served as project manager and primary point of contact for an inactive hazardous waste site regulated by the NYSDEC State Superfund Program. Assisted in the design and oversaw the

Mark Hutson, P.G.
Senior Project Manager

implementation of remedial measures including the installation and operation of a soil vapor extraction system to treat chlorinated solvent contamination in the vadose zone. Remediation is ongoing at this time.

NYCOER E-Designation Sites, New York, New York (Multiple Sites). Served as project manager for mulitple sites regulated under the NYC Office of Environemtal Remediation (OER) E-Designation Program in various lifecycle stages from initial investigation to Site Management. Managed and oversaw various scopes of work including PhaseI/Phase II Environmetal Site Assessments, Remedial Action Work Plan preparation and implementaion, report preparation and ongoing site management of engineering and institutional controls.

Phase I Environmental Site Assessments (Multiple Sites). Oversaw the preparation of numerous ASTM compliant Phase I Environmental Site Assessments including due diligence evaluations for private developers on sites ranging in size from residential properties to large warehouses and former manufacturing facilities.

Phase II Environmental Site Assessments/Remedial Investigations (Multiple Sites). Performed and managed numerous ASTM compliant Phase II Environmental Site Assessments and Remedial Investigations for due diligence purposes and under various regulatory programs including NYSDEC Brownfield Cleanup Program, NYSDEC Voluntary Cleanup Program, NYSDEC Spills, NYCOER E-Designation Program and others. The investigations included the sampling, analysis and reporting of soil, groundwater and soil vapor to assess potential contamination and develop conceptual site models prior to remediation.

Inwood Rezoning, Manhattan, New York. Assessed presence of hazardous materials in soil and groundwater at projected and potential development sites identified in the Inwood Rezoning proposal over a 27-block area of Inwood neighborhoods in the Manhattan Borough of New York City. Composed the hazardous materials chapter of the Environmental Impact Statement and coordinated with NYC Economic Development Corporation to address revisions and comments.

Port Richmond Brownfield Opportunity Area Study, Staten Island, New York. Developed an inventory of and analysis of known and potential Brownfield Sites within the project boundaries. Prepared an environmental assessment including a review of past site use and potential for environmental impact for six strategic sites proposed for potential redevelopment. Assisted in the preparation of the Nomination Document pursuant to NYS Department of State (NYSDOS) guidelines and coordinated with NYSDOS to address revisions and comments.

Penn Station Access Project, New York City Metro Area. Evaluated the potential of hazardous materials in soil and/or groundwater throughout the proposed construction corridor for the Penn Station Access Project (approximately 15 miles) through a comprehensive review of historical property information as well as conducting site reconnaissance for properties of concern. Oversaw the preparation of the Hazardous Materials chapter included in the final Environmental Assessment Statement prepare for the Metropolitan Transit Authority.

Former Retail Petroleum Facility Redevelopment, Brooklyn, New York. Served as project manager for the remediation and redevelopment of a former retail petroleum facility with a open NYSDEC spill number. Remediation of the underlying soil and groundwater occurred simultaneously with the construction of a 12-story multi-use building. Remediation included the excavation of contaminated soil to 15 feet bgs followed by In Situ Chemical Oxidation of residual soil and ground water impacts. Project required interface with and coordination of numerous stakeholders and regulatory agencies including the NYSDEC, NYCOER, NYCDEP, NYCTA and NYCDOB.

Soil Vapor Intrusion Investigation, Brooklyn, New York. Served as project manager for a large soil vapor intrusion investigation of a former retail petroleum facility now a PETCO retail store. Responsible for the development and execution of a sampling plan in compliance with NYSDOH/EPA guidelines which included the installation of numerous subsurface soil vapor sampling points and indoor/outdoor sampling of ambient air conditions to determine potential exposure scenarios.

Retail Petroleum/Bulk Storage Facilities Portfolio, New York (Multiple Sites). Served as project manager for numerous active and former retail petroleum facilities in varying lifecycle stages including site characterization, remedial design and implementation, and closure for a major petroleum client. Responsibilities included site characterization, scope development, remedial design and

Mark Hutson, P.G.

Senior Project Manager

implementation, data management and interpretation, UST/AST removal, budget forecasting and management, regulatory compliance and reporting, and management of project teams and subcontractors.

Insurance Claim Investigation and Support, New York/New Jersey. Served as the regional lead and project manager for an international insurance company acting as environmental expert to assist the insurer in claim determinations. Responsibilities included claim investigation and technical support on projects associated with petroleum and industrial chemical releases, remediation, and UST removals in New York and New Jersey. Responsible for developing cost to incident closure estimates, determining what is reasonable and necessary regarding an insured's response to a claim, preparation of claim recommendations and reports including reviewing insured's invoices and invoice tracking.

Commingled Plume Investigation/Remediation, Blythe, California. Acted as field geologist/environmental scientist for a public municipality client responsible for a commingled gasoline/diesel plume emanating from multiple sources. Responsibilities included plume characterization, site investigation, remedial design, implementation and operation, permitting, data collection and analysis, and waste management. Oversaw the installation of five multi-phase extraction (MPE) systems and was responsible for the operation, maintenance and optimization of the MPE systems operating simultaneously.

Various Environmental Sites, Arizona, California, Nevada. Served as lead environmental scientist/field geologist for numerous environmental remediation sites throughout Arizona, Southern California and Nevada. Responsibilities included site characterization, sub-surface investigations, sampling of environmental media, data analysis and interpretation report preparation, and oversight of remedial contractors.

Certifications/Training

- OSHA 40-HAZWOPER Training
- OSHA 8-Hour Supervisor Training
- OSHA 10-Hour Construction Safety
- NYCOER Gold Certified Professional
- LIRR Roadway Worker Protection Training (2019)
- DOT Hazardous Waste Manifest Training (2019)

Jackson Bogach, E.I.T.

Assistant Project Manager

Summary of Experience

Mr. Bogach has experience working on a variety of environmental site investigation and remediation projects, including Phase I and Phase II ESA's, substation decommissioning, Brownfields redevelopment, UST and AST sites, and soil and groundwater monitoring. His experience on construction sites includes contaminated soil monitoring and truck manifesting. He also has experience in soil sampling, groundwater sampling, surface water sampling, soil-vapor intrusion sampling, hazardous metals sampling, wastewater permit renewals, and logging soil data for test borings. Further technical skills include ArcGIS, hydraulic modeling, hydrological modeling, large data analysis, and drafting reports.

Relevant Project Experience

Assistant Project Manager, 14th Street ADA Complex – MTA Contract A-37129, New York, New York. GZA was retained as the Environmental Manager for the ADA upgrades along the 14th Street Subway Line in New York, New York. The role of Environmental Manager is to oversee all activities in the environmental specifications in the Project Requirements and Design Criteria for the General Contractor. Citnalta-Forte Joint Venture is the General Contractor for the project. Mr. Bogach's role included drafting plans such as a Waste Management Plan, Stormwater Pollution Prevention Plan, and Environmental Management Plan. Mr. Bogach drafted bi-weekly and monthly reports related to all environmental activities, tracked waste management for the project, performed National Environmental Policy Act Re-Evaluations, and completed NYCDEP sewer discharge permits.

Assistant Project Manager, 101 East 150th Street, Bronx, New York. 101 East 150th Street is a large former commercial/industrial lot in the Bronx that is being redeveloped into a 6-story charter school by the client. Elevated levels of chlorinated and petroleum-related VOCs in soil and soil vapor were found during Phase II ESI sampling. The Site is anticipated to enter the State Brownfield Cleanup Program as a volunteer. Mr. Bogach performed Remedial Investigation sampling at the Site. He also drafted the BCP application and its exhibits, the Remedial Investigation Report, Remedial Action Work Plan, Interim Remedial Measure Plan, and the Waste Characterization Report.

Assistant Project Manager, Grand Central Terminal Upgrades – MTA Contract A-37679, New York, New York. GZA was retained as the Environmental Manager for the Grand Central Terminal Upgrades in New York, New York. The role of Environmental Manager is to oversee all activities in the environmental specifications in the Project Requirements and Design Criteria for the General Contractor. Citnalta-Forte Joint Venture is the General Contractor for the project. Mr. Bogach's role included drafting plans such as a Spill Prevention and Response Plan, Waste Management Plan, and environmental specifications. Mr. Bogach drafted bi-weekly and monthly reports related to all environmental activities and tracked waste management for the project.

Assistant Project Manager, 807 Metropolitan Avenue, Brooklyn, New York. 807 Metropolitan Avenue is an auto repair shop in Brooklyn, NY. GZA's client was required by the NYSDEC to perform an environmental exploration at the Site. The site is located within 200 feet of an existing subway structure, which requires approval by NYC MTA to drill borings at the Site. Mr. Bogach managed this project which included

Education

M.S., Environmental Engineering, University of Tennessee, 2019
B.S., Civil Engineering, University of Tennessee, 2018

Licenses & Registrations

Engineer-in-Training (Civil), 2018 Tennessee, #1960663
OSHA 30-hr Construction – 2020
OSHA 10-hr Construction – 2020
USDOT/IATA Hazardous Materials Shipping and Transportation – 2020
NYS DEC Erosion & Sediment Control Qualified Inspector – 2020
OSHA 40-hr HAZWOPER – 2016

Areas of Specialization

- Environmental Engineering
- Water Resources Engineering
- Environmental Site Investigation
- Geographic Information Systems (GIS)
- AutoCAD

Jackson Bogach, E.I.T.

Assistant Project Manager

coordinating with the client and managing the budget. Mr. Bogach also drafted the MTA Adjacency drawings and coordinated with the MTA.

Assistant Project Manager, 68th Street Hunter College Station Elevator Installation – MTA Contract A-36164, New York, New York. 68th Street Hunter College Station is undergoing ADA-upgrade elevator installation. GZA was retained to complete an Environmental Anticipatory Boring Program to characterize site soils and groundwater. Mr. Bogach drafted the Environmental Anticipatory Boring Program Plan and performed soil sampling at the Site.

Assistant Project Manager, Kearny Train Yard, Kearny, New Jersey. GZA has an on-going contract to perform environmental and geotechnical engineering services for the Client at the Kearny, New Jersey Train yard. The client is exploring the installation of two manholes at the Site. GZA oversaw the installation of two permanent monitoring wells to analyze the hydraulic properties of the shallow groundwater. Mr. Bogach performed hydraulic calculations using slug test data and drafted the hydraulic properties report.

Engineer I, 187 Hegeman Avenue, Brooklyn, New York. 187 Hegeman Avenue is a proposed residential building in Brooklyn, New York. GZA was retained to perform the City Environmental Quality Review (CEQR) through the New York City Office of Environmental Coordination for the proposed construction. Mr. Bogach prepared the CEQR report and associated figures.

Engineer I, 586 River Avenue, Bronx, New York. 586 River Avenue is a large commercial property in the Bronx, New York undergoing site due diligence for property acquisition. Mr. Bogach performed soil, soil vapor, and groundwater sampling during the Phase II Environmental Site Investigation. He also created boring logs using gINT, drafted site figures for the Report using AutoCAD, analyzed the analytical data, and drafted the Phase II Environmental Site Investigation Report.

Engineer I, 601 Wales Avenue, Bronx, New York. 601 Wales Avenue is a commercial property in the Bronx, New York that contains a historical, unregistered UST. Mr. Bogach oversaw the closing-in-place of the UST and prepared the UST Closure Report.

Engineer I, 590 Wales Avenue, Bronx, New York. 590 Wales Avenue is a commercial property in the Bronx, New York going through potential sale and acquisition. Mr. Bogach assisted with Phase I Environmental Site Investigation reconnaissance, Phase II Environmental Site Investigation soil and soil vapor sampling, drafting the Phase I and II Environmental Site Investigation Reports, and drafting site figures using AutoCAD.

Engineer I, NYC DEP SPCC Plans, Various Locations, New York. Mr. Bogach has written multiple Spill Prevention, Control, and Countermeasure (SPCC) plans for Wastewater Treatment and Combined Sewer Overflow Facilities in New York. He conducted site investigations, drafted the SPCC plans, and create facility diagrams using AutoCAD.

Engineer I, 153-02 Hillside Avenue, Jamaica, New York. GZA was retained to perform an environmental site investigation for a commercial development along Hillside Avenue in Jamaica, New York. Mr. Bogach prepared New York City Transit drawings to be granted approval by the MTA to drill near a subway structure.

Engineer I, NYCHA – Jacob Riis Houses, Manhattan, New York. The Jacob Riis Houses are a New York City Housing Authority property undergoing capital improvements under the Hurricane Sandy Capital Improvement Program and is a former Manufactured Gas Plant Site. GZA was retained as the Qualified Environmental Professional for the project. Mr. Bogach had multiple roles for this project. He conducted waste characterization soil sampling of MGP waste, Underground Storage Tank endpoint sampling, drilling oversight, and Community Air Monitoring Plan oversight. He also drafted workplans, health and safety plans, and waste characterization reports for various phases of the project.

Engineer I, NYPD Modular Buildings – Rodman's Neck, Bronx, New York. The NYPD is constructing new modular buildings at their Rodman's Neck outdoor firing range. GZA was retained to conduct a waste characterization of the soil that will be excavated and hauled off-Site. Mr. Bogach was the field engineer during the waste characterization sampling event. This included overseeing test boring drilling, logging soil data, and soil sampling. He also analyzed the soil data and drafted the waste characterization report.

Jackson Bogach, E.I.T.

Assistant Project Manager

Engineer I, 910 E 172nd St, Bronx, New York. 910 E 172nd St is a petroleum contaminated Site in a largely residential area in Bronx, NY. Mr. Bogach conducted quarterly groundwater sampling using low-flow sampling techniques. He also installed and sampled from passive diffusion sampler bags in groundwater wells injected with Petrofix® for petroleum remediation. Mr. Bogach also gauged wells for groundwater depth and presence of LNAPL, and then created groundwater contour maps using ArcGIS and AutoCAD.

Engineer I, BJs Fuel Station, Newburgh, New York. BJs is a fuel station and commercial construction project in Newburgh, New York. Mr. Bogach performed a baseline environmental assessment prior to petroleum products being shipped to and stored on-site. The assessment included test boring drilling oversight, classifying soil, soil sampling, and groundwater sampling from temporary monitoring wells.

Engineer I, Fulton MGP, Brooklyn, New York. Mr. Bogach performed DNAPL recovery and air monitoring during site construction at a former manufactured gas plant located near the Gowanus Canal in Brooklyn, New York. Daily oversight included ensuring construction followed the site-specific Community Air Monitoring Plan.

Engineer I, 28 Windrose, Greenwich, Connecticut. 28 Windrose is a residential construction project on the Long Island Sound in Greenwich, Connecticut. Mr. Bogach oversaw the drilling of helical piles for the house's foundation, which included recording the appropriate data and ensuring the piles met all design requirements. He also was responsible for logging soil data of test borings during subsurface exploration.

Engineer I, 50 Nevins St, Brooklyn, New York. 50 Nevins St is an apartment building redevelopment project in the Boerum Hill section of Brooklyn, NY. The Site has an E-Designation under the New York City Office of Environmental Remediation. Mr. Bogach performed daily field monitoring of air under the Community Air Monitoring Plan and of potentially contaminated soil, including overseeing the haul-off of excavated soil. At the base of excavation, he took grab endpoint soil samples at various locations across the Site. He drafted daily field reports to send to the Office of Environmental Remediation. Mr. Bogach also created figures representing sample locations and construction drawings using AutoCAD and analyzed the end-point sampling data.

Engineer I, 512 W 143rd St, Manhattan New York. 512 W 143rd St is a residential construction project in Manhattan, NY. Contaminated soil was found during remedial investigation. Mr. Bogach monitored the soil during construction progress. He also oversaw the haul-off of excavated soil and drafted daily field reports.

Engineer I, 5011 Queens Blvd, Sunnyside, New York. At 5011 Queens Blvd, Mr. Bogach conducted monthly inspections at a construction site for a residential apartment building. The site is E-Designated by the New York City Office of Environmental Remediation. Monthly inspection included confirming construction was following E-Designation compliance.

Engineer I, 1232 Southern Blvd, Bronx, New York. 1232 Southern Blvd is an existing building that had experienced sub-slab water infiltration issues. Mr. Bogach assisted with hydraulic and hydrological calculations for the water infiltration source investigation.

Engineer I, 775 Washington St, Manhattan, New York. 775 Washington St. is a construction site located in Manhattan, New York. The site required a dewatering permit due to the shallow groundwater table at the site. Mr. Bogach performed groundwater sampling using low-flow sampling techniques to determine water quality that will be discharged during dewatering.

Engineer I, Elmwood Preserve, White Plains, New York. The Elmwood Preserve site is a former country club and golf course in White Plains, New York. The land is expected to be used as a future site for residential townhomes. Previous maintenance of the site included using heavy amounts of pesticides and fertilizers. In preparation of an Environmental Impact Statement, Mr. Bogach assisted with soil sampling using hand auger techniques at various locations within the site. He also revised the site Health and Safety Plan.

Experience Prior to GZA

Graduate Research Assistant, University of Tennessee, Knoxville, Tennessee. In this role, Mr. Bogach conducted preliminary design and assessment for an urban stream restoration project on Beaver Creek in Powell, Tennessee in conjunction with the

Jackson Bogach, E.I.T.

Assistant Project Manager

Tennessee Department of Transportation. He was tasked with topographically surveying the site, assessing the site using the Rosgen Method of stream classification, preparing an ecological inventory and assessment, creating a 1D hydraulic model using HEC-RAS and a 2D hydraulic model using River 2D, modeling the increase of flow rates due to the projected increase of impervious land in the area, delineating the watershed using ArcGIS, preliminary design, and drafting the preliminary design report. Mr. Bogach also managed the class that assisted on the project by overseeing other tasks and acting as a liaison to the managing professor.

Graduate Teaching Assistant, University of Tennessee, Knoxville, Tennessee. As a graduate teaching assistant, Mr. Bogach taught the lab section of the freshman Engineering Fundamentals course at the University of Tennessee for six classes a week. He also was responsible for tutoring students, grading papers and lab reports, and communicating class updates on a daily basis.

Staff Technician, Anchor QEA of North Carolina, Asheville, North Carolina. Mr. Bogach provided support for a variety of projects in the company's environmental site assessment and remediation service line. Tasks included groundwater sampling and data analysis for a Superfund site, hazardous metals sampling at a decommissioned power plant, monitoring soil haul-off and truck manifesting at a coal ash plant, predicting groundwater flow directions in ArcGIS, quantifying soil volume in a lake for a dam removal project, well construction oversight, and drafting numerous reports.

Co-op Student, Anchor QEA of North Carolina, Asheville, North Carolina. As a Co-op Student, Mr. Bogach assisted with projects in the company's environmental site assessment and remediation service line. His role included creating maps in ArcGIS, conducting Phase I and Phase II ESA's, soil sampling, groundwater sampling, soil-vapor intrusion sampling, data analysis, quality control, drafting monitoring reports, and creating boring logs using gINT.

Matt DiLorenzo

Staff Scientist I

Summary of Experience

Mr. DiLorenzo is a Staff Scientist I who has experience in environmental projects including Phase I Environmental Site Assessments, Phase II Investigations and sampling soil, groundwater, lead in drinking water, asbestos, mold, VOCs, and other general air quality parameters. These assessments and investigations were conducted for commercial, industrial, and residential properties within the 5 boroughs of New York City and throughout New Jersey. Mr. DiLorenzo has experience writing daily status reports, field reports, remedial Scopes of Work, and analyzing and tabulating environmental sampling data.

Relevant Project Experience

Scientist I, LiRo NYCHA Jacob Riis Houses, New York, New York. The Jacob Riis Houses are a New York City Housing Authority property undergoing capital improvements under the Hurricane Sandy Capital Improvement Program and is a former Manufactured Gas Plant Site. GZA was retained as the Qualified Environmental Professional for the project. Mr. DiLorenzo's responsibilities on this project were to monitor dust and VOC levels in the air using CAMP equipment, sign truck manifests as an agent of NYCHA, oversee construction, excavation, and the installation of the stormwater retention system.

Scientist I, MTA 68th Street College Station, New York, New York The NYC MTA retained GZA for pre-excavation environmental reconnaissance and sampling. Mr. DiLorenzo performed discrete and composite soil sampling, monitoring well gauging low flow groundwater sampling, submitting samples for laboratory analysis and tabulated laboratory results.

Scientist I, MTA 14th Street Complex, New York, New, York. The NYC MTA retained GZA for pre-excavation environmental reconnaissance and sampling Mr. DiLorenzo performed monitoring well gauging, low flow sampling and groundwater collection for the 4 monitoring wells located on Site. Mr. DiLorenzo also performed inspections, water depth gauging and low flow sampling inside the 4 manhole rooms located on the platform of the 123-subway line.

Scientist I, Columbia University Prentis Hall, New York, New York GZA was retained by Columbia University to provide oversight of a fuel tank and other contaminated material removal from the basement and sub-basement of Prentis Hall, a building owned by the university. Mr. DiLorenzo oversaw material removal and truck manifesting while on site.

Scientist I, 30-55 Vernon Boulevard E-Designation Services, New York, New York. Mr. DiLorenzo's responsibilities included preparing a HASP for this project and tabulating groundwater, soil and VOC laboratory results.

Scientist I, South Fork Onshore Phase I, East Hampton, New York Mr. DiLorenzo responsibilities on this project were to perform monitoring well gauging, low flow sampling, groundwater collection and submit samples for laboratory analysis.

Education

B.S., Environmental Science, Ithaca College, 2018

Licenses & Registrations

- 40-Hour OSHA HAZWOPER
- US DOT/IATA Training for the Shipping and Transportation of Hazardous Materials
- OSHA 10-Hour Construction
- OSHA 30-Hour Construction
- New York State Asbestos Inspector
- MTA NYC Transit Track Safety Certification
- NYC Site Safety Training

Areas of Specialization

- Environmental Site Remediation
- Environmental Site Investigations
- Low Flow Groundwater Sampling
- CAMP Monitoring
- Excavation and Construction Oversight
- Asbestos Surveying and Sampling
- AHERA Inspections

Matt DiLorenzo

Staff Scientist I

Environmental Scientist, BASF Corporation, Iselin, New Jersey. Mr. DiLorenzo's responsibilities included bulk sampling of window caulking throughout the facility prior to major building renovations. Due to positive asbestos findings in the window caulking Mr. DiLorenzo provided oversight during window caulking abatement and post-abatement asbestos clearance air sampling throughout the facility.

Environmental Scientist, West Orange Municipal Building, West Orange, New Jersey. Mr. DiLorenzo's responsibilities were to collect air samples for VOC's, formaldehyde, particulate, and carbon monoxide to determine if the West Orange Municipal Building was compliant with the WELL building standard. Mr. DiLorenzo tabulated all direct reading measurements and laboratory results.

Environmental Scientist, Quest Diagnostics Laboratory, Clifton, New Jersey. Mr. DiLorenzo's responsibilities were to provide formaldehyde and VOC exposure monitoring for employees at this facility. Mr. DiLorenzo tabulated all laboratory results and provided a full monitoring report to the client.

Environmental Scientist, The Learning Experience, Middletown, New Jersey. Mr. DiLorenzo's responsibilities were to provide a full IEHA survey of this childcare center. Based on potential hazards the site, Mr. DiLorenzo collected air samples using SUMA canisters to confirm the air quality inside the childcare center was acceptable. Mr. DiLorenzo then completed all necessary IEHA documents and submitted to the NJDEH.

Environmental Scientist, Heritage Woods Condominium Association, Old Bridge, New Jersey. Mr. DiLorenzo's responsibilities were to provide interior and exterior remedial oversight and post remediation sampling on condominium units impacted by water intrusion and mold growth. Mr. DiLorenzo tabulated all laboratory results and provided a unit specific remedial Scope of Work for each condominium unit.

Chunhua Liu, PhD

Senior Technical Specialist

Summary of Experience

Dr. Liu is a senior chemist with more than 10 years of experience in analytical chemistry, data validation and management, and quality control and quality assurance for remedial investigations and remedial actions. Her experience includes laboratory chemical analysis, EPA Region I and Region II data validation and data usability evaluation, data usability evaluation for Massachusetts Contingency Plan (MCP), sampling and analysis plan development in accordance with the NYSDEC Analytical Service Protocol and Massachusetts Compendium of Quality Assurance and Quality Control Requirements (QA/QC) and Performance Standards for Selected Analytical Methods, and quality control and quality assurance for Superfund and MCP projects.

Dr. Liu majored in environmental chemistry and during her doctoral study at Harvard School of Public Health, she researched analytical methods for sediment and evaluated metal fate and transport in sediment. Dr. Liu worked at Parsons for over seven years and at Gradient for one year before joining GZA. At Parsons, Dr. Liu led the quality control and assurance and data management efforts from developing Quality Assurance Project Plan (QAPP) to assuring implementation of QA/QC requirements and from field sampling preparation and arrangement to chemical data management. Dr. Liu was responsible for the QA/QC and data validation and data usability evaluation for a 10,000-acre BRAC and Superfund NPL site in New York and assisted in the successful transfer of over 8,000 acres of land. Dr. Liu performed data usability evaluation for various Massachusetts Contingency Plan sites at Gradient and GZA.

Education

B.E., 1992, Environmental Engineering, Tsinghua University, Beijing, China
M.E., 1995, Environmental Engineering, Tsinghua University, Beijing, China
M.S., 1998, Environmental Health, Harvard School of Public Health
D.S., 2000, Environmental Chemistry, Harvard School of Public Health

Areas of Specialization

- Human Health Risk Assessment
- Ecological Risk Assessment
- Data Usability Evaluation
- Project Quality Control and Assurance
- Fate and Transport Modeling

Relevant Project Experience

Senior Technical Specialist. Leads GZA human health risk assessment efforts for federal and state level superfund and MCP projects. Dr. Liu is also responsible for data usability evaluation for various projects.

Technical Director. Directed preparation and submittal of the Site-Wide Sampling and Analysis Plan (SAP) and the Site-Wide Quality Assurance Project Plan (QAPP) for a 10,000-acre Superfund site in New York in accordance with the Department of Defense (DOD), NYSDEC ASP, EPA Region II and EPA guidance. Directed project field sampling and data management. Supervised data validation in accordance with EPA Region II SOPs and NYSDEC ASP based on the NYSDEC ASP Category B deliverables. Identified laboratories qualified for project chemical analyses and interfaced with various analytical laboratories to address analytical deficiencies. Submitted data summary report to EPA Region II on a quarterly basis.

Lead Chemist and Risk Assessor. Led data usability evaluation and supported the successful closure of a 125-acre Hingham Annex Guaranteed Fixed Price Remediation Project. Dr. Liu also led the risk assessment effort and the effort of evaluating pesticide fate and transport at the site and successfully demonstrated that the pesticide conditions at the site were related to the past normal use of pesticides and therefore were not associated with the release at the Site.

Technical Director. Directed preparation and submittal of the SAP and the QAPP for various Formerly Used Defense (FUD) Sites. Supervised field sampling and data

Chunhua Liu, PhD
Senior Technical Specialist

validation in accordance with guidance from various EPA regions. Reviewed data validation and data usability report.

Technical Director. Directed data validation for various Superfund sites in EPA Region I and Region II in accordance with the EPA regional and state SOPs and the EPA Functional Guidelines. Led data validation for numerous MCP sites for various analytical analyses including metal, VOC, SVOC, pesticide, PCB, EPH, VPH, and TPH analyses.

Project Chemist. Evaluated different analytical methods for hexavalent chromium analysis. Compared analytical methods developed by NJDEP and EPA and identified the appropriate method for a CERCLA site in New Jersey.

Project Chemist. Evaluated quantitatively potential impacts to metal data usability by interference caused by common metals in environmental samples for a CERCLA site in New York.

Project Chemist. Performed data validation for indoor air samples for various CERCLA and MCP Sites to assist evaluation of potential vapor intrusion pathway.

Project Chemist. Performed Level IV data validation for a Superfund site in New York for various analytical analyses including metal, VOC, SVOC, pesticide, and PCB analyses. Reviewed TIC identification and quantitation and assessed chromatograms and mass spectrums for VOCs and SVOCs.

Project Chemist. Provided technical support, prepared QAPPs, established proper data quality objectives (DQOs) for various projects, maintained project quality control, trained junior scientists, coordinated project field sampling and laboratory analyses, addressed non-conformance issues associated with the data produced by the laboratory, conducted statistical analysis, and prepared data validation reports on numerous RCRA/CERCLA and MCP projects.

ENVIRONMENTAL ASSESSMENT AND REMEDIATION PROJECTS

(Former Malden MGP) Senior Scientist - Lead Risk Assessor, Chemist, Site Assessment, Malden, Massachusetts. Leading ongoing risk assessment work at large, complex former MGP that encompasses more than 16 acres of land and more than 10 different properties. Work has included vapor intrusion pathway evaluation, imminent hazard evaluation, substantial hazard evaluation, data usability evaluation, and risk characterizations for evaluation of effectiveness of sub-slab depressurization systems and remediation, direction of Site remediation and investigations, and verification of the need for AULs. GZA was able to demonstrate that indoor air impacts in a residential area were not related to MGP residuals, allowing for closure of that portion of the Site. Risk characterizations also demonstrated that Site conditions did not pose substantial hazards, confirming the effectiveness of the Temporary Solution.

(Commercial Point LNG Facility) Senior Scientist - Lead Risk Assessor, Site Assessment and Closure, Dorchester Massachusetts. Directed risk characterization to support MCP closure of former MGP facility that was currently being used as a Liquefied Natural Gas (LNG) storage and distribution facility. Performed risk characterization to support supplemental Phase II – IV MCP investigations and Permanent Solution status while allowing for beneficial reuse of the facility for LNG operations and a solar power generating facility. Also performed focused risk characterizations in support of an AUL filing and potential reuse options for portions of the Site.

(Former Haverhill Holder Site) Senior Scientist - Lead Risk Assessor, Site Closure, Haverhill Massachusetts. Directed risk characterization to support MCP closure of former MGP gas holder facility where wastes had been disposed. Conducted risk characterization to facilitate development of cost-effective cleanup plan involving focused soil excavation and use restrictions that allowed for achievement of a Permanent Solution. Performed a Method 3 risk characterization to support the complex supplemental Phase II investigation. This complex site encompassed properties owned by seven different parties, including residential land and portions of a river/tributary system.

(Gloucester Former MGP) Senior Scientist - Lead Risk Assessor, Human Health Risk Assessment, North Shore, Massachusetts. Performed Method 3 Risk Characterization for multiple parcels to support the Supplemental Phase II Comprehensive Site Assessment initiated by other consultants under the Massachusetts Contingency Plan. This Site included MGP impacts to

Chunhua Liu, PhD
Senior Technical Specialist

approximately 45 acres of Gloucester Harbor sediment. GZA evaluated potential human health risks via exposure to soil, groundwater, sediment, surface water, homegrown produce, and consumption of fish. In addition, Risk Characterization was used in the early stages of the project to assist identification of data gaps and Site investigation.

(Salem Power Plant) Project Manager, Cost Recovery Negotiations, Salem, Massachusetts. Working through counsel, provided advice to a prior owner with respect to remedial obligations under the Massachusetts Contingency Plan (MCP) associated with impacts to soil at this power generating facility. Work included review of hot spot evaluation, risk characterization, and remediation performed at the Site. Given the Site use, we concluded that most of the claimed costs that had been incurred by the current owner were not necessary under the MCP and thus should not be subject to recovery from our client.

(Sawyer Passway) Senior Scientist - Lead Risk Assessor, Chemist, MGP Site Closure, Fitchburg, Massachusetts. Performed a Substantial Hazard Evaluation and a Method 3 Risk Characterization to support fast-track Massachusetts Contingency Plan (MCP) Phase II/III study of large, complex former MGP facility on the banks of a major New England river. The work had to be completed within two months to meet a key regulatory deadline. Work included a risk evaluation to support a streamlined supplemental field exploration program, a risk evaluation to direct the focused soil excavation, and a substantial hazard evaluation for the cost-effective temporary solution within the required regulatory deadlines. GZA's continuing work on this project has included technical support for an insurance cost-recovery claim, periodic evaluations of the temporary solution, completion of soil stabilization/solidification pilot studies, implementation of focused remedial programs during site building demolition work and development of remedial, plans directed at achieving a Permanent Solution (PS). Based on updated evaluations, a cost-effective approach to a PS was developed in 2014 and a Method 3 Risk Characterization was performed to support a PSS in 2015.

(Former Army Depot Activity Site), Technical Director, Syracuse, New York. Directed preparation and submittal of the Site-Wide Sampling and Analysis Plan (SAP) and the Site-Wide QAPP for a 10,000-acre Superfund site in New York in accordance with the Department of Defense (DOD), NYSDEC ASP, USEPA Region II and USEPA guidance. Directed project field sampling and data management. Supervised data validation in accordance with USEPA Region II SOPs and NYSDEC ASP based on the NYSDEC ASP Category B deliverables. Identified laboratories qualified for project chemical analyses and interfaced with various analytical laboratories to address analytical deficiencies. Submitted data summary report to USEPA Region II on a quarterly basis.

(Waverley Oaks Road), Senior Scientist - Lead Risk Assessor, Human Health Risk Assessment, Waltham, Massachusetts. This property has been impacted by improper storage of large quantities of waste oil that was to be used to heat on-site green houses, or to be processed and resold. This Site is regulated under the Massachusetts Contingency Plan; Massachusetts Department of Environmental Protection reviewed and approved all work plans and reports for the site investigation and risk assessment; it was downgraded from a Tier 1A to a Tier 1B Site following completion of the Phase II investigations.

Waste oil releases have impacted nearly 10-acres of an on-Site pond, stream and wetland, including 3 acres that have visible oil presented within surficial wetland soil and sediment. GZA conducted a Method 3 Risk Characterization to support the permanent solution of the Site. For the Vapor Intrusion pathway, GZA identified constituents not related to Site release and verified the conclusion based on the evaluation of Site-specific attenuation factors.

Publications and Presentations

Liu, C., J. Jay, T. Ford. Evaluation of Environmental Effects on Metal Transport from Capped Contaminated Sediment under Conditions of Submarine Groundwater Discharge. Env. Sci. Tech. 2001 35: 4549-4555.

Liu, C., J. Jay, R. Ika, S. James, and T. Ford. Capping efficiency for metal-contaminated marine sediment under conditions of groundwater inflow. Env. Sci. Tech. 2001 35: 2334-2340.

Blanchet, R., Liu, C., Bowers, T. Summary of Available Freshwater and Marine Sediment Quality Guidelines and Their Use in North America. Abstract accepted at SEATEC Conference, November, 2001

Blanchet, R., Liu, C., Bowers, T. Estimation of Average Exposure Point Concentrations for Pesticides Assuming Accumulation and Degradation in the Environment. Abstract accepted at SEATEC Conference, November, 2001

Chunhua Liu, PhD

Senior Technical Specialist

Seeley, M.R., Schettler, S., Liu, C., Blanchet, R.J., Bowers, T.S. Assessing Cancer Risks Due to Use of Insecticides to Control the Mosquito-borne West Nile Virus: Use of the Margin of Exposure Approach. Abstract accepted at Society of Toxicology, 41st Annual Meeting, March 17-21, 2002.

Chunhua Liu, Jennifer Jay, Ravi Ika, Shine James, Timothy Ford. Capping Efficiency for Metal-Contaminated Marine Sediment under Conditions of Submarine Groundwater Discharge. Poster presentation at Conference on Dredged Material Management: Options and Environmental Considerations. December 3-6, 2000

Chunhua Liu, Jennifer Jay, Timothy Ford. Evaluation of Environmental Effects on Metal Transport from Capped Contaminated Sediment Under Conditions of Submarine Groundwater Discharge. Poster presentation at Conference on Dredged Material Management: Options and Environmental Considerations. December 3-6, 2000

Chunhua Liu, Jennifer Jay, Timothy Ford. Core analysis: Is it a good indicator of metal release and capping efficiency? Poster presentation at Conference on Dredged Material Management: Options and Environmental Considerations. December 3-6, 2000

Chunhua Liu. 2000. Capping Efficiency for Metal Contaminated Marine Sediment under Conditions of Submarine Groundwater Discharge. Doctoral Thesis. Harvard School of Public Health

Chunhua Liu, Ravi Ika, Tim Ford. 1998. Metal flux in near shore capping sites under conditions of submarine groundwater discharge. In: Fourth Marine & Estuarine Shallow Water Science & Management Conference. March 15-19, 1998

Wei Lin, Guowei Fu, Chunhua Liu. 1996. Study on allocating permissible pollutants discharge based on axioms system. Chin. J. Environ. Sci. 1996 17(3):35-37

Wei Lin, Chunhua Liu, Guowei Fu. 1995. Environmental conflict analysis and its application in environmental planning and management: siting of public facilities. Chin. J. Environ. Sci. 1995 16(6): 36-39

Chunhua Liu, Yongfeng Nie, Wei Lin. 1995. Application prospects of landfill gas utilization technique in China. Pollution Control Technology 1995 8(3): 143-145

Chunhua Liu. 1995. Evaluation of gas production from sanitary landfill. Master's thesis. Tsinghua University, Beijing, P.R.China

Wei Lin, Chunhua Liu. 1994. Rudimentary study on countermeasure to comprehensively control air pollution caused by motor vehicles in China. Pollution Control Technology 1994 7(4): 1-3

Xiurong Zhang, Chunhua Liu, Yanru Yang, Qingzhong Bai. 1993. Environmental impact report of wastewater treatment plant project in Xuanhua City, China.

Chunhua Liu, Yongfeng Nie. 1993. Water balance evaluation in Hongmei hazardous waste landfill. In: Environmental Impact Assessment of Hongmei Hazardous Waste Landfill: 25-33

Chunhua Liu. 1992. Modeling landfill leachate production and migration. Bachelor Thesis. Tsinghua University, Beijing, P.R.China

Chunhua Liu. 1991. A discussion with the author of "clean water extraction from ocean water". Technology of Water Purification 1991(1): 39-41

Affiliations/Memberships

- Member, LSP Association
- Member, Society for Risk Analysis
- Certified EIT in Massachusetts

Christine A. Camardella, P.G., PMP
54 Prentice Road
Levittown, New York 11756
chriscamardella@hotmail.com
516-946-1121

Data Validation/Data Review/ Environmental Consultant

Providing consultation, data validation and data review services. These services include evaluation of analytical data with the objective of determining whether the data presented meets the site/project specific criteria for data quality and data use. Validation and review will be performed in accordance with the NYSDEC DER10 and USEPA 600/8-91/003, EPA 540/R/94/093 & EPA 540/R/94/097, USEPA National Functional Guidelines for Data Validation and EPA Region 2 SOPs for Data Validation.

Over 25 years of experience in both the laboratory and the environmental consulting field, with expertise in chemistry and environmental technology. Working knowledge of state and federal laws, regulations, and guidelines for the environment, water quality, and health including NYSDEC, NYCDEP, OER and NYSDOH. Additional skills are in quality control and quality assurance, data validation, expert technical review, chemical analysis, client communication and service, staff supervision and mentoring, regulatory interface, compliance management, work plan and proposal preparation, soil and groundwater investigation oversight, project scheduling and tracking, and technical editing as well as extensive financial management experience including forecasting and budget management. Manage and train junior staff.

Experience:

Lead Project Manager, Complex Project Management – Gas
National Grid – April 2018 - Present

- Prioritize, plan and coordinate project development activities according to stakeholder requirements.
- Supervise project team on daily basis to execute assigned projects within deadlines and budget.
- Prepare project proposals and develop project plan, schedule, and budget.
- Determine resource requirements and identify resources with the right skills to successfully execute projects.
- Assess potential risks and technical challenges and develop appropriate mitigation plans.
- Perform cash flow analysis and process invoices in a timely fashion.
- Develop cost reduction initiatives while maintaining quality and productivity.
- Analyze and resolve project issues in a timely and accurate manner.
- Provide technical guidance for large-scale projects.

Senior Project Manager
Advanced Site Restoration, LLC – September 2016 - February 2017

- Provided management and support for several retail petroleum clients.
- Prepared Phase I and Phase II Environmental Site Assessments.
- Knowledge in state and federal laws, regulations, and guidelines for the environment, water quality, and health including NYSDEC, NYCDEP, NYC OER and NYSDOH.
- Prepared high-level technical reports including Remedial Action Plans.
- Provided high level technical review of reports.
- Acted as a liaison between client and regulatory agencies.
- Provided data validation and data summary usability reports for clients.
- Managed and train junior staff while providing mentoring and support.
- Prepared proposals for clients.
- Managed several complex projects involving chemistry data QA/QC, asbestos removal, shoring installation, soil excavation, UST removal, and remediation system installation, in-situ bioremediation and soil and groundwater remediation.

Project Manager
Impact Environmental Consulting, Inc. - January 2011 - September 2016

- Managed retail petroleum client portfolios for projects in Nassau, Suffolk, Brooklyn, Queens, Bronx and Westchester.
- Advised clients on most cost-effective remedial strategies to obtain cleanup objectives.
- Expertise in Phase I and Phase II Environmental Site Assessments, remedial systems, in-situ bioremediation, UST removal, excavation, Site redevelopment, and soil and groundwater chemistry.
- Worked closely with regulatory agencies as well as local municipalities.
- Prepared and reviewed technical reports for client and/or regulatory submittal.

Pro Developed budgets and cost estimates.

- Managed and trained junior staff.

Senior Project Manager
Sovereign Consulting, Inc.- February 2009 - August 2010

- Provided project management and support for a multi-million-dollar project for a major retail petroleum company.
- Served as technical support on project with client and other team members, which has resulted in additional assessment work to obtain soil and groundwater characteristics in area of major plume.
- Managed quarterly sampling activities for an extensive groundwater monitoring well network including staffing, equipment, regulatory coordination and permits.
- Provided additional project management support for several retail petroleum projects in Brooklyn, Queens, and Nassau & Suffolk Counties.
- Maintained excellent client relationship and adhere to client expectations.
- Prepared and review technical reports for the client and regulatory agency.
- Documented cost savings of over $500,000 resulting in an award from the client.

Senior Project Manager
Kleinfelder, Inc. - January 2004 - February 2009

- Provided project management for a multi-million-dollar portfolio in Kings County for a major retail petroleum company.
- Supervised a staff of 5 professionals and provide mentorship and guidance.
- Communicated with regulatory agencies and maintain a working relationship with key regulators.
- Provided financial management and support.
- Assisted in providing technical guidance for large-scale projects, including reviewing and recommending new technologies.
- Provided management and support for several complex projects involving asbestos removal, shoring install, excavation, UST removal, and remediation system install and groundwater and soil remediation.
- Adhered to all company and client health and safety programs.

Project Environmental Scientist
Groundwater & Environmental Services, Inc.- December 2001 - December 2003

- Provided project management support activities including client involvement, work plan and proposal preparation, project scheduling and tracking, budget evaluation and analysis, and technical editing and report finalization.
- Developed and implemented Site work plans and proposals.
- Communicated with regulatory agencies.
- Performed oversight of soil and groundwater investigations.
- Conducted Phase I/II Site assessments for acquisitions and divestments of properties: including all associated fieldwork and reports.

Water Quality Specialist/Assistant Laboratory Director
Long Island Water Corporation - January 1992 – November 2001

- Responsible for maintaining laboratory certification for potable water via EPA and Nassau County Dept. of Health (NCDOH) approved testing methods.
- Assisted in evaluating laboratory programs, coordinated sampling/testing procedures to assure regulatory compliance.
- Established and directed quality assurance programs. Prepared reports and made recommendations as needed.

Chemist
Nassau County Department of Health, Division of Labs & Research - January 1990 - January 1992

- Analyzed potable and non-potable waters through EPA and NYSDOH requirements.
- Provided assistance with quality control systems and techniques.

Education:

New York Institute of Technology
Master Degree with Distinction, Environmental Technology, 2002

Adelphi University
Master Degree, Chemistry, 1994

St. Bonaventure University
Bachelor of Science Degree, Chemistry, 1990

Nassau Community College
Courses taken in Biology & Microbiology, 1998

Licenses:

Professional Geologist, License No. 1003

Certifications:

Project Management Professional (PMP)

Professional Memberships:
Project Management Institute (PMI)
Project Management Institute (PMI) Long Island Chapter
New York State Council of Professional Geologists (NYSCPG)
Long Island Association of Professional Geologists (LIAPG)

APPENDIX D

SVE PILOT TEST WORKPLAN

Known for excellence.
Built on trust.

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

GZA GeoEnvironmental of New York
55 Lane Road
Suite 407
Fairfield, NJ 07004
T: 973.774.3300
F: 973.774.3350
www.gza.com

October 22, 2024
File No. 41.0163305.00

Jennifer Gonzalez
Project Manager
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
47-40 21st Street,
Long Island City, NY 11101

RE: Soil Vapor Extraction Pilot Test Work Plan
NYSDEC BCP Site Nos. C224390
19-29 Clay Street, & 60-62 Commercial Street
Brooklyn, New York 11222
Block 2482 Lots 9, 10, and 53

Dear Ms. Gonzalez:

On behalf of Clay Properties, LLC (Participant/Owner), Goldberg Zoino & Associates, P.C. d/b/a GZA GeoEnvironmental of New York (GZA) is pleased to provide this Soil Vapor Extraction (SVE) Pilot Test Work Plan for the property located at 19-29 Clay Street, and 60-62 Commercial Street (the Site) in Brooklyn, New York. The Site is enrolled in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) as site number C224390. The Remedial Investigation for this project was completed in February 2023 and August-September 2024. A Remedial Investigation Report (RIR) was submitted to the NYSDEC on October 4, 2024. This SVE Pilot Test Work Plan is submitted in concurrence with the proposed Interim Remedial Measure Workplan (IRMWP) for the project.

BACKGROUND

The Site is located at 19-29 Clay Street, and 60-62 Commercial Street in Brooklyn, New York and is bound to the north (across Commercial Street) by an asphalt-paved storage yard for equipment and vehicles by the New York City Transit Authority (NYCTA); to the east by a 1-story warehouse and a new 7-story residential building (NYSDEC BCP Site No. C224153); to the south (across Clay Street) by the Former NuHart Plastics Site (NYSDEC BCP Site No. C224287); and to the west by a mixed-use development currently under construction (NYSDEC BCP Site No. C244278).

The Site is comprised of three lots, totaling approximately 0.46 acres. 19-27 Clay Street (Lot 9) contains a 2-story warehouse building that will be demolished as part of the IRM. The ground floor of the warehouse is currently unoccupied and the second floor is used as a temporary office by the Owner. 60-62 Commercial (Lot 10) is currently used as a parking area and storage yard, and 29 Clay Street (Lot 53) is currently a vacant lot. The proposed temporary SVE system is proposed to be located in the eastern and northern parcel extents of the 29 Clay Street lot.

An Equal Opportunity Employer M/F/V/H

Past uses of the Site include various industrial and manufacturing operations including iron works, a tin can storage facility, a cotton batting company, paper storage warehouse, and non-specific manufacturing uses.

SOIL VAPOR EXTRACTION SYSTEM

This workplan's objective is to describe a SVE pilot test whose data will be used to design and construct a full temporary SVE system that will be implemented during the construction phase of this project. The temporary SVE system will be designed to be converted to a permanent SVE system post-construction if post-remediation air sampling constitutes continuation of the system. The SVE system will be installed in the Northern and Eastern portions of the 29 Clay Street Lot and the Eastern portion of 60-62 Commercial Street to address off-site migration of chlorinated volatile organic compounds (cVOC) contamination identified during the Remedial Investigation (RI). See **Figure 1** for the proposed SVE treatment area.

The SVE system is expected to target the northern and eastern property line of the 29 Clay Street lot and eastern property line of the 60-62 Commercial Street, adjacent to the residential structures along these site boundaries. The SVE system will encompass an area of approximately 3,900 square feet (SF). However, final design will depend on the results of the pilot test.

The SVE remedial technology involves airflow within the subsurface with an applied vacuum, enhancing the in-situ volatilization of contaminants and capture of soil vapors. The SVE process uses the volatility of the contaminants to allow mass transfer from adsorbed and dissolved phases in soil and groundwater to the vapor phase, where it is removed under vacuum, and discharged to the atmosphere after treating with granular activated carbon (GAC). Airflow is induced in the subsurface by a pressure gradient applied through horizontally installed extraction piping. The negative pressure inside the soil vapor extraction system will be generated by a vacuum blower, which causes soil vapors to migrate toward the piping.

To design a SVE system, subsurface airflow pathways and extraction flow rates must be properly understood. The airflow field developed is dependent on many factors: the level of applied vacuum, available screen interval in the vadose zone, porosity, soil air permeability and its spatial variation, and depth to groundwater. Prior to designing or installation of a full-scale SVE system, GZA will conduct a pilot study at the Site to evaluate the applicability of this technology; obtain design parameters including radius of influence (ROI), applied vacuum, sustainable flowrates, vapor contaminant loadings; and promote remedial efficiency associated with the full-scale system.

SVE PILOT TEST STUDY

The SVE pilot test will be broken into multiple steps including extraction and monitoring well installation, mobilization, system shakedown, and SVE pilot testing.

Soil Vapor Extraction and Monitoring Well Installation

GZA will perform the SVE pilot test using the proposed extraction and monitoring wells shown on **Figure 1**. Prior to the pilot test, GZA will install two 4-inch SVE extraction wells and two 2-inch SVE monitoring wells, utilizing a drilling sub-contractor and direct-push technology (DPT) drilling. The shallow groundwater monitoring wells, MW-07S and MW-08S will also be utilized as monitoring wells during the pilot test. MW-07S and MW-08S are screened approximately 3 feet above and 7 feet beneath the groundwater table. The screen above the groundwater table

will provide monitoring information of subsurface air flow. If the groundwater table is found to be above the top of the screen through field measurements on the day of the test, then these wells will not be used to collect data.

The SVE extraction wells (VE-01 and VE-02) will be constructed using 4-inch diameter schedule 40 PVC riser pipe, and a 4-inch diameter, 0.020-inch slot, schedule 40 PVC screen. The screen will be installed from approximately 2 to 6 ft bgs, based on an estimated groundwater depth of 8 feet bgs. A solid PVC riser will extend up from the slotted screen to approximately 6-inches below ground surface. The annular space will be backfilled with #2 filter sand and an 8-inch manhole will be installed at the ground surface for well access. Before installing the extraction well, GZA will confirm groundwater depth and adjust well depths accordingly. The SVE well will be screened approximately 2-feet above the groundwater table. A typical detail for the extraction well is included as **Figure 2**.

Three (3) soil vapor monitoring points (MP-01 through MP-03) will be installed at respective intervals to provide radius of influence readings between the two extraction wells and three monitoring wells of 5, 10, 20, 30, 35 and 50 feet. This assumed that the vapor extraction wells will also be used for monitoring during the test. The monitoring points will be installed using 2-inch diameter schedule 40 PVC riser pipe, and a 2-inch diameter, 0.020-inch slot, schedule 40 PVC screen. The screens will be installed from approximately 2 to 6 ft bgs or approximately 2-feet above the groundwater table. The monitoring points will be installed using DPT, the annular space of the monitoring well will be backfilled with No. 2 filter sand and contain 8-inch manhole at the surface. The soil vapor monitoring well installation details are included on **Figure 2**. a

SVE Pilot Test Mobilization

A 3-horsepower (hp) regenerative blower unit with a variable frequency drive vacuum will be temporarily mobilized to the Site. The blower will be capable of developing 75-inches of water column and an air flow rate of 200 cubic feet per minute (cfm). The specifications for the blower are included in **Attachment A**. The skid-mounted unit will be equipped with a 170-lb vapor phase granular activated carbon (GAC) drum. A portable generator will be used to power the system during the pilot test. Appropriately sized vacuum and pressure hoses will connect the system.

It is anticipated that mobilization, system shakedown, and the SVE pilot test will occur in one, 8-hour field day.

System Shakedown

An initial shakedown test will be conducted prior to starting with the pilot test to get familiar with the system capacity and controls. It will be conducted at low and maximum sustainable applied vacuum. The procedures for each individual phase of the pilot test are provided below.

- Calibrate/check magnehelic gauges prior to test start.
- Run SVE blower with the dilution valve closed to determine the maximum achievable flow rate and vacuum. If water is sucked from the well, gradually open the dilution valve to determine the maximum flow rate without extracting water. The specifications for the SVE blower to be used during the pilot test is included as **Attachment A.**
- Take induced vacuum readings at each vapor point to get an idea of the magnitude/level of response.
- Confirm proposed flow rates fall into a range of approximately 50%, 75% and 100% of the maximum sustainable applied vacuum.

SVE Pilot Test

The SVE Pilot Test will include applying vacuum/flow to each of the installed extraction wells utilizing the provided blower, hose, and fittings. During each test, vacuum and flow monitoring will be performed on the extraction point and vacuum influence monitoring will be performed on the monitoring wells. The blower effluent will be treated through a 170-lb vapor phase carbon drum. At least three different magnitudes of vacuum/flow will be applied during the testing. For planning purposes, the proposed vacuum settings will be 10 cfm, 40 cfm, and 70 cfm. Dependent on field readings while testing, the vacuum settings may be adjusted to reach an optimal flow rate. The system and ground will be allowed to stabilize for at least 20-minutes between each test. An example form for collecting field measurements is included as **Table 1**.

During each test, field personnel will collect air readings from the pre-GAC influent and post-GAC effluent using a photoionization detector (PID) with parts per million (ppm) capabilities. GZA will collect four air samples, one from the pre-GAC influent and one from the post-GAC effluent, during the test with the low and intermediate vacuum setting (assuming 10 cfm and 40 cfm, unless adjusted in the field). The samples will be collected from the influent and effluent sampling ports using 2.7-Liter summa canisters with a 30-minute flow regulator. Air samples will be submitted to a New York ELAP-certified laboratory for VOC analysis by EPA TO-15 method.

In accordance with DAR-1 Guidance and Flowchart 1 within the guidance, pilot test activities qualify as a "trivial activity" under New York Codes, Rules and Regulations (6 CRR 201 – 3.3 - Item #30), and therefore do not require air modeling or permitting under Part 212. The Community Air Monitoring Plan (CAMP) and Construction Health and Safety Plan (CHASP) as shown in the IRMWP will be followed during SVE Pilot Test and associated well installation activities.

EVALUATION OF PILOT TEST RESULTS

Analytical laboratory data from SUMMA canisters, vacuum monitoring point measurements, and airflow measurements at the discharge will be used to design the temporary and full-scale system. The following factors will be used to evaluate the viability:

- Induced/applied vacuum
- Air flow
- Contaminant concentrations in the effluent
- Operating vacuum condition
- Radius of influence
- Treatment unit size

SVE DESIGN AND CONSTRUCTION

Data collected from the pilot test will be used to evaluate and calculate the design parameters for the temporary and full-scale SVE system, including; required flow rate, applied vacuum, and ROI for the SVE well. The remedial equipment will be sized to match the designed flow rate from each well and vacuum required during SVE system operation. A target vacuum of at least -0.10 IW at each vapor monitoring point will be required for the full-scale design. The proposed full-scale system will be installed as a temporary system to be used throughout construction, with the ability to be converted to a permanent SVE system, if necessary. The full-scale system will also include a series of vacuum monitoring wells in a network. A mobile SVE system trailer will house the blower,

air-water separator, controls, GAC drums and other system components. The temporary and full-scale system will include an exhaust stack that is at least 10-feet high and will be discharged at least 10-feet from any operable window or public space. Signage will be posted to prevent workers and the public from being in close proximity to the exhaust stack. Long-term maintenance of the SVE system will be addressed in the project's Remedial Action Work Plan and Site Management Plan.

If you have any questions, please contact Victoria Whelan at (631) 793-8821 or Mark Hutson at (646) 929-8955.

Sincerely,
GZA GEOENVIRONMENTAL OF NEW YORK

Mark Hutson, P.G.
Senior Project Manager

Stephen M. Kline, P.E.
Consultant Reviewer

Victoria Whelan, P.G.
Senior Vice President

ATTACHMENTS

Table 1 – Induced Vacuum Log Sheet

Figure 1 – Pilot Test Study Layout
Figure 2 – Pilot Test Study Details

Attachment A – SVE Pilot Test Blower Specifications

TABLE

Table 1 - Field Form
SVE System Pilot Test
19-27 Clay Street, 29 Clay Street, 60-62 Commercial Street

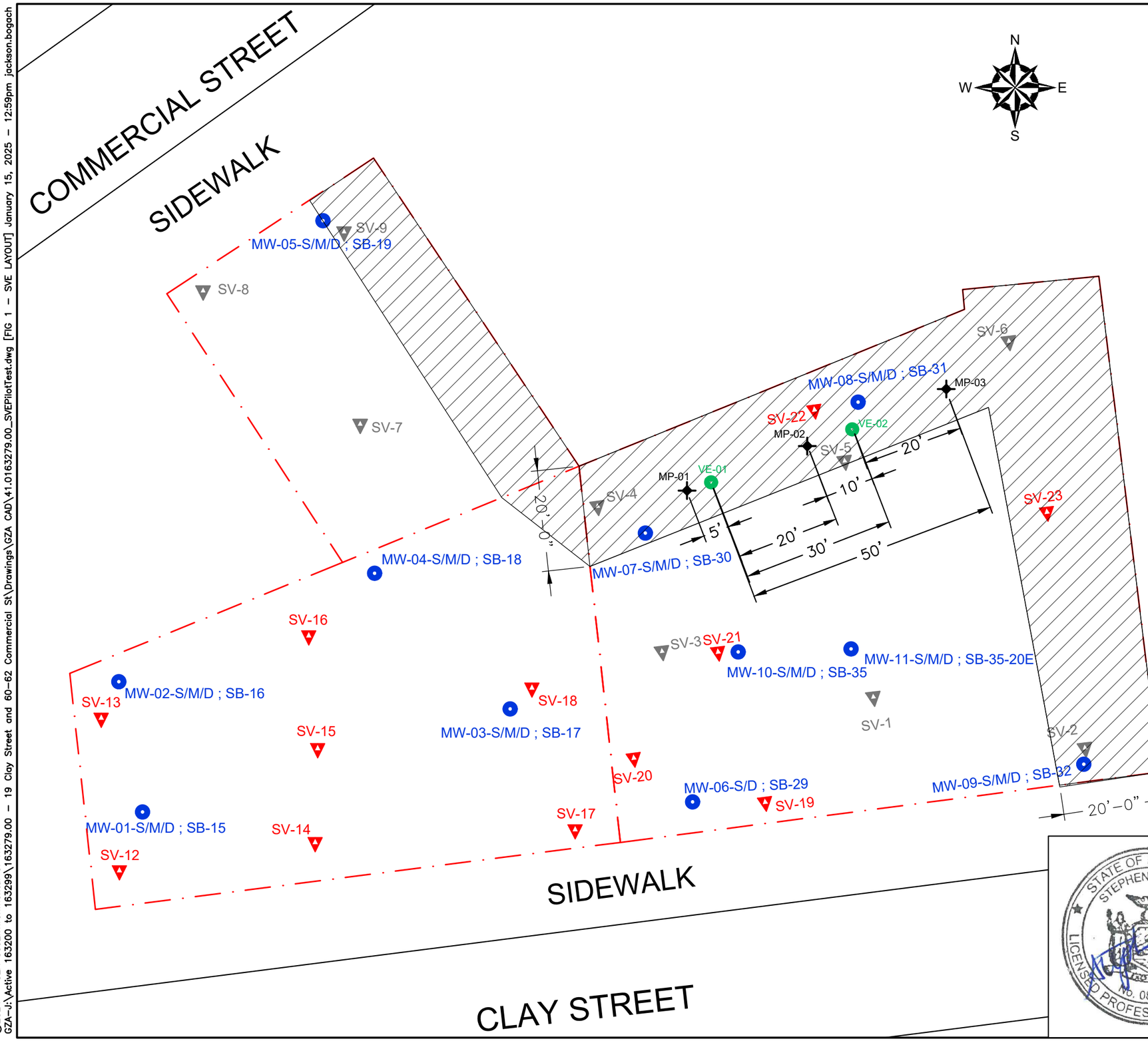
Project Name: 19-27 Clay Street, 29 Clay Street, 60-62 Commercial Street
Project Number: 41.0163297.00
Date: _____
Weather: _____
Personnel: _____
Vapor Extraction Well(s): _____
Test Start Time: _____ **Test End Time:** _____

Test Phase: _____
Notes: _____

Time of Readings	Elapsed Time	Air Flow	Observation Points											
			VE-01		VE-02		MP-01		MP-02		MW-07		MW-08	
			VAC	PID	VAC	PID	VAC	PID	VAC	PID	VAC	PID	VAC	PID
hr:min	min	CFM	in-H20	ppm	in-H20	ppm	in-H20	ppm	in-H20	ppm	in-H20	ppm	in-H20	ppm

Vac: Vacuum in inches of water
ppm: parts per million

FIGURES



GENERAL NOTES

1. BASE MAP DEVELOPED FROM DRAWING TITLED "FIGURE 6 – PROPOSED SAMPLING LOCATIONS", PREPARED BY "PREFERRED ENVIRONMENTAL SERVICES", ORIGINAL SCALE 1" = 25', DATED FEBRUARY 2024.
2. FORMER EXPLORATION LOCATIONS SHOWN ARE APPROXIMATED BASED ON THE SITE PLAN REFERENCED IN NOTE 1.
3. EXPLORATION LOCATIONS ARE APPROXIMATED BASED ON FIELD MEASUREMENTS FROM EXISTING SITE FEATURES.

LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE PROPOSED SVE TREATMENT AREA
- VE-01 — APPROXIMATE PROPOSED SOIL VAPOR EXTRACTION MONITORING POINT – SEE DETAIL 1 ON FIGURE 2
- MP-01 — APPROXIMATE PROPOSED SOIL VAPOR MONITORING POINT – SEE DETAIL 2 ON FIGURE 2
- SV-12 — APPROXIMATE SOIL VAPOR SAMPLING LOCATION – 2024 NYSDEC RI
- SV-7 — APPROXIMATE REMEDIAL INVESTIGATION SOIL VAPOR SAMPLING LOCATION – 2023 NYCOER RI
- MW-01-S/M/D SB-15 — APPROXIMATE MONITORING WELL CLUSTER AND SOIL BORING LOCATION – 2024 NYSDEC RI

0 10 20 40
SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

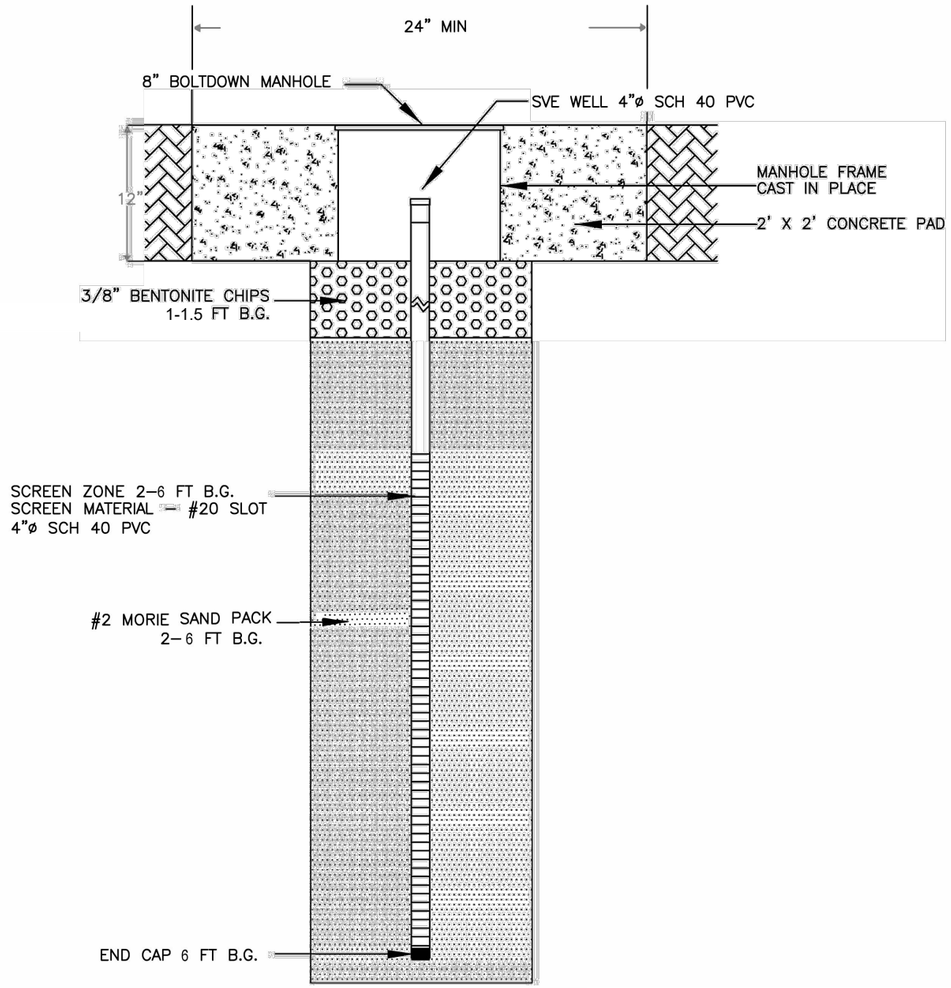
STATE OF NEW YORK
STEPHEN M. KLIME
LICENSED PROFESSIONAL ENGINEER
No. 080431

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

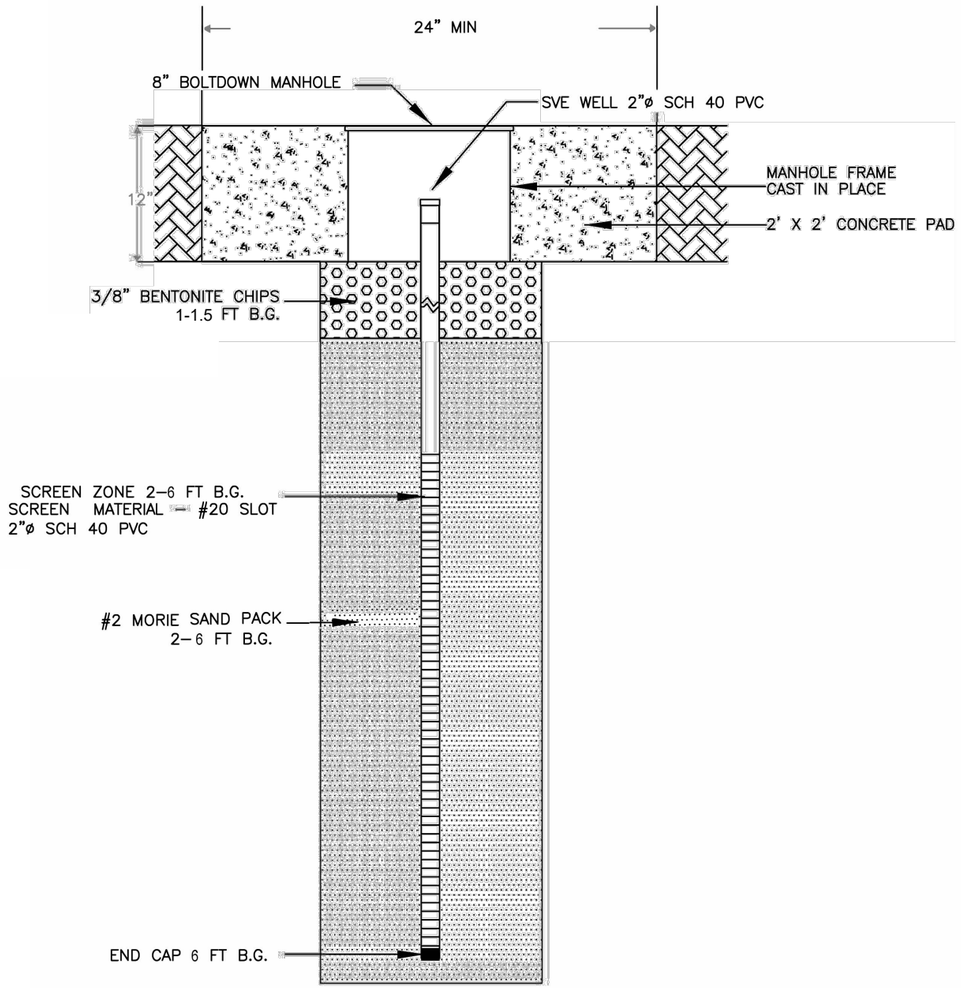
PILOT TEST STUDY LAYOUT

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		PREPARED FOR: CLAY PROPERTIES, LLC	
PROJ MGR: MH	REVIEWED BY: VW	CHECKED BY: SMK	FIGURE D-1
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1" = 20'	
DATE: JANUARY 2025	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 – GZA GeoEnvironmental of NY.
GZA–J:\Active 163200 to 163299\163279.00 – 19 Clay Street and 60–62 Commercial St\Drawings\GZA CAD\41.0163279.00_SVEPilotTest.dwg [FIG 1 – SVE LAYOUT] January 15, 2025 – 12:59pm jackson.bogach



DETAIL 1 - SOIL VAPOR EXTRACTION POINT (VE)
NOT TO SCALE



DETAIL 2 - SOIL VAPOR MONITORING POINT (MP)
NOT TO SCALE

GENERAL NOTES

1. DETAILS ADAPTED FROM DRAWING TITLED "PROPOSED SOIL VAPOR EXTRACTION WELL CONSTRUCTION DETAIL", BY "ENVIROTRAC ENVIRONMENTAL SERVICES".

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

19-27 CLAY ST, 29 CLAY ST, AND 60-62 COMMERCIAL STREET
BROOKLYN, NY 11222

PILOT TEST STUDY DETAILS

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		CLAY PROPERTIES, LLC	
PROJ MGR: MH	REVIEWED BY: VW	CHECKED BY: SMK	FIGURE D-2
DESIGNED BY: JHB	DRAWN BY: JHB	SCALE: 1" = 20'	
DATE: JANUARY 2025	PROJECT NO. 41.0163279.00	REVISION NO. -	SHEET NO.

©2024 - GZA GeoEnvironmental of NY.
GZA-J:\Active 163200 to 163299\163279.00 - 19 Clay Street and 60-62 Commercial St\Drawings\GZA CAD\41.0163279.00_SVEPilotTest.dwg [FIG 2 - SVE DETAILS] January 15, 2025 - 12:59pm jackson.bogach

ATTACHMENT A – SVE PILOT TEST BLOWER SPECIFICATIONS

EN/CP 606
Explosion-Proof Regenerative Blower

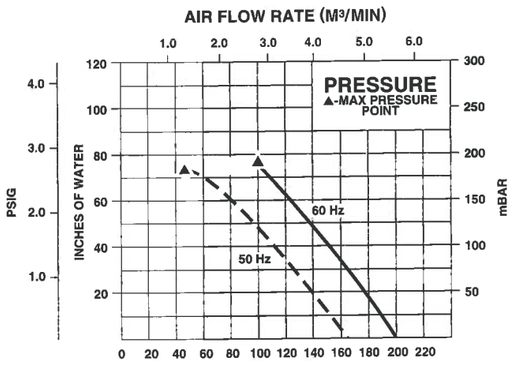
FEATURES
- Manufactured in the USA
- Maximum flow: 200 SCFM
- Maximum pressure: 75 IWG
- Maximum vacuum: 75 IWG
- Standard motor: 3.0 HP, explosion-proof
- Cast aluminum blower housing, cover, impeller & manifold; cast iron flanges (threaded); teflon lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

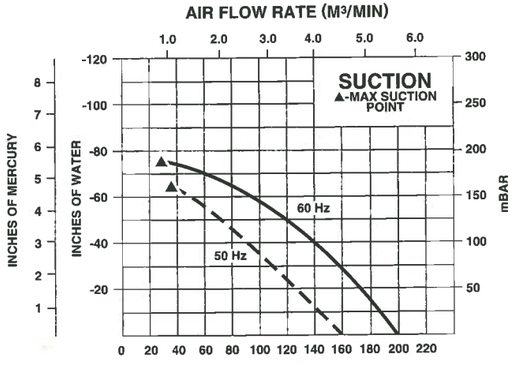
MOTOR OPTIONS
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

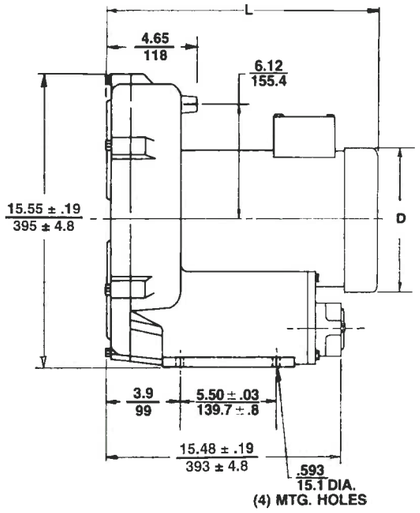
ACCESSORIES (See Catalog Accessory Section)
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges & relief valves
- Switches – air flow, pressure, vacuum or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)

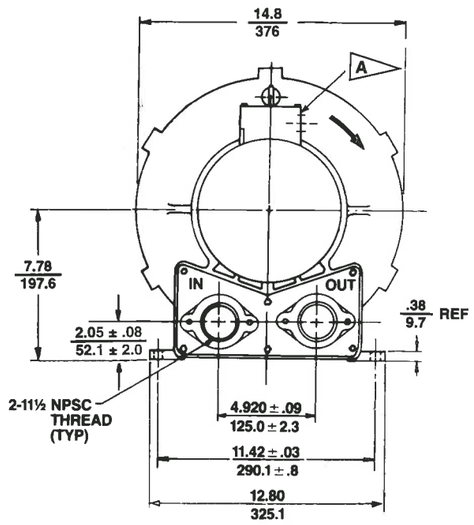
BLOWER PERFORMANCE AT STANDARD CONDITIONS





EN/CP 606
Explosion-Proof Regenerative Blower





DIMENSIONS: IN / MM
TOLERANCES: .XX ± .1 / 2.5
(UNLESS OTHERWISE NOTED)

MODEL	L (IN) ± .3	L (MM) ± 8	D (IN) ± .1	D(MM) ±3
EN/CP606M72ML	17.89	454	7.2	182
EN/CP606M5ML	19.9	505	8.5	216

A 0.75" NPT CONDUIT CONNECTION

SPECIFICATIONS

MODEL	EN606M5ML	EN606M72ML		EN606M86ML	CP606FU5MLR	CP606FU72MLR
Part No.	038538	038536		038437	–	038972
Motor Enclosure – Shaft Material	Explosion-proof – **CS**	Explosion-proof – **CS**		Explosion-proof – **CS**	Chem XP – **SS**	Chem XP – **SS**
Horsepower	3.0	3.0		3.0	Same as EN606M5ML – 038538 except add Chemical Processing (CP) features from catalog inside front cover	Same as EN606M72ML – 038536 except add Chemical Processing (CP) features from catalog inside front cover
Phase – Frequency [1]	Single - 60 Hz	Three - 60 Hz		Three - 60 Hz		
Voltage [1]	208-230	208-230	460	575		
Motor Nameplate Amps	15.5-14.5	7.8-7.4	3.7	3.0		
Max. Blower Amps [3]	19	7.6	3.8	3.1		
Inrush Amps	94-88	60-54	27	26		
Starter Size	1	0	0	0		
Service Factor	1.0	1.0		1.0		
Thermal Protection [2]	Class B - Pilot Duty	Class B - Pilot Duty		Class B - Pilot Duty		
XP Motor Class – Group	I-D, II-F&G	I-D, II-F&G		I-D, II-F&G		
Shipping Weight	130 lb (59 kg)	106 lb (48 kg)		106 lb (48 kg)		

[1] Rotron motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **200-220/400-440 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

[2] Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

[3] Maximum blower amps corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

Specifications subject to change without notice. Please contact factory for specification updates.

APPENDIX E

CONSTRUCTION HEALTH AND SAFETY PLAN

Known for excellence.
Built on trust.

CONSTRUCTION HEALTH AND SAFETY PLAN

19-27 and 29 Clay Street and 60-62 Commercial Street Brooklyn, New York Block 2482, Lots 9, 10 and 53

October 2024
File No. 41.0163279.00

PREPARED FOR:

Clay Properties, LLC
134 North 4th Street | Brooklyn, NY 10005

GZA GeoEnvironmental of New York
104 West 29th Street | 10th Floor | New York, NY 10001
T: 212.594.8140 F : 212.279.8180
www.gza.com

Copyright© 2024 GZA GeoEnvironmental of New York

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 OVERVIEW 1

1.2 SITE HAZARDS 1

1.3 PROJECT TEAM 1

2.0 HAZARD ASSESSMENT 2

2.1 CHEMICAL HAZARDS AND KNOWN/SUSPECT CHEMICALS OF CONCERN 2

2.2 VOLATILE ORGANIC COMPOUNDS (VOCS) 6

2.3 SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS) 7

2.4 METALS 7

2.5 POLYCHLORINATED BIPHENYLS (PCBS) 8

2.6 PESTICIDES 8

2.7 PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) 8

3.0 AIR MONITORING 8

3.1 ORGANIC VAPOR MONITORING 9

3.2 AIR MONITORING INSTRUMENTS AND ACTION LEVELS 9

3.3 TOTAL PARTICULATES 9

3.4 PARTICULATE MONITORING, RESPONSE LEVELS, AND ACTIONS 11

3.5 PERSONAL EXPOSURE MONITORING 11

4.0 PERSONAL PROTECTIVE EQUIPMENT 11

4.1 GENERAL SITE WORK 11

4.2 EXCAVATION AREAS AND OTHER SOIL HANDLING 12

5.0 SITE CONTROL 12

5.1 WORK ZONE 12

5.2 SUPPORT ZONE 13

5.3 OTHER SITE CONTROL AND SAFETY MEASURES 13

TABLE OF CONTENTS

5.4 SITE SECURITY 13

6.0 DECONTAMINATION 14

6.1 PERSONAL DECONTAMINATION 14

6.2 EQUIPMENT DECONTAMINATION 14

7.0 MEDICAL MONITORING AND TRAINING REQUIREMENTS 15

7.1 MEDICAL MONITORING 15

7.2 TRAINING 15

7.3 SUBCONTRACTORS 16

7.4 SITE SAFETY MEETINGS 16

8.0 EMERGENCY ACTION PLAN 16

8.1 EMPLOYEE INFORMATION 17

8.2 EMERGENCY SIGNAL AND ALARM SYSTEMS 17

8.3 EMERGENCY CONTACTS 17

8.4 HOSPITAL LOCATION 17

8.5 INCIDENT REPORTING PROCEDURES 18

ATTACHMENTS

ATTACHMENT – E-1 SAFETY DATA SHEETS

ATTACHMENT – E-2 HEALTH AND SAFETY BRIEFING/SITE ORIENTATION RECORD

ATTACHMENT – E-3 MAP TO HOSPITAL

ATTACHMENT – E-4 ACCIDENT AND INJURY REPORT FORM

1.0 INTRODUCTION

1.1 OVERVIEW

This project-specific Construction Health and Safety Plan (CHASP) has been developed by GZA GeoEnvironmental of New York (GZA) on behalf of Clay Properties, LLC (Owner/Client) to establish the procedures necessary for the protection from potential contaminated materials resulting from the remedial activities at 19-27 and 29 Clay Street and 60-62 Commercial Street in Brooklyn, New York (Site). This CHASP is intended to supplement the Contractor's Safety Program. The procedures in this plan have been developed based on current knowledge regarding the hazards which are known or anticipated for the operations to be conducted at this Site.

1.2 SITE HAZARDS

This CHASP covers only the hazards associated with potential chemical exposures. Physical hazards such as injuries from typical excavation field work activities, including the operation of heavy equipment, noise exposure, heat and cold stress, electrical hazards, fire hazards, excavation hazards and general safety hazards associated with walking on working surfaces (trip and fall) are covered by the Contractor's safety program.

The construction activities call for the handling, transport and disposal of soil, fill, fluids and other materials removed from the property. Site activities may pose chemical exposure hazards. Potential chemical exposure hazards include skin contact, ingestion and inhalation hazards which may result from the presence of volatile organic compounds, semi-volatile organic compounds, and inorganic metallic elements (metals) on-Site. The potential adverse health effects form these detected contaminants are diverse. Many of these compounds are known or suspected to result in chronic illness from long-term exposures. However, due to the limited nature of the proposed construction, only acute effects are a potential concern. See **Section 2.0** for detailed chemical hazard information.

1.3 PROJECT TEAM

The organizational structure established for the implementation of construction health and safety requirements established by this CHASP, include identifying personnel who have been assigned specific authority to implement and enforce the provisions of this CHASP. Prior to the construction appropriate personnel will be identified in the table below:

Name	Project Title/Assigned Role	Phone Numbers
Mark Hutson	Project Manager	Work: 646-929-8955 Mobile: 332-208-2260
TBD	Site Supervisor	Work: Mobile:
TBD	Site Health and Safety Officer	Work: Mobile:
TBD	Alternate Site Health and Safety Officer	Work: Mobile:

The control of Site hazards is dependent upon the degree to which management enforces compliance and employees cooperate with the specified health and safety requirements. Therefore, personnel at all levels of the organization must recognize their individual responsibility to comply. All activities covered by this CHASP must be conducted in compliance with this CHASP and with applicable federal, state, and local health and safety regulations, including 29 Code of Federal Regulations (CFR) 1910.120. Personnel covered by this CHASP who cannot or will not comply must be excluded from Site activities by the Project Superintendent.

2.0 HAZARD ASSESSMENT

The following hazard assessment applies only to the activities within the specified scope of this CHASP.

2.1 CHEMICAL HAZARDS AND KNOWN/SUSPECT CHEMICALS OF CONCERN

The chemical hazard information provided below is based on data provided in the Remedial Investigation Report performed by GZA GeoEnvironmental, dated October 2024. Safety Data Sheets (SDS) are included in **Attachment E-1.** During the investigations, representative Site soils, soil vapor and groundwater samples were collected. Constituents with exceeding concentrations and their respective health effects are listed below for reference. Information presented is based upon established Occupational Safety and Health Administration (OSHA) permissible exposure limits (PEL) and The National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits (RELs) with time-weighted average (TWA). All other analytical parameters were reported within acceptable levels for Site urban residential land use. See **Section 4.2** for a description of the PPE that should be used for this Site.

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
1,1,1-Trichloroethane	PEL = 350 ppm TWA REL = 350 ppm TWA	Irritation to the eyes and skin. Also can cause headache, lassitude, central nervous system depression, poor equilibrium, dermatitis, cardiac arrhythmias, and liver damage.
1,1-Dichloroethane	PEL = 100 ppm TWA REL = 100 ppm TWA	Irritation to the skin. Also can cause central nervous system depression and liver, kidney, or lung damage.
1,1-Dichloroethylene	None have been established	Vapor can cause dizziness and drunkenness; high levels cause anesthesia. Liquid irritates eyes and skin.
1,1,2,2-Tetrachloroethane	PEL = 1 ppm TWA	Nausea, vomiting, cough, shortness of breath, dried skin, corneal clouding
1,2-Dichloroethane	PEL = 50 ppm TWA REL = 1 ppm TWA	Anesthetic effects, difficulty breathing, headache, dizziness, dermatitis, redness in eyes and blurred vision, gastrointestinal discomfort, drowsiness, weakness, vomiting
1,2,3-Trichloropropane	PEL = 50 ppm TWA	Headache, dizziness, tiredness, nausea, and vomiting
1,2,4-Trimethylbenzene	PEL = 25 ppm (125 mg/m^3)	Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness. Prolonged or repeated exposure can cause narcosis and bronchitis.
1,3,5-Trimethylbenzene	REL = 25 ppm TWA	Irritation of the eyes, skin, nose, throat, and respiratory system. Also can cause bronchitis, hypochromic anemia, headache, drowsiness, lassitude, dizziness, nausea, incoordination, vomiting, confusion, and chemical pneumonitis.
Acetone	PEL = 250 ppm TWA	Can cause serious eye irritation. May cause drowsiness and dizziness.
Benzene	PEL = 1 ppm TWA REL = 0.1 ppm TWA	Symptoms include skin irritation, serious eye irritation, genetic defects and cancer.
Carbon Tetrachloride	PEL = 10 ppm TWA	Irritation to the skin and eyes. Can also cause central nervous system depression, nausea, vomiting, liver and kidney injuries, drowsiness, dizziness, or incoordination. A possible carcinogen.
Chloroform	PEL = 10 ppm TWA	Symptoms include vomiting, cough, irritant effects, shortness of breath, respiratory arrest, narcosis, dizziness, nausea, agitation, spasms, inebriation, headache, stomach/intestinal disorders, ataxia, and cardiovascular disorders. Drying-out effect resulting in rough and chapped skin.
cis-1,2-Dichlorothene	PEL = 200 ppm TWA	Can cause moderate skin irritation. Highly flammable liquid and vapor.
Cyclohexane	PEL = 100 ppm TWA REL = 100 ppm TWA	Causes skin irritation, drowsiness, or dizziness. May be fatal if swallowed and enters airways.
Ethylbenzene	PEL = 100 ppm TWA REL = 100 ppm TWA	Irritation to the eyes, skin, and mucous membrane. Headache, dermatitis, narcosis, coma.
Methyl tert-butyl ether (MTBE)	PEL = 40 ppm TWA	Nausea, vomiting, dizziness, central nervous system depression, pneumonitis, agitation and spasms, narcosis, unconsciousness
Methylene Chloride	PEL = 25 ppm TWA	Can cause skin irritation, serious eye irritation, drowsiness, or dizziness. A suspected carcinogen. Prolonged exposure can cause damage to organs.
Naphthalene	PEL = 0.1 ppm (California) REL = 10 ppm TWA	Acute exposure of humans to naphthalene by inhalation, ingestion, and dermal contact is associated with hemolytic anemia, damage to the liver, and neurological damage. Cataracts have also been reported in workers acutely exposed.

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
n-Butylbenzene	None have been established.	Inhalation or contact with material may irritate or burn skin and eyes. Vapors may cause dizziness or asphyxiation.
n-Heptane	PEL = 500 ppm TWA REL = 85 ppm TWA	Dizziness, stupor, incoordination; loss of appetite, nausea; dermatitis; chemical pneumonitis (aspiration liquid); and unconsciousness.
n-Hexane	PEL = 500 ppm TWA REL = 50 ppm TWA	Irritation to the eyes and nose. Nausea, headache, peripheral neuropathy, numbness of the extremities, muscle weakness, dermatitis, dizziness, and chemical pneumonitis (aspiration liquid).
n-Propylbenzene	None have been established.	Irritation to the eyes and skin.
p-Isopropyltoluene	None have been established.	Headache, dizziness, tiredness, nausea, and vomiting
sec-Butylbenzene	None have been established.	Irritation to the eyes and skin.
Styrene	PEL = 50 ppm TWA	Dermatitis, central nervous system depression, nausea, dizziness, headache
Tetrachloroethene (PCE)	PEL = 100 ppm TWA	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]
Toluene	PEL = 200 ppm TWA	Reproductive toxicity. May be harmful if swallowed and enters airways. Causes skin irritation, drowsiness, or dizziness.
Trans-1,2-Dichloroethene	PEL = 200 TWA	Can cause a rash or burning of the skin. Can irritate the eyes, nose, throat, and lungs. Can cause dizziness and lightheadedness, and may effect the liver and kidneys.
Trichloroethene (TCE)	PEL = 100 ppm TWA REL = 2 ppm TWA	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen].
Vinyl Chloride	PEL = 1 ppm TWA	Lassitude, abdominal pain, gastrointestinal bleeding, enlarged liver, pallor cyanosis of extremities. Can cause frostbite in liquid form. A possible carcinogen.
Xylenes	PEL = 100 ppm TWA REL = 100 ppm STEL = 150 ppm	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
1,4-Dioxide	PEL = 100 ppm TWA	Skin irritation, vertigo, drowsiness, headache, anorexia and irritation of the eyes, nose, throat and lungs. Some symptoms of poisoning include the irritation of the upper respiratory passages, coughing, irritation of eyes, drowsiness, vertigo, headache, anorexia, stomach pains, nausea, vomiting, coma, and death;
Benzo(a)anthracene	PEL = 0.2 mg/m^3 TWA REL = 0.1 mg/m^3 TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Beno(a)pyrene	PEL = 0.2 mg/m^3 TWA REL = 0.1 mg/m^3 TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Benzo(b)fluoranthene	PEL = 0.2 mg/m^3 TWA REL = 0.1 mg/m^3 TWA	No signs or symptoms of acute or chronic exposure have been reported in humans; suspect human carcinogen.
Benzo(k)fluoranthene	PEL = 0.2 mg/m^3 TWA	Contact can irritate the skin and eyes. Benzo(k)fluoranthene may be a carcinogen.
Chrysene	PEL = 0.2 mg/m^3 TWA REL = 0.1 mg/m^3 TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Dibenz(a,h)anthracene	PEL = 0.2 mg/m³ TWA REL = 0.1 mg/m³ TWA	No signs or symptoms of acute or chronic exposure have been reported in humans; suspect human carcinogen.
Fluoranthene	None has been established.	Hazardous if swallowed
Hexachlorabutadiene	REL = 0.02 ppm TWA	Irritating to skin and mucous membranes
Indeno(1,2,3-cd)pyrene	PEL = 0.2 mg/m³ TWA REL = 0.1 mg/m³ TWA	No signs or symptoms of acute or chronic exposure have been reported in humans; suspect human carcinogen.
Phenol	PEL = 5 ppm TWA	Destructive to mucous membranes and upper respiratory tract, eyes, and skin. Causes spasms, inflammation and edema of the larynx, wheezing, headache, nausea, vomiting, jaundice, respiratory failure, and cardiac arrest
Arsenic	PEL = 10 mg/m³ REL = 2 mg/m³	Toxic if swallowed or inhaled. Causes skin irritation. Causes serious eye damage.
Barium	PEL = 0.5 mg/m³ REL = 0.5 mg/m³	Irritation of the skin, eyes and respiratory system. Can cause vomiting, abdominal cramps, diarrhea and nausea.
Cadmium	PEL = 0.1 mg/m³	Causes respiratory distress and pulmonary edema. Causes bronchitis, anosmia and discoloration of teeth.
Copper	PEL = 0.1 mg/m³ REL = 0.1 mg/m³	Irritation eyes, upper respiratory system; metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough, lassitude (weakness, exhaustion); metallic or sweet taste; discoloration skin, hair.
Chromium	PEL = 1 mg/m³ REL = 0.5 mg/m³	Irritation to eyes, skin, and lung fibrosis (histologic).
Lead	PEL = 0.05 mg/m³ REL = 0.05 mg/m³	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.
Magnesium	PEL = 15 mg/m³	Irritation eyes, nose; metal fume fever: cough, chest pain, flu-like fever.
Manganese	PEL = 5 mg/m³ REL = 1 mg/m³	Manganism, asthenia, insomnia, mental confusion, metal fume fever, dry throat, cough, chest tightness, low-back pain, vomiting, malaise, kidney damage.
Mercury	PEL = 0.05 mg/m³ REL = 0.1 mg/m³	Irritation 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	PEL = 1 mg/m³ REL = 0.015 mg/m³	Skin and eye irritation. Respiratory irritation. Allergic reactions and flu-like illness. Headache, dizziness and nausea.
Sodium	PEL = 2 mg/m³ REL = 2 mg/m³	Irritation to eyes, skin, and mucous membrane.
Selenium	PEL = 0.2 mg/m³ REL = 2 mg/m³	Toxic if swallowed or if inhaled. May cause damage to organs through prolonged or repeated exposure.
Zinc	PEL = 15 mg/m³ REL = 5 mg/m³	Exposure to zinc oxide can occur through inhalation, ingestion, and eye or skin contact; affects the respiratory system; Acute exposure to zinc oxide can result in coughing, substernal pain, upper respiratory tract irritation, rales, chills, fever, nausea, and vomiting; Chronic exposure to zinc oxide by skin contact may result in popular-pustular skin eruptions in the axilla, inner thigh, inner arm, scrotum, and pubic areas.

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Polychlorinated Biphenyls (PCBs)	PEL = 1 mg/m^3 TWA	Liver and skin damage, birth defects, irritation and pain of the eyes, skin irritation, vomiting, abdominal pain, and dizziness and drowsiness
4,4'-DDE	None have been established.	Toxic if swallowed, suspected of causing cancer
4,4'-DDT	PEL = 1 mg/m^3 TWA	Damage to organs with prolonged exposure. Suspected of causing cancer.
Dieldrin	PEL = 0.1 mg/m^3 TWA	Discomfort, headache, nausea, vomiting, dizziness, tremors, tonic convulsions, clonic spasms, coma, respiratory failure
PFHpA	No occupational exposure limit values	Causes burns by all exposure routes. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.
PFHxS	No occupational exposure limit values	Causes severe skin burns and eye damage.
PFOA	No occupational exposure limit values	Harmful if swallowed or inhaled and causes can cause serious eye damage. A suspected carcinogen. Causes damage to the liver through prolonged or repeated exposure. May damage fertility or the unborn child.
PFOS	No occupational exposure limit values	Harmful is swallowed. Causes severe skin burns and eye damage. May cause respiratory irritation.

2.2 VOLATILE ORGANIC COMPOUNDS (VOCS)

Various VOCs were detected in previous soil, groundwater, and soil gas samples.

Soil sampling from the Remedial Investigation detected, 1,1,1-trichlororethane, 1,1-Dichloroethane, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, acetone, cis-1,2-Dichloroethene, ethylbenzene, methylene chloride, naphthalene, n-Butylbenzene, n-Propyl benzene, sec-butylbenzene, tetrachloroethene (TCE), trichloroethene (PCE), toluene, vinyl chloride, and Xylenes above either their respective New York State Department of Environmental Conservation (NYSDEC) Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs) and/or Restricted-Residential Use Soil Cleanup Objectives (RRUSCOs) in one or more soil samples.

Groundwater sampling detected 1,1,1-Trichloroethane, 1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, 1,1-Dichloroethane, 1,1-Dichloroethylene, 1,2,3-Trichloropropane, 1,2,4-trimethylbenzene, 1,2-Dichloroethane, 1,3,5-trimethylbenzene, 1,4-dioxane, benzene, chloroform, cis-1,2-Dichloroethene, ethyl benzene, isopropyltoluene, methyl tert-butyl ether (MTBE), methylene chloride, naphthalene, n-propylbenzene, o-xylene, p-isopropyltoluene, sec-butylbenzene, styrene, tetrachloroethylene (PCE), toluene, trans-1,2-Dichloroethylene, trichloroethylene (TCE), vinyl chloride, and xylenes above their respective NYSDEC Technical and Operation Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) in one or more samples.

Soil vapor and ambient air samples showed petroleum-related VOCs and chlorinated VOCs present at low to high concentrations. There were several VOCs that exceeded the respective New York

State Department of Health (NYSDOH) Decision Matrices, including 1,1,1-Trichloroethane, 1,2,4-trimethylbenzene, 1,1-Dichloroethylene, benzene, Carbon Tetrachloride, Cyclohexane, n-heptane, n-hexane, naphthalene, o-xylene, Tetrachloroethene (PCE), Trichloroethene (TCE) and/or Toluene.

2.3 SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS)

The SVOCs detected in the Remedial Investigation sampling that exceeded the NYSDEC Part 375 UUSCO and/or RUSCO are Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, and phenol.

Groundwater sampling detected 1,4-dioxane, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, chrysene, fluoranthene, hexachlorabutadiene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene above the NYSDEC TOGS 1.1.1 AWQS.

Due to the relatively low vapor pressure of SVOCs, no vapor hazards are anticipated at ambient temperatures. However, if Site conditions are dry, the generation of contaminated dusts may pose a potential inhalation hazard. Therefore, dust levels should be controlled with wetting, if necessary, as described in **Section 3.2**. In addition, repeated contact with certain SVOCs have been associated with the development of skin cancer. Dermal contact with SVOCs with the skin may cause photosensitization of the skin, producing skin burns after subsequent exposure to ultraviolet radiation. Protective measures, such as the wearing of chemically resistant gloves, are appropriate when handling SVOC contaminated materials.

2.4 METALS

Remedial Investigation Soil sampling detected Arsenic, Barium, Cadmium, Copper, Lead, Manganese, Mercury, Nickel, Selenium, and Zinc above their respective NYSDEC Part 375 UUSCO and/or RUSCOs.

Metals detected above the NYSDEC TOGS 1.1.1 AWQS in the Remedial Investigation groundwater sampling are cadmium, chromium, copper, lead, Magnesium, Manganese, nickel, Sodium, selenium, and mercury.

The exceedances are likely attributed to historic fill materials present throughout the Site. Overexposure to metal compounds has been associated with a variety of local and systemic health hazards, both acute and chronic in nature, including lung damage, neurological effects, gastrointestinal effects, kidney and liver damage, allergic dermatitis, and other skin disorders. Exposure to metals is most commonly through inhalation and ingestion of dust. Due to the wide variety of metals detected in soil and groundwater samples, a Community Air Monitoring Program (CAMP) should be implemented to monitor the total dust in air. GZA believes that

airborne metals are not a significant risk to Site workers. However, if Site conditions are dry, the generation of contaminated dusts may pose a potential inhalation hazard. Therefore, dust levels should be controlled with wetting, if necessary, as described in **Section 3.2**.

2.5 POLYCHLORINATED BIPHENYLS (PCBS)

Polychlorinated biphenyls (PCBs) were detected in two shallow soil samples above the UUSCO. PCBs were not detected in groundwater above the NYSDEC TOGS 1.1.1. AWQS. PCBs are generally observed in the shallow soil and at concentrations that are typically found in historic fill observed in New York City. Due to the relatively low vapor pressure of PCBs, vapor hazards at ambient temperatures are not expected to occur. However, if Site conditions are dry, the generation of contaminated dusts may pose a potential inhalation hazard. Therefore, dust levels should be controlled with wetting if necessary, as described in **Section 3.2**.

2.6 PESTICIDES

The pesticides 4,4'-DDE 4,4'-DDT, and dieldrin were detected in soil samples above the UUSCO and/or RRSCO. Pesticides were not detected in groundwater above the TOGS 1.1.1 AWQS.

Due to the relatively low vapor pressure of pesticide compounds, vapor hazards at ambient temperatures are not expected to occur.

2.7 PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

The emerging contaminants Perfluorooctanesulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) were detected in soil samples above their respective NYSDEC Part 375 UUSCOs during the Remedial Investigation.

PFAS in groundwater were compared to the NYSDEC Part 375 Remedial Program for PFAS. PFOA, PFOS, Perfluoroheptanoic Acid (PFHpA), and Perfluorohexanesulfuonic Acid (PFHpA) exceeded the NYSDEC Part 375 Remedial Program for PFAS in groundwater samples during the Remedial Investigation.

3.0 AIR MONITORING

Air monitoring falls into two separate categories: direct reading/environmental monitoring, and personal exposure monitoring. The following Sections summarize the types of environmental monitoring as well as the appropriate response actions applicable to the Site.

3.1 ORGANIC VAPOR MONITORING

Volatile organic vapor hazards have been identified for the Site (see **Section 2.0**). Therefore, organic vapor monitoring with a photoionization detector (PID) is expected to be required for the Site. Monitoring for VOCs will be conducted prior to the start of ground intrusive activities, to establish the Site background VOC concentration levels. The background concentration will then be incorporated and considered when evaluating VOC concentrations at the Site. Vapor monitoring will be performed during the first three days of ground intrusive activity and compared to the background concentrations to determine if additional monitoring is warranted.

3.2 AIR MONITORING INSTRUMENTS AND ACTION LEVELS

Photoionization Detector (PID), Organic Vapor Detector (H-Nu, OVM, OVA) - Breathing Zone Readings.

Response Levels (above background levels)	**Action**
0 to 10 ppm	Remain in Level D. Use colorimetric tubes or other chemical specific device to verify PID readings do not contain low PEL toxic materials (Benzene, Vinyl Chloride, etc.) where applicable. If benzene is present above 1 ppm withdraw from excavation and proceed to level C.
10 to 25 ppm	Withdraw from work area and contact Project Management. Proceed to Level C protection for re-entry, or discontinue operation
> 25 ppm	Secure operations withdraw from work area, and discontinue work at that location until contaminants can be evaluated, and detailed plan implemented.

3.3 TOTAL PARTICULATES

Due to the presence of SVOCs, and metals in soils on-Site, total respirable particulates may be a concern. Dust levels should be visually monitored and if levels become noticeable, soils should be wetted down to control dusty conditions. Wetting may be accomplished using various methods, including a hose connected to a fire hydrant or other on-Site source of water. The Client's Project Superintendent shall be responsible for determining when the wetting of soils is needed and the most appropriate method to use. In addition, recommended measurements for particulate monitoring are detailed below.

Upwind concentrations should be measured at the start of each work day during active handling of excavated materials (including stockpiling and truck loading) and periodically thereafter to establish background conditions. The particulate air monitoring work will be conducted using a pDR-1200 personal airborne particulate monitor (or approved equivalent) calibrated daily.

The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers (um) in size (PM-10) and capable of integrating over a period of 5-minutes or less for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate excess of the action level.

Dust migration will be visually assessed during all work activities, and at no time will the downwind perimeter particulate levels be allowed to exceed a total standard of 10 mg/m^3 (or "nuisance" dust levels).

If the downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m^3) greater than the background (upwind perimeter) for a 5-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 (e.g., soil wetting) provided the downwind PM-10 particulate levels do not exceed 150 ug/m^3 above the upwind level and 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 ug/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume if dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentrations to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

3.4 PARTICULATE MONITORING, RESPONSE LEVELS, AND ACTIONS

Parameter	Monitoring Instrument	Response Levels (above background	Action	Conditions for Continuing Work Activities
Particulates < 10 um (PM-10)	Dust Meter	Fugitive dust migration	1. Implement dust suppression techniques	Dust suppression techniques are in place
		> 100 ug/m^3 but < 150 ug/m^3	1.Implement dust suppression techniques	Levels must not exceed 150 ug/m^3 with dust suppression techniques in place
		> 150 ug/m^3	1. Halt activity 2. Re-evaluate activities	Levels decrease below 150 ug/m^3 and fugitive dust migration is prevented

3.5 PERSONAL EXPOSURE MONITORING

Lead based paint (LBP) and asbestos containing materials (ACM) may be encountered during and following building demolition, due to the age of the existing site building. However, the possible presence of LBP and ACM have not been characterized. Personal exposure monitoring of LBP and ACM may be required following characterization of the building materials. No radiological hazards have been identified within the Site vicinity (see **Section 2.0**).

4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) will be donned as described below for the activities covered by this CHASP. Based on available analytical data and the proposed intrusive activities, the Contractor, anticipates that all activities will require Level D, Modified Level D PPE, or Level C. Level C PPE may be donned if breathing zone concentrations of VOCs exceed the permissible exposure limits (PELs).

4.1 GENERAL SITE WORK

General Site work conducted outside the excavation areas, operators of heavy equipment, and non-intrusive activities which do not generate dust will require Level D protective equipment. Level D is defined as:

- Hardhat
- Eye protection
- Hearing protection (with site workers at all times and donned when appropriate)

- Steel-toed work boots
- Work clothes

Workers shall wear appropriate hearing protection during designated hearing protection-required tasks (such as, jack hammering, pile driving etc.). To reduce the exposure to noise, personnel working in areas of excessive noise must use hearing protectors (earplugs or earmuffs).

Rule-of-Thumb: Wherever actual data from sound level meters or noise dosimeters is unavailable, if it is necessary to raise one's voice above a normal conversational level to communicate with others within 3 to 5 feet away, hearing protection should be worn.

4.2 EXCAVATION AREAS AND OTHER SOIL HANDLING

Personnel working in the areas of active excavation, but not operating heavy equipment, and any other personnel potentially contacting contaminated materials will be required to wear Modified Level D PPE. Modified Level D is defined as:

- Hardhat
- Eye protection
- Hearing protection (as warranted see above)
- Steel-toed work boots
- Tyvek Coveralls
- Disposable nitrile chemically resistant gloves

Level C PPE and Level B are not expected to be required.

5.0 SITE CONTROL

To prevent both exposure of unprotected personnel and migration of contamination due to tracking by personnel or equipment, work areas along with personal protective equipment requirements will be clearly identified with signage. Pedestrian traffic will be managed to the extent possible by the Contractor's Traffic and Pedestrian Control Plan.

The Contractor will designate a work zone and support zone as defined below.

5.1 WORK ZONE

Work zones on Site will be temporary or dynamic, encompassing the work area(s) actively being worked in on that particular day(s). Site personnel will be advised of the current work area(s) as

part of site safety meetings. The Contractor will have a hydrant permit or other water source available to wet down exposed soils to control dust.

5.2 SUPPORT ZONE

The support zone will consist of an area outside the areas of active excavation and soil handling, where equipment and support vehicles will be located. Eating, drinking and smoking will be permitted only in this area. Sanitary facilities will be located on Site. In addition, potable water and water and soap for hand washing will be available at the Site.

5.3 OTHER SITE CONTROL AND SAFETY MEASURES

The following measures are designed to augment the specific health and safety guidelines provided in this plan. These issues will form the basis of the Site ordination and daily safety meetings discussed in **Section 7.0**, below.

- The Site hazards will be evaluated by the Client's Project Superintendent using the Site Safety Checklist.
- No one is to perform field work alone. Team members must be intimately familiar with the procedures for initiating an emergency response.
- Avoidance of contamination is of the utmost importance. Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces or materials. Walk around (not through) puddles and dis-colored surfaces. Do not kneel on the ground or set equipment on the ground.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited except in the support zone after proper decontamination as defined in **Section 6.0.**
- The use of alcohol or drugs is prohibited during the conduct or field operations.
- Safety equipment (PPE) will be required for all field personnel unless otherwise approved by the subcontractor's health and safety representatives and/or the Project Superintendent.

5.4 SITE SECURITY

The Site shall be unoccupied during Site work accept for Contractor personnel and subcontractors. If possible, access to the work areas during field work will be limited by closing site gates to reduce unauthorized pedestrian traffic. The Client's Project Superintendent is responsible for identifying the presence of all employees on Site.

Equipment left on Site during off hours must be locked, immobilized and/or otherwise secured to prevent theft or unauthorized use or access. The Contractor and subcontractors' employees will not be permitted on Site during off-hours without specific client approval.

6.0 DECONTAMINATION

Proper decontamination will be performed for personnel and equipment before leaving the Site. All solid waste generated during decontamination will be bagged by the Contractor personnel and stored on Site for disposal. Water will be disposed of by on-Site infiltration into soil within an exclusion zone.

6.1 PERSONAL DECONTAMINATION

Personal decontamination will be accomplished by following a systematic procedure of cleaning and removal of personal protective equipment (PPE). The Contractor will supply decontamination equipment to allow PPE to be brushed to remove gross contamination and then scrubbed clean in a detergent solution and then rinsed clean. To facilitate this, a three-basin wash system will be set up on site by the Contractor.

Disposable PPE, such as Tyvek coveralls, gloves, and hearing protection, etc. will be placed in trash bags in an on-Site container pending a disposal. Alternative chemical decontamination procedures, such as steam-cleaning reusable rubber outer boots, may be used if necessary.

Steps required in a decontamination sequence will depend on the level of protection worn in accordance with **Section 4.0**:

1. Remove and wipe clean hard hat
2. Brush boots and gloves of gross contamination
3. Scrub boots and gloves clean
4. Remove boot covers (if in use)
5. Rinse boots and gloves
6. Dry non-disposable equipment with paper towels
7. Remove Tyvek coveralls
8. Remove eye protection
9. Remove chemically resistant gloves

6.2 EQUIPMENT DECONTAMINATION

Hand tools and portable equipment will be decontaminated upon leaving the active excavation areas using the same procedures for personal decontamination. Wooden tools are difficult to

decontaminate because they absorb chemicals. Wooden hand tools will be kept on Site for the project duration and handled only by protected workers. At the end of the Site activities, wooden tools will be discarded if they cannot be decontaminated properly.

Large Equipment will be decontaminated in an area near the entrance to the Site. Decontamination of large equipment will mitigate the risk of spreading potentially-contaminated soil off-Site. The Contractor will use a combination of long-handled brushed, rods and shovels for general exterior cleaning and dislodging contaminated soil caught in tires and the undersides of vehicles and equipment.

Prior to leaving the Site, large equipment will be inspected to assure that excess material has not adhered to the equipment. If needed, the Contractor will clean the large equipment, including washing tires and undercarriages with a hose to remove excess adhered soil prior to leaving the Site.

Exposed excavated material will be covered on each truck after loading. The cover will be secured and remain in place until the container has reached the disposal facility.

7.0 MEDICAL MONITORING AND TRAINING REQUIREMENTS

Training records for Site personnel and subcontractors shall be provided by the Contractor prior to on-Site work and will be maintained on Site.

7.1 MEDICAL MONITORING

Only those workers excavating the hazardous lead areas are anticipated to need respiratory protection. Other excavation areas and general Site work it is anticipated that respiratory protection is not required by the levels of soil contamination. Therefore, only the workers excavating the hazardous lead areas will require medical monitoring requirements on this project.

7.2 TRAINING

All personnel covered by this CHASP must have completed the appropriate training requirements specified in 29 CFR 1910.1200 Hazard Communication and 29 CFR 1910.120(e). In accordance with NYC Department of Building, Local Law 196, at job sites where it is required to designate a Construction Superintendent, Site Safety Coordinators or Site Safety Managers will need, workers will need to undergo Construction Safety Training (i.e. OSHA 10-hour and OSHA 30-hour classes).

Workers requiring access to the excavation (laborers and operators) prior to completion of soil remedial activities will require 40-hour HAZWOPER training due to the presence of hazardous lead in soil and the potential for gasoline contaminated soils and underground storage tanks.

Also, at least one Contractor employee must be on Site during all activities to act as the Site Foreman and will be responsible for identifying existing and predictable hazards in surroundings or working conditions that are unsanitary, hazardous, or dangerous to Site workers and or the community, and will have the authorization to take prompt corrective measures to eliminate them. This individual must have documentation of at least three days of supervised field experience as well as completion of the specified 8-hour training course for managers and supervisors. Records of certifications and training should be kept by the Contractor.

7.3 SUBCONTRACTORS

Subcontractors will be required to provide to the Contractor Project (Site) Manager specific written documentation that each individual assigned to this project has completed the medical monitoring and training requirements specified above. This information must be provided prior to their performing any work on site.

7.4 SITE SAFETY MEETINGS

Prior to the commencement of on-Site investigative activities, a Site safety meeting will be held to review the specific requirements of this CHASP. Sign-off sheets will be collected at this meeting (see **Attachment E-2**). Short safety refresher meetings will be conducted daily or as conditions or work activates change. In addition, the Project Superintendent will document that Site visitors have had the required training in accordance with 29 CFR 1910.120 and will provide documented pre-entry safety briefings.

8.0 EMERGENCY ACTION PLAN

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance." The Contractor personnel covered by this CHASP may not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). The Contractor response actions will be limited to evacuation and medical/first aid as described below.

The basic elements of an emergency evacuation plan include employee training, alarm systems, escape routes, escape procedures, critical operations or equipment, rescue and medical duty assignments, designation of responsible parties, emergency reporting procedures, and methods to account for all employees after evacuation.

8.1 EMPLOYEE INFORMATION

General training regarding emergency evacuation procedures is included in the Contractor initial and refresher training courses. Also, as described, employees must be instructed in the specific aspects of emergency evacuation applicable to the Site as part of the site safety meeting prior to the commencement of all on-site activities. On-Site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed. This information will be provided during the Site safety meetings (see **Section 7.4**) will be documented by the Contractor.

8.2 EMERGENCY SIGNAL AND ALARM SYSTEMS

An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial Site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices cannot be clearly perceived above ambient noise levels (i.e., noise from heavy equipment, trucks, etc.) and anytime a clear line-of-sight cannot be easily maintained amongst all personnel because of distance, terrain or other obstructions. The Contractor will maintain an air horn (or whistle) on-Site that will be used to signal an emergency so that it can be heard over other construction noises on-Site.

8.3 EMERGENCY CONTACTS

Police:	911
Fire:	911
Ambulance:	911
NYU Langone Health Emergency Room:	(646) 929-7800

8.4 HOSPITAL LOCATION

The closest emergency room is located at NYU Langone Health at 550 1st Avenue, New York, NY, 10016. The most direct route to the hospital from the Site is to head east on Clay Street, turn right at the 1st cross street onto Manhattan Avenue, and turn left onto Green Street. Turn left on McGuinness Boulevard, turn right onto 49th Avenue, turn right onto 11th Place, and turn right onto 50th Avenue. Turn left and continue through the Queens-Midtown Tunnel, take the exit toward Upton/3 Ave/ 38 Street/ 41 Street, take the ramp to 39th Street, turn right onto E 37th Street, turn right onto 2nd Avenue, turn left onto E 30th Street, then turn left onto 1st Avenue and the destination is on the right. **Attachment E-3** presents a hospital route map.

8.5 INCIDENT REPORTING PROCEDURES

Any incident (other than minor first aid treatment) resulting in injury, illness or property damage requires an accident investigation and report. The investigation should be initiated as soon as emergency conditions are under control. The purpose of this investigation is not to attribute blame but to determine the pertinent facts, so that repeat or similar occurrences can be avoided.

The investigation should begin while details are still fresh in the mind of anyone involved. The person administering first aid may be able to start the fact gathering process if the injured can speak. Pertinent facts must be determined. Questions beginning with who, what, when, where, and how are usually most effective to discover ways to improve job performance in terms of efficiency and quality of work, as well as safety and health concerns. An Accident and Injury Report Form is included as **Attachment E-4**.

ATTACHMENT – E-1
SAFETY DATA SHEETS

SAFETY DATA SHEET

Version 6.4
Revision Date 07/22/2022
Print Date 08/06/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 1,1,1-Trichloroethane

Product Number : 235571
Brand : Aldrich
Index-No. : 602-013-00-2
CAS-No. : 71-55-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315

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.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

H332	Harmful if inhaled.

Precautionary statement(s)

P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	'Chlorothene' Methylchloroform
Formula	:	$C_2H_3Cl_3$
Molecular weight	:	133.40 g/mol
CAS-No.	:	71-55-6
EC-No.	:	200-756-3
Index-No.	:	602-013-00-2

Component	Classification	Concentration
1,1,1-Trichloroethane		
	Acute Tox. 4; Aquatic Acute 3; Ozone 1; H332, H402, H420	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
For precautions see section 2.2.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place.

Storage class
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,1,1-Trichloroethane	71-55-6	TWA	350 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		STEL	450 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Not classifiable as a human carcinogen		
		C	350 ppm 1,900 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	350 ppm 1,900 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	350 ppm 1,900 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	450 ppm 2,450 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	800 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
1,1,1-Trichloroethane	71-55-6	Methyl chloroform	20parts per million	In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to last shift of workweek			

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		Methyl chloroform	700 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift			

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
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-34.99 °C (-30.98 °F)
f)	Initial boiling point and boiling range	72.0 - 75.0 °C 161.6 - 167.0 °F
g)	Flash point	()No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 15 %(V) Lower explosion limit: 7.5 %(V)
k)	Vapor pressure	133.3 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	No data available
m)	Density	1.34 g/cm3
	Relative density	No data available
n)	Water solubility	1.25 g/l at 23 °C (73 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 2.49
p)	Autoignition temperature	537.0 °C (998.6 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Contains the following stabilizer(s):
Low alkyl epoxide (0.05 %)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Potassium, Magnesium, Sodium/sodium oxides, Zinc, Strong bases

10.6 Hazardous decomposition products
In the event of fire: see section 5

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 9,600 mg/kg
Symptoms: Nausea, Vomiting, Risk of aspiration upon vomiting., Aspiration may cause pulmonary edema and pneumonitis.
Remarks: (RTECS)
Acute toxicity estimate Inhalation - 4 h - 19 mg/l - vapor(Calculation method)

Inhalation: absorption
Dermal: absorption

Skin corrosion/irritation
Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Carcinogenicity
No data available

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Exposure to and/or consumption of alcohol may increase toxic effects., prolonged or repeated exposure can cause:, narcosis, Liver injury may occur., Kidney injury may occur.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Systemic effects:

After absorption:

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Headache
Dizziness
Tiredness
narcosis
drop in blood pressure
Unconsciousness

After uptake of large quantities:

depressed respiration
cardiovascular disorders

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test LC50 - Pimephales promelas (fathead minnow) - 52.8 mg/l - 96 h (US-EPA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - > 530 mg/l - 48 h (US-EPA)
Toxicity to algae	static test EC50 - Pseudokirchneriella subcapitata (algae) - 41 mg/l - 72 h (OECD Test Guideline 201)
	static test NOEC - Pseudokirchneriella subcapitata (green algae) - 7.8 mg/l - 72 h (OECD Test Guideline 201)
	IC50 - Scenedesmus capricornutum (fresh water algae) - > 670 mg/l - 96 h Remarks: (Lit.)
Toxicity to bacteria	EC50 - Sewage sludge - 360 mg/l - 30 min (OECD Test Guideline 209)

12.2 Persistence and degradability

Biodegradability	Result: 0 % - Not readily biodegradable. (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.7 Other adverse effects

Biological effects:
Hazard for drinking water supplies.
Further information on ecology
Substance which may present a danger to the structure and/or the functioning of the stratospheric ozone layer according to EC Regulation No 2037/2000 (listed in Annex I, Group V).
Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
UN number: 2831 Class: 6.1 Packing group: III
Proper shipping name: 1,1,1-Trichloroethane
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 2831 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: 1,1,1-TRICHLOROETHANE

IATA
UN number: 2831 Class: 6.1 Packing group: III
Proper shipping name: 1,1,1-Trichloroethane

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2020-07-14

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2020-07-14

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2020-07-14

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,1,1-Trichloroethane	71-55-6	2020-07-14

SECTION 16: Other information

Further information

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.4 Revision Date: 07/22/2022 Print Date: 08/06/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 8.3
Revision Date 04/18/2021
Print Date 08/06/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 1,1-Dichloroethane

Product Number : 48512
Brand : Supelco
Index-No. : 602-011-00-1
CAS-No. : 75-34-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Acute toxicity, Oral (Category 4), H302
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Short-term (acute) aquatic hazard (Category 3), H402
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Signal word	Danger
Hazard statement(s)	
H225	Highly flammable liquid and vapor.
H302	Harmful if swallowed.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H412	Harmful to aquatic life with long lasting effects.
Precautionary statement(s)	
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	Ethylidene chloride
Formula	:	$C_2H_4Cl_2$
Molecular weight	:	98.96 g/mol
CAS-No.	:	75-34-3
EC-No.	:	200-863-5
Index-No.	:	602-011-00-1

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Component	Classification	Concentration
1,1-Dichloroethane		
	Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2A; STOT SE 3; Aquatic Acute 3; Aquatic Chronic 3; H225, H302, H319, H335, H402, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Dry powder Dry sand

Unsuitable extinguishing media
Do NOT use water jet.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Advice on protection against fire and explosion
Use explosion-proof equipment.**Advice on protection against fire and explosion**
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Store at room temperature.
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,1-Dichloroethane	75-34-3	TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		TWA	100 ppm 400 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm 400 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	100 ppm 400 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 60 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-98.0 °C (-144.4 °F)
f)	Initial boiling point and boiling range	55.0 - 58.0 °C 131.0 - 136.4 °F
g)	Flash point	-10.0 °C (14.0 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Vapors may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 725.0 mg/kg

LC50 Inhalation - Rat - 4 h - 13000 ppm

Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
Chronic exposure may cause dermatitis.

Germ cell mutagenicity
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information
RTECS: KI0175000

Liver injury may occur., Kidney injury may occur., narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
UN number: 2362 Class: 3 Packing group: II
Proper shipping name: 1,1-Dichloroethane
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 2362 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,1-DICHLOROETHANE

IATA
UN number: 2362 Class: 3 Packing group: II
Proper shipping name: 1,1-Dichloroethane

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,1-Dichloroethane	75-34-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,1-Dichloroethane	75-34-3	2007-07-01

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 16: Other information

Further information

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 8.3 Revision Date: 04/18/2021 Print Date: 08/06/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

According to JIS Z 7253:2019
Revision date 05-Oct-2023
Revision Number 3.05

Section 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name	1,1-Dichloroethylene
Product Code	047-27055

Supplier
FUJIFILM Wako Pure Chemical Corporation
1-2 Doshomachi 3-Chome, Chuo-ku, Osaka 540-8605, Japan
Phone: +81-6-6203-3741
Fax: +81-6-6203-2029

Emergency telephone number +81-6-6203-3741 / +81-3-3270-8571

Recommended uses For research use only

Restrictions on use Seek expert judgment when using for purposes other than those recommended.

Section 2: HAZARDS IDENTIFICATION

GHS classification

Classification of the substance or mixture

Self-reactive substances and mixtures	Type G
Flammable liquids	Category 1
Acute toxicity - Oral	Category 4
Acute toxicity - Inhalation (Vapors)	Category 4
Serious eye damage/eye irritation	Category 2A
Carcinogenicity	Category 2
Reproductive Toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 1, Category 3
Category 1 respiratory system, liver, kidneys	
Category 3 Narcotic effects	
Specific target organ toxicity (repeated exposure)	Category 1
Category 1 blood, respiratory system, liver, kidneys, Male reproductive organ	
Acute aquatic toxicity	Category 2
Chronic aquatic toxicity	Category 3

Pictograms

Signal word Danger

Hazard statements

H224 - Extremely flammable liquid and vapor
H319 - Causes serious eye irritation
H302 - Harmful if swallowed
H332 - Harmful if inhaled
H351 - Suspected of causing cancer
H361 - Suspected of damaging fertility or the unborn child
H336 - May cause drowsiness or dizziness
H412 - Harmful to aquatic life with long lasting effects
H401 - Toxic to aquatic life
H370 - Causes damage to the following organs: respiratory system, liver, kidneys

H372 - Causes damage to the following organs through prolonged or repeated exposure: blood, respiratory system, liver, kidneys, Male reproductive organ

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
- Do not breathe dust/fume/gas/mist/vapors/spray
- Wash face, hands and any exposed skin thoroughly after handling
- Do not eat, drink or smoke when using this product
- Use only outdoors or in a well-ventilated area
- Avoid release to the environment
- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. 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

Precautionary statements-(Response)

- IF exposed: Call a POISON CENTER or doctor/physician
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
- If eye irritation persists: Get medical advice/attention
- IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
- Call a POISON CENTER or doctor/physician if you feel unwell
- IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
- Rinse mouth
- In case of fire: Use suitable extinguishing media for extinction

Precautionary statements-(Storage)

- Store in a well-ventilated place. Keep container tightly closed
- Store locked up

Precautionary statements-(Disposal)

- Dispose of contents/container to an approved waste disposal plant

Others

Other hazards Not available

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

Single Substance or Mixture Substance

Formula CH2:CCl2

Chemical Name	Weight-%	Molecular weight	ENCS	ISHL No.	CAS RN
1,1-Dichloroethylene	97.0	96.94	(2)-103	*	75-35-4

Note on ISHL No.: * in the table means announced chemical substances.

Impurities and/or Additives： [Stabilizer]p-Methoxyphenol about 0.02 %

Section 4: FIRST AID MEASURES

Inhalation

Remove to fresh air. If symptoms persist, call a physician.

Skin contact

Wash off immediately with soap and plenty of water. If symptoms persist, call a physician.

Eye contact

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediate medical attention is required.

Ingestion

Rinse mouth. Never give anything by mouth to an unconscious person. Call a physician or poison control center immediately. Do not induce vomiting without medical advice.

Protection of first-aiders

Use personal protective equipment as required.

Section 5: FIRE FIGHTING MEASURES

Suitable extinguishing media

Water spray (fog), Carbon dioxide (CO2), Foam, Extinguishing powder, Sand

Unsuitable extinguishing media

No information available

Specific hazards arising from the chemical product

Thermal decomposition can lead to release of irritating and toxic gases and vapors. Vapors may form explosive mixtures with air

Special extinguishing method

No information available

Special protective actions for fire-fighters

Use personal protective equipment as required. Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

Section 6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

For indoor, provide adequate ventilation process until the end of working. Deny unnecessary entry other than the people involved by, for example, using a rope. While working, wear appropriate protective equipments to avoid adhering it on skin, or inhaling the gas. Work from windward, and retract the people downwind.

Environmental precautions

To be careful not discharged to the environment without being properly handled waste water contaminated.

Methods and materials for contaminent and methods and materials for cleaning up

Absorb dry sand, earth, sawdust and the waste. Collect empty container that can be sealed.

Recoverly, neutralization

No information available

Secondary disaster prevention measures

Clean contaminated objects and areas thoroughly observing environmental regulations.

Section 7: HANDLING AND STORAGE

Handling

Technical measures

Highly flammable. Avoid contact with high temperature objects, spark, and strong oxidizing agents. Use with local exhaust ventilation.

Precautions

Do not rough handling containers, such as upsetting, falling, giving a shock, and dragging. Prevent leakage, overflow, and scattering. Not to generate steam and dust in vain. Seal the container after use. After handling, wash hands and face, and then gargle. In places other than those specified, should not be smoking or eating and drinking. Should not be brought contaminated protective equipment and gloves to rest stops. Deny unnecessary entry of non-emergency personnel to the handling area.

Safety handling precautions

Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use personal protective equipment as required. Avoid contact with skin, eyes or clothing.

Storage

Safe storage conditions

Storage conditions	Keep container protect from light, store in well-ventilated place at room temperature (preferably cool). Keep container tightly closed. Packed with an inert gas.
Safe packaging material	Glass
Incompatible substances	Strong oxidizing agents

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls

In case of indoor workplace, seal the source or use a local exhaust system. Provide the safety shower facility, and hand- and eye-wash facility. And display their position clearly.

Exposure limits

Chemical Name	JSOH (Japan)	ISHL (Japan)	ACGIH
1,1-Dichloroethylene 75-35-4	N/A	N/A	TWA: 5 ppm

Chemical Name	Concentration standard value set by the Minister of Health, Labor and Welfare (8hr)	Concentration standard value set by the Minister of Health, Labor and Welfare (Short-Term)
1,1-Dichloroethylene 75-35-4	5 ppm	N/A

Personal protective equipment

Respiratory protection gas mask for organic gas (JIS T 8152)
Hand protection chemical protective gloves (JIS T 8116)
Eye protection protective eyeglasses or chemical safety goggles
Skin and body protection Long-sleeved work clothes

General hygiene considerations

Handle in accordance with good industrial hygiene and safety practice.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Form	
Color	Colorless - pale yellow brown
Turbidity	clear - slightly muddy
Appearance	liquid
Odor	characteristic odor
Melting point/freezing point	-122 °C
Boiling point, initial boiling point and boiling range	31.7 °C
Flammability	Extremely flammable liquid and vapor
Evaporation rate:	no data available
Flammability (solid, gas):	no data available
Upper/lower flammability or explosive limits	
Upper:	11.4%
Lower:	5.6%
Flash point	-25 °C
Auto-ignition temperature:	no data available
Decomposition temperature:	no data available
pH	no data available
Viscosity (coefficient of viscosity)	no data available
Dynamic viscosity	no data available
Solubilities	Ethanol , acetone : Very soluble. water : practically insoluble,or insoluble .
n-Octanol/water partition coefficient:(log Pow)	no data available
Vapour pressure	no data available
Specific Gravity / Relative density	1.221 g/mL (20℃)
Vapour density	3.4
Particle characteristics	no data available

Section 10: STABILITY AND REACTIVITY

Stability

Reactivity no data available
Chemical stability May be altered by light.

Hazardous reactions
None under normal processing

Conditions to avoid
Extremes of temperature and direct sunlight, Heat, flames and sparks, static electricity, spark

Incompatible materials
Strong oxidizing agents

Hazardous decomposition products
Carbon monooxide (CO), Carbon dioxide (CO_2), Halides

Section 11: TOXICOLOGICAL INFORMATION

Acute toxicity

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
1,1-Dichloroethylene	1500 mg/kg (Rat)	N/A	6350 ppm (Rat) 4 h

Chemical Name	Acute toxicity -oral- source information	Acute toxicity -dermal- source information	Acute toxicity -inhalation gas- source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.	Based on the NITE GHS classification results.	Based on the NITE GHS classification results.

Chemical Name	Acute toxicity -inhalation vapor- source information	Acute toxicity -inhalation dust- source information	Acute toxicity -inhalation mist- source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.	Based on the NITE GHS classification results.	Based on the NITE GHS classification results.

Skin irritation/corrosion

Chemical Name	Skin corrosion/irritation source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.

Serious eye damage/ irritation

Chemical Name	Serious eye damage/irritation source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.

Respiratory or skin sensitization

Chemical Name	Respiratory or Skin sensitization source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.

Reproductive cell mutagenicity

Chemical Name	germ cell mutagencity source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.

Carcinogenicity

Chemical Name	Carcinogenicity source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.

Chemical Name	NTP	IARC	ACGIH	JSOH (Japan)
1,1-Dichloroethylene 75-35-4		Group 2B		Group 2B

Reproductive toxicity

Chemical Name	Reproductive toxicity source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.

STOT-single exposure

Chemical Name	STOT -single exposure- source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.

STOT-repeated exposure

Chemical Name	STOT -repeated exposure- source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.

Aspiration hazard

Chemical Name	Aspiration Hazard source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity

Chemical Name	Algae/aquatic plants	Fish	Crustacea
1,1-Dichloroethylene	*EbC50 : Chlamydomonas reinhardi 9.12 mg/L 72 h EC10 : Scenedesmus quadricauda 240 mg/L 96 h*	*N/A*	*EC50 : Daphnia magna 11.6 mg/L 48 h*

Other data

Chemical Name	Short-term (acute) hazardous to the aquatic environment source information	Long-term (chronic) hazardous to the aquatic environment source information
1,1-Dichloroethylene	Based on the NITE GHS classification results.	Based on the NITE GHS classification results.

Persistence and degradability No information available
Bioaccumulative potential No information available
Mobility in soil No information available
Hazard to the ozone layer No information available

Section 13: DISPOSAL CONSIDERATIONS

Waste from residues
Disposal should be in accordance with applicable regional, national and local laws and regulations.
Contaminated container and contaminated packaging
Disposal should be in accordance with applicable regional, national and local laws and regulations.

Section 14: TRANSPORT INFORMATION

ADR/RID
UN number UN1303
Proper shipping name: Vinylidene chloride, stabilized
UN classfication 3
Subsidiary hazard class
Packing group I
Marine pollutant Yes

IMDG
UN number UN1303
Proper shipping name: Vinylidene chloride, stabilized
UN classfication 3
Subsidiary hazard class P
Packing group I
Marine pollutant (Sea) Yes
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code No information available

IATA
UN number UN1303
Proper shipping name: Vinylidene chloride, stabilized
UN classfication 3
Subsidiary hazard class
Packing group I
Environmentally Hazardous Substance Yes

Section 15: REGULATORY INFORMATION

Japanese regulations

Fire Service Act	Category IV, special inflammable materials, dangerous grade 1
Poisonous and Deleterious Substances Control Law	Not applicable
Industrial Safety and Health Act	Harmful Substances Whose Names Are to be Indicated on the Label (Law Art.57, Para.1, Enforcement Order Art.18) Notifiable Substances (Law Art.57-2, Enforcement Oder Art.18-2 Attached Table No.9)No.241 Dangerous Substances - Flammable Substance (Enforcement Order Attached Table 1 Item 4)
Regulations for the carriage and storage of dangerous goods in ship	Flammable Liquids (Ordinance Art.3, Ministry of Transportation Ordinance Regarding Transport by Ship and Storage, Attached Table 1)
Civil Aeronautics Law	Flammable Liquids (Ordinance Art.194, MITL Nortification for Air Transportation of Explosives etc., Attached Table 1)
Marine Pollution Prevention Law	Enforcement ordinance Appendix No. 1 Noxious liquid substance Category Y Marine pollutants (P and PP substances)
Pollutant Release and Transfer Register Law (2023.4.1-)	Class 1
Class 1 - No.	158
Water Pollution Control Act	Harmful Substances (Law Art.2, Enforcement Order Art.2, Ordinace Designating Wastewater Standards Art.1)
Export Trade Control Order	Not applicable
Air Pollution Control Law	Hazardous Air Pollutants
Soil Contamination Control Law	Designated Hazardous Substances

Chemical Name	Poisonous and Deleterious Substances Control Law	Industrial Safety and Health Act Substances (Law Art.57-2)	Pollutant Release and Transfer Register Law (2023.4.1-)
1,1-Dichloroethylene 75-35-4 (97.0)	-	Applicable	Applicable

Section 16: OTHER INFORMATION

Key literature references and sources for data etc.

NITE: National Institute of Technology and Evaluation (JAPAN)
http://www.safe.nite.go.jp/japan/db.html
IATA dangerous Goods Regulations
RTECS:Registry of Toxic Effects of Chemical Substances
Japan Industrial Safety and Health Association GHS Model SDS
Dictionary of Synthetic Oraganic Chemistry , SSOCJ, Koudansha Scientific Co.Ltd.
Chemical Dictionary, Kyouritsu Publishing Co., Ltd.
etc

Disclaimer

This SDS is according to JIS Z 7253: 2019. 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, 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.
GHS Classification is according to JIS Z 7252:2019. *JIS: Japanese Industrial Standards

End of Safety Data Sheet

SAFETY DATA SHEET

Version 6.4
Revision Date 11/03/2023
Print Date 06/22/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 1,1,2,2-Tetrachloroethane

Product Number : 106534
Brand : Aldrich
Index-No. : 602-015-00-3
CAS-No. : 79-34-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Inhalation (Category 2), H330
Acute toxicity, Dermal (Category 1), H310
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Pictogram

Signal Word Danger

Hazard statement(s)

H310 + H330	Fatal in contact with skin or if inhaled.
H411	Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P262	Do not get in eyes, on skin, or on clothing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing.
P284	Wear respiratory protection.
P302 + P350 + P310	IF ON SKIN: Gently wash with plenty of soap and water. Immediately call a POISON CENTER or doctor/ physician.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P361	Remove/ Take off immediately all contaminated clothing.
P363	Wash contaminated clothing before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Rapidly absorbed through skin.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Acetylene tetrachloride

Formula : $C_2H_2Cl_4$
Molecular weight : 167.85 g/mol
CAS-No. : 79-34-5
EC-No. : 201-197-8
Index-No. : 602-015-00-3

Component	Classification	Concentration
1,1,2,2-tetrachloroethane		
	Acute Tox. 2; Acute Tox. 1; Aquatic Acute 2; Aquatic Chronic 2; H330, H310, H401, H411	<= 100 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class
Storage class (TRGS 510): 6.1B: Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Component	CAS-No.	Value	Control parameters	Basis
1,1,2,2-tetrachloroethane	79-34-5	TWA	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	1 ppm 7 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen Potential for dermal absorption		
		TWA	5 ppm 35 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		PEL	1 ppm 7 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -43 °C (-45 °F) - lit.
f)	Initial boiling point and boiling range	147 °C 297 °F - lit.
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	10.7 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	No data available
m)	Density	1.586 g/cm3 at 25 °C (77 °F) - lit.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 5
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Sodium/sodium oxides, Strong bases, Potassium, Nitrates, 2,4-dinitrophenyl disulfide

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Symptoms: Nausea, Vomiting
Acute toxicity estimate Inhalation - 4 h - 0.501 mg/l - vapor

(Expert judgment)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Symptoms: Cough, Shortness of breath

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Acute toxicity estimate Dermal - 5 mg/kg
(Expert judgment)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Skin corrosion/irritation
Remarks: Drying-out effect resulting in rough and chapped skin.

Serious eye damage/eye irritation
Remarks: Lacrimal irritation due to vapours.
Risk of corneal clouding.

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

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

IARC: 2B - Group 2B: Possibly carcinogenic to humans (1,1,2,2-tetrachloroethane)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: KI8575000
Headache, Nausea, Vomiting, Tremors, Incoordination., fatigue, Dizziness, Anorexia., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

Headache
Dizziness
Drowsiness
Tiredness
Cardiac irregularities
Cyanosis
inebriation
Tremors
ataxia (impaired locomotor coordination)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Unconsciousness
Coma
narcosis
respiratory arrest
death

Use of alcoholic beverages may enhance toxic effects.

Absorption can result in damage to:

Liver
Kidney

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 20.3 mg/l - 96 h Remarks: (ECOTOX Database)
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 23 mg/l - 48 h Remarks: (ECOTOX Database)
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 76.9 mg/l - 72 h Remarks: (ECOTOX Database)
Toxicity to fish(Chronic toxicity)	LOEC - other fish - 7.23 mg/l - 10 d Remarks: (ECOTOX Database)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 14 d - 0.00962 mg/l(1,1,2,2-tetrachloroethane) Bioconcentration factor (BCF): 8

12.4 Mobility in soil

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.
Biological effects:
Forms toxic mixtures in water, dilution measures notwithstanding.
Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

SECTION 14: Transport information

DOT (US)

UN number: 1702 Class: 6.1 Packing group: II
Proper shipping name: 1,1,2,2-Tetrachloroethane
Reportable Quantity (RQ): 100 lbs
Marine pollutant: yes Poison Inhalation Hazard: No

IMDG

UN number: 1702 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: 1,1,2,2-TETRACHLOROETHANE
Marine pollutant : yes
Marine pollutant : yes

IATA

UN number: 1702 Class: 6.1 Packing group: II
Proper shipping name: 1,1,2,2-Tetrachloroethane

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,1,2,2-tetrachloroethane	79-34-5	2018-04-24

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,1,2,2-tetrachloroethane	79-34-5	2018-04-24

Pennsylvania Right To Know Components

1,1,2,2-tetrachloroethane	CAS-No.	Revision Date
	79-34-5	2018-04-24

California Prop. 65 Components

, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.1,1,2,2-tetrachloroethane	CAS-No. 79-34-5	Revision Date 2007-09-28

SECTION 16: Other information

Further information
Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.4 Revision Date: 11/03/2023 Print Date: 06/22/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Version 7.4
Revision Date 04.03.2024
Print Date 11.10.2024
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 1,2-Dichloroethane

Product Number : 284505
Brand : Sigma-Aldrich
Index-No. : 602-012-00-7
REACH No. : 01-2119484658-20-XXXX
CAS-No. : 107-06-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Scientific research and development

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Flammable liquids, (Category 2)	H225: Highly flammable liquid and vapor.
Acute toxicity, (Category 4)	H302: Harmful if swallowed.
Acute toxicity, (Category 3)	H331: Toxic if inhaled.
Skin irritation, (Category 2)	H315: Causes skin irritation.

The life science business of Merck operates as MilliporeSigma in the US and Canada

Eye irritation, (Category 2)	H319: Causes serious eye irritation.
Carcinogenicity, (Category 1B)	H350: May cause cancer.
Specific target organ toxicity - single exposure, (Category 3), Respiratory system	H335: May cause respiratory irritation.
Aspiration hazard, (Category 1)	H304: May be fatal if swallowed and enters airways.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram

Signal Word	Danger
Hazard Statements	
H225	Highly flammable liquid and vapor.
H302	Harmful if swallowed.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H335	May cause respiratory irritation.
H350	May cause cancer.
Precautionary Statements	
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. 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.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
Supplemental Hazard Statements	none
	Restricted to professional users.

Reduced Labeling (<= 125 ml)

Pictogram

Signal Word	Danger

The life science business of Merck operates as MilliporeSigma in the US and Canada

Hazard Statements	
H331	Toxic if inhaled.
H350	May cause cancer.
H304	May be fatal if swallowed and enters airways.
Precautionary Statements	
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P331	Do NOT induce vomiting.
Supplemental Hazard Statements	none

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
Toxicological information:
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	Ethylene dichloride Ethylene chloride
Formula	:	$C_2H_4Cl_2$
Molecular weight	:	98,96 g/mol
CAS-No.	:	107-06-2
EC-No.	:	203-458-1
Index-No.	:	602-012-00-7

Component	Classification	Concentration
1,2-Dichloroethane Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
CAS-No. 107-06-2 EC-No. 203-458-1 Index-No. 602-012-00-7	Flam. Liq. 2; Acute Tox. 4; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2; Carc. 1B; STOT SE 3; Asp. Tox. 1; H225, H302, H331, H315, H319, H350, H335, H304	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck operates as MilliporeSigma in the US and Canada

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

The life science business of Merck operates as MilliporeSigma in the US and Canada

5.4 Further information

Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

8.2 Exposure controls

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Viton®
Minimum layer thickness: 0,7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Chloroprene
Minimum layer thickness: 0,65 mm
Break through time: 10 min
Material tested:KCL 720 Camapren®

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter A (acc. to DIN 3181) for vapours of organic compounds

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

The life science business of Merck operates as MilliporeSigma in the US and Canada

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Physical state	viscous liquid
b)	Color	colorless
c)	Odor	of solvents
d)	Melting point/freezing point	Melting point/range: -35 °C - lit.
e)	Initial boiling point and boiling range	83 °C - lit.
f)	Flammability (solid, gas)	No data available
g)	Upper/lower flammability or explosive limits	Upper explosion limit: 15,9 %(V) Lower explosion limit: 6 %(V)
h)	Flash point	ca.13 °C - closed cup - DIN 51755 Part 1
i)	Autoignition temperature	440 °C at 1.013 hPa - DIN 51794
j)	Decomposition temperature	300 °C
k)	pH	No data available
l)	Viscosity	Viscosity, kinematic: No data available Viscosity, dynamic: 0,83 mPa.s at 20 °C
m)	Water solubility	7,9 g/l at 25 °C - OECD Test Guideline 105- soluble
n)	Partition coefficient: n-octanol/water	log Pow: 1,45 at 20 °C - Bioaccumulation is not expected.
o)	Vapor pressure	87 hPa at 20 °C 102 hPa at 25 °C
p)	Density	1,256 g/mL at 25 °C - lit.
	Relative density	No data available
q)	Relative vapor density	No data available
r)	Particle characteristics	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	32,45 mN/m at 20 °C

The life science business of Merck operates as MilliporeSigma in the US and Canada

Relative vapor density	4,1 at 20 °C

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Exothermic reaction with:
Alkaline earth metals
alkali amides
Nitric acid
nitrogen oxides
Oxidizing agents
Chlorine
powdered magnesium
Zinc
Risk of explosion with:
Alkali metals
powdered aluminium
Powdered metals
Potassium
nitrogen dioxide

10.4 Conditions to avoid
Warming.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 770 mg/kg
(OECD Test Guideline 401)
Acute toxicity estimate Oral - 770 mg/kg
(ATE value derived from LD50/LC50 value)
LC50 Inhalation - Rat - male and female - 4 h - 7,8 mg/l - vapor

(OECD Test Guideline 403)
Acute toxicity estimate Inhalation - 7,8 mg/l - vapor

The life science business of Merck operates as MilliporeSigma in the US and Canada

(ATE value derived from LD50/LC50 value)
LD50 Dermal - Rabbit - male - 4.890 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rabbit
Result: irritating
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitization
Local lymph node assay (LLNA) - Mouse
Result: negative
(OECD Test Guideline 429)

Germ cell mutagenicity
Test Type: Ames test
Test system: S. typhimurium
Metabolic activation: with and without metabolic activation
Result: positive
Remarks: (ECHA)
Test Type: Ames test
Test system: Escherichia coli
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 471
Result: positive
Test Type: In vitro mammalian cell gene mutation test
Test system: human lymphoblastoid cells
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 476
Result: positive
Test Type: In vitro mammalian cell gene mutation test
Test system: human lymphoblastoid cells
Metabolic activation: without metabolic activation
Result: positive
Remarks: (ECHA)
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster lung cells
Metabolic activation: with and without metabolic activation
Result: positive
Remarks: (ECHA)
Test Type: unscheduled DNA synthesis assay
Test system: rat hepatocytes
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 482
Result: positive

Test Type: Micronucleus test
Species: Mouse

The life science business of Merck operates as MilliporeSigma in the US and Canada

Application Route: Intraperitoneal
Method: OECD Test Guideline 474
Result: negative

Test Type: Mutagenicity (mammal cell test): micronucleus.
Species: Mouse
Cell type: Red blood cells (erythrocytes)
Application Route: Oral
Method: OECD Test Guideline 474
Result: negative

Test Type: sister chromatid exchange assay
Species: Rat
Cell type: mammary gland
Application Route: inhalation (vapor)

Result: negative
Remarks: (ECHA)

Species: Drosophila melanogaster
Cell type: sperm
Application Route: Inhalation
Method: OECD Test Guideline 477
Result: positive

Test Type: Transgenic rodent somatic cell gene mutation assay
Species: Mouse

Application Route: Intraperitoneal

Result: negative
Remarks: (ECHA)

Carcinogenicity
Presumed to have carcinogenic potential for humans

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
Aspiration may cause pulmonary edema and pneumonitis.

11.2 Additional Information

Endocrine disrupting properties

Product:

Assessment	The substance/mixture does not contain

The life science business of Merck operates as MilliporeSigma in the US and Canada

components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Repeated dose toxicity - Rat - male and female - Oral - 90 d - NOAEL (No observed adverse effect level) - 37,5 mg/kg
Remarks: Subchronic toxicity

Repeated dose toxicity - Mouse - male and female - Inhalation - 104 Weeks

RTECS: KI0525000
Acts as a simple asphyxiant by displacing air., anesthetic effects, Difficulty in breathing, Headache, Dizziness, Prolonged or repeated contact with skin may cause:, defatting, Dermatitis, Contact with eyes can cause:, Redness, Blurred vision, Provokes tears., Effects due to ingestion may include:, Gastrointestinal discomfort, Central nervous system depression, Paresthesia., Drowsiness, Convulsions, Conjunctivitis., Pulmonary edema. Effects may be delayed., Irregular breathing., Stomach/intestinal disorders, Nausea, Vomiting, Increased liver enzymes., Weakness, Heavy or prolonged skin exposure may result in the absorption of harmful amounts of material.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Pancreas. -

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 136 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 160 mg/l - 48 h Remarks: (in soft water) (IUCLID)
Toxicity to algae	static test EC50 - Desmodesmus subspicatus (green algae) - 166 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	static test EC50 - activated sludge - 35.500 mg/l - 3 h (OECD Test Guideline 209)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	static test NOEC - Daphnia magna (Water flea) - 11 mg/l - 28 d Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 20 d Result: > 90 % - Inherently biodegradable.

The life science business of Merck operates as MilliporeSigma in the US and Canada

Remarks: (ECHA)

12.3 Bioaccumulative potential

Bioaccumulation — Lepomis macrochirus - 14 d
at 16 °C - 0,957 mg/l(1,2-Dichloroethane)

Bioconcentration factor (BCF): 2

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

No data available

SECTION 14: Transport information

14.1 UN number

ADR/RID: 1184 IMDG: 1184 IATA: 1184

14.2 UN proper shipping name

ADR/RID: ETHYLENE DICHLORIDE
IMDG: ETHYLENE DICHLORIDE
IATA: Ethylene dichloride

14.3 Transport hazard class(es)

ADR/RID: 3 (6.1) IMDG: 3 (6.1) IATA: 3 (6.1)

14.4 Packaging group

ADR/RID: II IMDG: II IATA: II

The life science business of Merck operates as MilliporeSigma in the US and Canada

14.5 Environmental hazards

ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user

Tunnel restriction code : (D/E)

Further information : No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Authorisations and/or restrictions on use

REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59). : 1,2-Dichloroethane

This product contains a substance listed on Annex XIV of the REACH Regulation (EC) Nr. 1907/2006.

Listed substance / Sunset Date : 1,2-Dichloroethane / 22.11.2017

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII) : 1,2-Dichloroethane

National legislation

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.	H2	ACUTE TOXIC
	P5c	FLAMMABLE LIQUIDS
	H2	ACUTE TOXIC
	P5c	FLAMMABLE LIQUIDS

Other regulations

Observe work restrictions regarding maternity protection in accordance to Dir 92/85/EEC or stricter national regulations where applicable.

Take note of Dir 94/33/EC on the protection of young people at work.

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

The life science business of Merck operates as MilliporeSigma in the US and Canada

SECTION 16: Other information

Full text of H-Statements

H225	Highly flammable liquid and vapor.
H302	Harmful if swallowed.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H335	May cause respiratory irritation.
H350	May cause cancer.

Full text of other abbreviations

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent

The life science business of Merck operates as MilliporeSigma in the US and Canada

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.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

The life science business of Merck operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Revision Date 27-Mar-2024 **Revision Number** 3

1. Identification

Product Name **1,2,3-trichloropropane**

Cat No. : **L04312**

CAS No 96-18-4
Synonyms Allyl trichloride; Glycerol trichlorohydrin; Trichlorohydrin

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757

Emergency Telephone Number
For information **US** call: 001-800-227-6701 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No. **US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 4
Acute oral toxicity	Category 4
Acute dermal toxicity	Category 4
Carcinogenicity	Category 1B
Reproductive Toxicity	Category 1B

Label Elements

Signal Word
Danger

Hazard Statements
Combustible liquid
May cause cancer
May damage fertility

Harmful if swallowed or in contact with skin

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
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Response
IF exposed or concerned: Get medical attention/advice
Skin
IF ON SKIN: Wash with plenty of soap and water
Call a POISON CENTER or doctor/physician if you feel unwell
Wash contaminated clothing before reuse
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep cool
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)

WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
1,2,3-Trichloropropane	96-18-4	> 99

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention.

Inhalation Remove from exposure, lie down. Remove to fresh air. If not breathing, give artificial respiration. Get medical attention.

Ingestion Clean mouth with water. Get medical attention.

Most important symptoms and effects Difficulty in breathing. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Water mist may be used to cool closed containers. Chemical foam. Water mist may be used to cool closed containers.

Unsuitable Extinguishing Media No information available

Flash Point 74 °C / 165.2 °F

Method - No information available

Autoignition Temperature 304 °C / 579.2 °F

Explosion Limits

Upper	12.6%
Lower	3.2%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Combustible material. Flammable. Vapors may form explosive mixtures with air. Containers may explode when heated.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2). Phosgene. Hydrogen chloride gas.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions See Section 12 for additional Ecological Information. Do not flush into surface water or sanitary sewer system.

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.

7. Handling and storage

Handling Do not breathe mist/vapors/spray. Do not get in eyes, on skin, or on clothing. Handle product only in closed system or provide appropriate exhaust ventilation. Keep away from open flames, hot surfaces and sources of ignition.

Storage. Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat, sparks and flame. Keep containers tightly closed in a dry, cool and well-ventilated place. Incompatible Materials. Strong bases. Metals. Finely powdered metals.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
1,2,3-Trichloropropane	TWA: 0.005 ppm	(Vacated) TWA: 10 ppm (Vacated) TWA: 60 mg/m³ TWA: 50 ppm TWA: 300 mg/m³	IDLH: 100 ppm TWA: 10 ppm TWA: 60 mg/m³	TWA: 10 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Recommended Filter type: Organic gases and vapours filter. Type A. Brown. conforming to EN14387.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Light yellow
Odor	sweet
Odor Threshold	No information available
pH	Not applicable
Melting Point/Range	-14 °C / 6.8 °F
Boiling Point/Range	152 - 156 °C / 305.6 - 312.8 °F @ 760 mmHg
Flash Point	74 °C / 165.2 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	12.6%
Lower	3.2%
Vapor Pressure	4.5 mbar @ 20 °C
Vapor Density	5.1 (Air = 1.0)
Specific Gravity	1.386
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	304 °C / 579.2 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C3 H5 Cl3
Molecular Weight	147.43

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Keep away from open flames, hot surfaces and sources of ignition.

Incompatible Materials Strong bases, Metals, Finely powdered metals

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Phosgene, Hydrogen chloride gas

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
1,2,3-Trichloropropane	LD50 = 150 mg/kg (Rat)	LD50 = 250 mg/kg (Rabbit)	LC50 > 4800 mg/m³ (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 No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
1,2,3-Trichloropropane	96-18-4	Group 2A	Reasonably Anticipated	A2	X	A3

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity Teratogenic effects have occurred in experimental animals.

STOT - single exposure None known

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.

12. Ecological information

Ecotoxicity

Contains a substance which is:. Harmful to aquatic organisms. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
1,2,3-Trichloropropane	Not listed	LC50: = 75 mg/L, 96h static	Not listed	EC50: 27.8 - 41.1 mg/L, 48h

		(Lepomis macrochirus) LC50: 25.9 - 28.9 mg/L, 96h static (Pimephales promelas) LC50: = 50.8 mg/L, 96h flow-through (Pimephales promelas)		semi-static (Daphnia magna) LC50: = 20 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.

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 UN2810
Hazard Class 6.1
Packing Group III

TDG

UN-No UN2810
Hazard Class 6.1
Packing Group III

IATA

UN-No UN2810
Proper Shipping Name TOXIC LIQUID, ORGANIC, N.O.S.*
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No UN2810
Proper Shipping Name Toxic liquid, organic, n.o.s.
Hazard Class 6.1
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
1,2,3-Trichloropropane	96-18-4	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea

(KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
1,2,3-Trichloropropane	96-18-4	X	-	202-486-1	X	X	X	X	X	KE-34093

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Component	CAS No	Weight %	SARA 313 - Threshold Values %	SARA 313 - Reporting threasholds
1,2,3-Trichloropropane	96-18-4	> 99	0.1 %	-

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
1,2,3-Trichloropropane	96-18-4	Carcinogen	-	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
1,2,3-Trichloropropane	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

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
1,2,3-Trichloropropane	96-18-4	-	Use restricted. See item 28. (see link for restriction details) Use restricted. See item 30. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	SVHC Candidate list - 202-486-1 - Carcinogenic, Article 57a;Toxic for reproduction, Article 57c

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

REACH links
https://echa.europa.eu/authorisation-list
https://echa.europa.eu/substances-restricted-under-reach
https://echa.europa.eu/candidate-list-table

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
1,2,3-Trichloropropane	96-18-4	Listed	Not applicable	Not applicable	Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
Not applicable

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
1,2,3-Trichloropropane	96-18-4	Not applicable	Not applicable	Not applicable	Annex I - Y45

16. Other information

Prepared By Health, Safety and Environmental Department
Email: chem.techinfo@thermofisher.com
www.thermofisher.com

Revision Date 27-Mar-2024
Print Date 27-Mar-2024
Revision Summary New emergency telephone response service provider.

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information

relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 6.2
Revision Date 07/23/2022
Print Date 08/06/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 1,2,4-Trimethylbenzene

Product Number : T73601
Brand : Aldrich
Index-No. : 601-043-00-3
CAS-No. : 95-63-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Aspiration hazard (Category 1), H304
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Pictogram	
Signal Word	Danger

Hazard statement(s)

H226	Flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H411	Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula : C_9H_{12}

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Molecular weight	:	120.19 g/mol
CAS-No.	:	95-63-6
EC-No.	:	202-436-9
Index-No.	:	601-043-00-3

Component	Classification	Concentration
1,2,4-Trimethylbenzene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 2; H226, H332, H315, H319, H335, H304, H401, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Dry powder Dry sand

Unsuitable extinguishing media
Do NOT use water jet.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Advice on protection against fire and explosion
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,2,4-Trimethylbenzene	95-63-6	TWA	25 ppm 125 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	25 ppm	USA. ACGIH Threshold Limit Values (TLV)
		PEL	25 ppm 125 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	-43.7 °C (-46.7 °F)
f)	Initial boiling point and boiling range	168.0 - 169.0 °C 334.4 - 336.2 °F
g)	Flash point	48.0 °C (118.4 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 6.4 %(V) Lower explosion limit: 0.9 %(V)
k)	Vapor pressure	2.3 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	No data available
m)	Density	0.88 g/cm3
	Relative density	No data available
n)	Water solubility	0.057 g/l at 25 °C (77 °F) - slightly soluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	515.0 °C (959.0 °F)
q)	Decomposition	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

temperature

r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 6,000 mg/kg
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
Test Type: in vitro test
Test system: S. typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Test Type: In vivo micronucleus test
Species: Rat
Cell type: Bone marrow
Application Route: Intraperitoneal
Method: Mutagenicity (micronucleus test)
Result: negative

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: DC3325000
prolonged or repeated exposure can cause:, narcosis, Bronchitis., Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Central nervous system -

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 7.72 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 3.6 mg/l - 48 h (OECD Test Guideline 202)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
UN number: 3295 Class: 3 Packing group: III
Proper shipping name: Hydrocarbons, liquid, n.o.s.
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 3295 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: HYDROCARBONS, LIQUID, N.O.S.

IATA
UN number: 3295 Class: 3 Packing group: III
Proper shipping name: Hydrocarbons, liquid, n.o.s.

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
1,2,4-Trimethylbenzene	95-63-6	2007-07-01

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,2,4-Trimethylbenzene	95-63-6	2007-07-01

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,2,4-Trimethylbenzene	95-63-6	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
1,2,4-Trimethylbenzene	95-63-6	2007-07-01

SECTION 16: Other information

Further information

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.2 Revision Date: 07/23/2022 Print Date: 08/06/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 8.3
Revision Date 07/23/2022
Print Date 08/06/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 1,3,5-Trimethylbenzene

Product Number : 442236
Brand : Supelco
Index-No. : 601-025-00-5
CAS-No. : 108-67-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Aspiration hazard (Category 1), H304
Short-term (acute) aquatic hazard (Category 3), H402
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Signal Word	Danger

Hazard statement(s)

H226	Flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H402	Harmful to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	Mesitylene 1,3,5-Trimethylbenzene
Formula	:	C_9H_{12}
Molecular weight	:	120.19 g/mol
CAS-No.	:	108-67-8
EC-No.	:	203-604-4
Index-No.	:	601-025-00-5

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Component	Classification	Concentration
mesitylene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; STOT SE 3; Asp. Tox. 1; Aquatic Acute 3; Aquatic Chronic 2; H226, H332, H315, H335, H304, H402, H411 Concentration limits: >= 25 %: STOT SE 3, H335;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Combustible.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
mesitylene	108-67-8	TWA	25 ppm 125 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	25 ppm	USA. ACGIH Threshold Limit Values (TLV)
		PEL	25 ppm 125 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
required

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting	Melting point/range: -45 °C (-49 °F) - lit.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	point/freezing point	
f)	Initial boiling point and boiling range	163 - 166 °C 325 - 331 °F - lit.
g)	Flash point	50 °C (122 °F) at ca.1,013.25 hPa
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 6 %(V) Lower explosion limit: 0.88 %(V)
k)	Vapor pressure	3.2 hPa at 25 °C (77 °F)
l)	Vapor density	No data available
m)	Density	0.864 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	0.0482 g/l at 25 °C (77 °F) - slightly soluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	550.0 °C (1022.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	0.843 mm2/s at 20 °C (68 °F) - 0.630 mm2/s at 50 °C (122 °F) -
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	27.55 mN/m at 25 °C (77 °F)

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapor/air-mixtures are explosive at intense warming.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Heating.

10.5 Incompatible materials
Strong oxidizing agents

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

10.6 Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - male - 6,000 mg/kg
(EC Directive 92/69/EEC B.1 Acute Toxicity (Oral))
LC50 Inhalation - Rat - male and female - 4 h - 10.2 mg/l - vapor

Remarks: (ECHA)
Inhalation: Irritating to respiratory system.
LD50 Dermal - Rat - male and female - > 2,000 mg/kg
Remarks: (ECHA)

Skin corrosion/irritation

Skin - Rabbit
Result: Irritating to skin. - 4 h
(Regulation (EC) No. 440/2008, Annex, B.4)

Serious eye damage/eye irritation

Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)
Remarks: (in analogy to similar products)

Respiratory or skin sensitization

Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)
Remarks: (in analogy to similar products)

Germ cell mutagenicity

Test Type: Ames test
Test system: S. typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Test Type: Micronucleus test
Species: Mouse
Cell type: Red blood cells (erythrocytes)
Application Route: Intraperitoneal
Method: OECD Test Guideline 474
Result: negative

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation. - Respiratory system

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 90 Days - NOAEL (No observed adverse effect level) - 600 mg/kg

RTECS: OX6825000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Carassius auratus (goldfish) - 12.52 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test LC50 - Daphnia magna (Water flea) - 6 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test ErC50 - Desmodesmus subspicatus (green algae) - 53 mg/l - 48 h (DIN 38412)
Toxicity to bacteria	static test NOEC - activated sludge - 24.2 mg/l - 28 h Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic Theoretical oxygen demand - Exposure time 28 d Result: 61 % - Readily biodegradable. (OECD Test Guideline 301F) Remarks: The 10 day time window criterion is not fulfilled.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)

UN number: 2325 Class: 3 Packing group: III
Proper shipping name: 1,3,5-Trimethylbenzene
Reportable Quantity (RQ):
1) Marine pollutant: yesPoison Inhalation Hazard: No

IMDG

UN number: 2325 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: 1,3,5-TRIMETHYLBENZENE
Marine pollutant : yes
Marine pollutant : yes

IATA

UN number: 2325 Class: 3 Packing group: III
Proper shipping name: 1,3,5-Trimethylbenzene

SECTION 15: Regulatory information

SARA 302 Components

This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 16: Other information

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 8.3 Revision Date: 07/23/2022 Print Date: 08/06/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.6
Revision Date 05/24/2022
Print Date 10/01/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Acetone

Product Number : 179124
Brand : SIGALD
Index-No. : 606-001-00-8
CAS-No. : 67-64-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word Danger

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Hazard statement(s)

H225	Highly flammable liquid and vapor.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.

Precautionary statement(s)

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing mist or vapors.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Repeated exposure may cause skin dryness or cracking.

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C_3H_6O
Molecular weight	:	58.08 g/mol
CAS-No.	:	67-64-1
EC-No.	:	200-662-2
Index-No.	:	606-001-00-8

Component	Classification	Concentration
acetone		
	Flam. Liq. 2; Eye Irrit. 2A; STOT SE 3; H225, H319, H336 Concentration limits: >= 20 %: STOT SE 3, H336;	<= 100 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters
In the event of fire, wear self-contained breathing apparatus.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®).
Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Component	CAS-No.	Value	Control parameters	Basis
acetone	67-64-1	TWA	250 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		STEL	500 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Not classifiable as a human carcinogen		
		TWA	250 ppm 590 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1,000 ppm 2,400 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		C	3,000 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	500 ppm 1,200 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	750 ppm 1,780 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
acetone	67-64-1	Acetone	25 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	33.3 mg/kg
Sea water	1.06 mg/l
Fresh water	10.6 mg/l
Sea sediment	3.04 mg/kg
Fresh water sediment	30.4 mg/kg
Onsite sewage treatment plant	100 mg/l

8.2 Exposure controls

Appropriate engineering controls

Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

Personal protective equipment

Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: butyl-rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Butoject® (KCL 898)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Latex gloves
Minimum layer thickness: 0.6 mm
Break through time: 10 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: clear, liquid Color: colorless
b)	Odor	pungent, weakly aromatic
c)	Odor Threshold	0.1 ppm
d)	pH	5 - 6 at 395 g/l at 20 °C (68 °F)
e)	Melting point/freezing point	Melting point/range: -94 °C (-137 °F) - lit.
f)	Initial boiling point and boiling range	56 °C 133 °F at 1,013 hPa - lit.
g)	Flash point	-17.0 °C (1.4 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid,	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	gas)	
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 13 %(V) Lower explosion limit: 2 %(V)
k)	Vapor pressure	245.3 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	No data available
m)	Density	0.791 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	soluble, in all proportions
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	465.0 °C (869.0 °F)
q)	Decomposition temperature	Distillable in an undecomposed state at normal pressure.
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Conductivity	0.01 µS/cm at 20 °C (68 °F)
Surface tension	23.2 mN/m at 20.0 °C (68.0 °F)

SECTION 10: Stability and reactivity

10.1 Reactivity

Vapors may form explosive mixture with air.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions

Risk of ignition or formation of inflammable gases or vapours with:
chromosulfuric acid
chromyl chloride
ethanolamine
Fluorine
Strong oxidizing agents
strong reducing agents
Nitric acid
chromium(VI) oxide
Risk of explosion with:
nonmetallic oxyhalides
halogen-halogen compounds
Chloroform
nitrating acid
nitrosyl compounds

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

hydrogen peroxide
halogen oxides
organic nitro compounds
peroxi compounds
Exothermic reaction with:
Bromine
Alkali metals
alkali hydroxides
Halogenated hydrocarbon
Sulfur dichloride
phosphorous oxichloride

10.4 Conditions to avoid
Warming.

10.5 Incompatible materials
rubber, various plastics

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - 5,800 mg/kg
Remarks: (ECHA)
LC50 Inhalation - Rat - 4 h - 76 mg/l - vapor

Remarks: Unconsciousness
Drowsiness
Dizziness
(External MSDS)
LD50 Dermal - Rabbit - 20,000 mg/kg
Remarks: (IUCLID)
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h
(Draize Test)
Remarks: (RTECS)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h
(Draize Test)
Remarks: (RTECS)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: Not a skin sensitizer.
Remarks: (ECHA)
Chronic exposure may cause dermatitis.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Germ cell mutagenicity
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Mouse lymphoma test
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
Inhalation - May cause drowsiness or dizziness. - Narcotic effects

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: AL3150000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption:

Headache
Salivation
Nausea
Vomiting
Dizziness
narcosis
Coma

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Kidney - Irregularities - Based on Human Evidence

Skin - Dermatitis - Based on Human Evidence

Kidney - Irregularities - Based on Human Evidence

Skin - Dermatitis - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 6,210 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test LC50 - Daphnia pulex (Water flea) - 8,800 mg/l - 48 h Remarks: (ECHA)
Toxicity to algae	static test NOEC - M.aeruginosa - 530 mg/l - 8 d (DIN 38412) Remarks: (maximum permissible toxic concentration) (IUCLID)
Toxicity to bacteria	static test EC50 - activated sludge - 61.15 mg/l - 30 min (OECD Test Guideline 209)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 91 % - Readily biodegradable. (OECD Test Guideline 301B)
Biochemical Oxygen Demand (BOD)	1,850 mg/g Remarks: (IUCLID)
Chemical Oxygen Demand (COD)	2,070 mg/g Remarks: (IUCLID)
Theoretical oxygen demand	2,200 mg/g Remarks: (Lit.)

12.3 Bioaccumulative potential

Does not bioaccumulate.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone
Reportable Quantity (RQ): 5000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1090 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: ACETONE

IATA
UN number: 1090 Class: 3 Packing group: II
Proper shipping name: Acetone

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.6 Revision Date: 05/24/2022 Print Date: 10/01/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.15
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Benzene

Product Number : 319953
Brand : SIGALD
Index-No. : 601-020-00-8
CAS-No. : 71-43-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Germ cell mutagenicity (Category 1B), H340
Carcinogenicity (Category 1A), H350
Specific target organ toxicity - repeated exposure (Category 1), Blood, H372
Aspiration hazard (Category 1), H304
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word	Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H340	May cause genetic defects.
H350	May cause cancer.
H372	Causes damage to organs (Blood) through prolonged or repeated exposure.
H412	Harmful to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe mist or vapors.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ 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.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C_6H_6
Molecular weight	:	78.11 g/mol
CAS-No.	:	71-43-2
EC-No.	:	200-753-7
Index-No.	:	601-020-00-8

Component	Classification	Concentration
benzene		
	Flam. Liq. 2; Skin Irrit. 2; Eye Irrit. 2A; Muta. 1B; Carc. 1A; STOT RE 1; Asp. Tox. 1; Aquatic Chronic 3; H225, H315, H319, H340, H350, H372, H304, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Flash back possible over considerable distance., Container explosion may occur under fire conditions.
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
benzene	71-43-2	TWA	0.5 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Leukemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen Danger of cutaneous absorption		
		STEL	2.5 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Leukemia Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen Danger of cutaneous absorption		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		TWA	10 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.40-1969		
		CEIL	25 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.40-1969		
		Peak	50 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.40-1969		
		See 1910.1028. See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028 The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply.		
		TWA	0.1 ppm	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		ST	1 ppm	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter A-(P3)
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: clear, colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 5.5 °C (41.9 °F) - lit.
f)	Initial boiling point and boiling range	80 °C 176 °F - lit.
g)	Flash point	-11 °C (12 °F) - DIN 51755 Part 1
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 8.0 %(V) Lower explosion limit: 1.2 %(V)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

k)	Vapor pressure	100 hPa at 20 °C (68 °F)
l)	Vapor density	No data available
m)	Density	0.874 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	ca.1.88 g/l at 23.5 °C (74.3 °F) - soluble
o)	Partition coefficient: n-octanol/water	log Pow: 2.13 at 25 °C (77 °F) - Bioaccumulation is not expected., (ECHA)
p)	Autoignition temperature	498 °C (928 °F) at 1,013.5 hPa
q)	Decomposition temperature	No data available
r)	Viscosity	0.604 mm2/s at 25 °C (77 °F) -
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Exothermic reaction with:
halogens
Halogenated hydrocarbon
in the presence of:
Light metals
Risk of explosion with:
halogen-halogen compounds
Nitric acid
Boranes
Ozone
peroxi compounds
perchlorates
permanganic acid
perchloryl fluoride
Strong oxidizing agents
Chlorine
fluorides
uranium hexafluoride
Oxygen

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

liquid
Risk of ignition or formation of inflammable gases or vapours with:
chromium(VI) oxide
Fluorine
nitryl compounds
Oxygen
oxyhalogenic compounds
Violent reactions possible with:
mineral acids
sulfur

10.4 Conditions to avoid
Warming.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - > 2,000 mg/kg
(OECD Test Guideline 401)
Symptoms: Nausea
LD50 Oral - Rat - male and female - 3,002 mg/kg
(OECD Test Guideline 401)
Symptoms: Risk of aspiration upon vomiting., Aspiration may cause pulmonary edema and pneumonitis.
Inhalation: No data available
Symptoms: mucosal irritations
LD50 Dermal - Rabbit - 13,630 mg/kg
Remarks: (IUCLID)
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: irritating
(OECD Test Guideline 404)
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Irritating to eyes.
(OECD Test Guideline 405)
Remarks: (IUCLID)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Respiratory or skin sensitization
Maximization Test - Guinea pig

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
May cause genetic defects.
Test Type: Ames test
Test system: Escherichia coli/Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: mouse lymphoma cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Chromosome aberration test in vitro
Test system: Chinese hamster lung cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative

Test Type: Mutagenicity (mammal cell test): micronucleus.
Species: Mouse
Cell type: Bone marrow
Application Route: inhalation (vapor)
Method: OECD Test Guideline 474
Result: positive

Carcinogenicity
May cause cancer. Positive evidence from human epidemiological studies.

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

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.
- Blood
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Aspiration hazard
Aspiration may cause pulmonary edema and pneumonitis.

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 13 Weeks - NOAEL (No observed adverse effect level) - 600 mg/kg

RTECS: CY1400000

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Nausea, Dizziness, Headache, narcosis, Inhalation of high concentrations of benzene may have an initial stimulatory effect on the central nervous system characterized by exhilaration, nervous excitation and/or giddiness, depression, drowsiness, or fatigue. The victim may experience tightness in the chest, breathlessness, and loss of consciousness. Tremors, convulsions, and death due to respiratory paralysis or circulatory collapse can occur in a few minutes to several hours following severe exposures. Aspiration of small amounts of liquid immediately causes pulmonary edema and hemorrhage of pulmonary tissue. Direct skin contact may cause erythema. Repeated or prolonged skin contact may result in drying, scaling dermatitis, or development of secondary skin infections. The chief target organ is the hematopoietic system. Bleeding from the nose, gums, or mucous membranes and the development of purpuric spots, pancytopenia, leukopenia, thrombocytopenia, aplastic anemia, and leukemia may occur as the condition progresses. The bone marrow may appear normal, aplastic or hyperplastic, and may not correlate with peripheral blood-forming tissues. The onset of effects of prolonged benzene exposure may be delayed for many months or years after the actual exposure has ceased., Blood disorders
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After absorption of large quantities:

narcosis
respiratory arrest
Convulsions

Possible damages:

Damage to:

Liver
Kidney
Central nervous system

Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Oryzias latipes (Orange-red killifish) - > 100 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	semi-static test EC50 - Daphnia magna (Water flea) - > 1,000 mg/l - 48 h (OECD Test Guideline 202)
	semi-static test NOEC - Daphnia magna (Water flea) - > 1,000 mg/l - 48 h

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	(OECD Test Guideline 202)
Toxicity to algae	static test ErC50 - Pseudokirchneriella subcapitata (green algae) - > 1,000 mg/l - 72 h (OECD Test Guideline 201)
	static test NOEC - Pseudokirchneriella subcapitata (green algae) - >= 1,000 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	static test EC50 - activated sludge - > 1,000 mg/l - 3 h (OECD Test Guideline 209)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Pimephales promelas (fathead minnow) - 0.8 mg/l - 32 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test LC50 - Daphnia magna (Water flea) - > 100 mg/l - 21 d (OECD Test Guideline 211)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 96 % - Readily biodegradable. (OECD Test Guideline 301F)

12.3 Bioaccumulative potential

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d - 0.05 mg/l(benzene) Bioconcentration factor (BCF): 10

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

Endangers drinking-water supplies if allowed to enter soil or water.
Discharge into the environment must be avoided.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1114 Class: 3 Packing group: II
Proper shipping name: Benzene
Reportable Quantity (RQ): 10 lbs
Reportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1114 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: BENZENE

IATA
UN number: 1114 Class: 3 Packing group: II
Proper shipping name: Benzene

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
benzene	71-43-2	10	10
benzene	71-43-2	10	10 (D018)

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

benzene 71-43-2 >= 90 - <= 100 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

US State Regulations

Massachusetts Right To Know

benzene	71-43-2

Pennsylvania Right To Know

benzene	71-43-2

Maine Chemicals of High Concern

benzene	71-43-2

Vermont Chemicals of High Concern

benzene	71-43-2

Washington Chemicals of High Concern

benzene	71-43-2

California Prop. 65

WARNING: This product can expose you to chemicals including benzene, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.15 Revision Date: 09/06/2024 Print Date: 09/07/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 8.3
Revision Date 04/05/2022
Print Date 08/09/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Carbon tetrachloride

Product Number : C5331
Brand : Sigma
Index-No. : 602-008-00-5
CAS-No. : 56-23-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Acute toxicity, Dermal (Category 3), H311
Skin sensitization (Sub-category 1B), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), Liver, Kidney, H372
Short-term (acute) aquatic hazard (Category 3), H402
Long-term (chronic) aquatic hazard (Category 3), H412
Hazardous to the ozone layer (Category 1), H420

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word: Danger

Hazard statement(s)

H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure if inhaled.
H412	Harmful to aquatic life with long lasting effects.
H420	Harms public health and the environment by destroying ozone in the upper atmosphere.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing must not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of water.Call a POISON CENTER/ doctor if you feel unwell.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.
P502	Refer to manufacturer/ supplier for information on recovery/ recycling.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Rapidly absorbed through skin.

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	CCl_4
Molecular weight	:	153.82 g/mol

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

CAS-No. : 56-23-5
EC-No. : 200-262-8
Index-No. : 602-008-00-5

Component	Classification	Concentration
Carbon tetrachloride		
	Acute Tox. 3; Skin Sens. 1B; Carc. 2; STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; Ozone 1; H301, H331, H311, H317, H351, H372, H402, H412, H420 Concentration limits: >= 1 %: STOT RE 1, H372; 0.2 - < 1 %: STOT RE 2, H373;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible.

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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Hydrogen chloride gas
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1A: Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Carbon tetrachloride	56-23-5	TWA	5 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Suspected human carcinogen Danger of cutaneous absorption		
		STEL	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Suspected human carcinogen Danger of cutaneous absorption		
		ST	2 ppm 12.6 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		
		TWA	10 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	25 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		C	200 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		PEL	2 ppm 12.6 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		STEL	10 ppm 63 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 240 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Body Protection
protective clothing

Respiratory protection
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: colorless
b)	Odor	sweet
c)	Odor Threshold	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -23 °C (-9 °F)
f)	Initial boiling point and boiling range	77 °C 171 °F at 1,013 hPa
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	45 hPa at 0.3 °C (32.5 °F) 120 hPa at 19.8 °C(67.6 °F) 14,549 hPa at 24 °C(75 °F)
l)	Vapor density	No data available
m)	Density	1.59 g/cm3 at 20 °C (68 °F)
	Relative density	No data available
n)	Water solubility	0.8461 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 2.83 at 25 °C (77 °F)
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	26.7 mN/m at 20 °C (68 °F) 19.5 mN/m at 80 °C (176 °F)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Risk of explosion with:
Alkali metals

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

powdered aluminium
Barium
Boranes
calcium silicide
halogen-halogen compounds
peroxi compounds
Fluorine
powdered magnesium
Powdered metals
sodium amide
silanes
silver perchlorate
nitrogen dioxide
alkenes
Oxygen
(as liquefied gas)
Oxygen
with
alkali hydroxides
calcium hypochlorite
with
heat
Violent reactions possible with:
Alkaline earth metals
Dimethylformamide
aluminium chloride
with
triethylaluminium

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
various plastics, Light metals, metal alloys, Metals

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 2,350 mg/kg
Remarks: (RTECS)
LC50 Inhalation - Rat - 4 h - 8000 ppm - vapor

LD50 Dermal - Rabbit - > 20,000 mg/kg
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Mild skin irritation - 24 h

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

(Draize Test)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Mild eye irritation - 24 h
(Draize Test)

Respiratory or skin sensitization
- Mouse
Result: The product is a skin sensitizer, sub-category 1B.
(OECD Test Guideline 429)

Germ cell mutagenicity
No data available

Carcinogenicity
Suspected of causing cancer.

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Carbon tetrachloride)
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Inhalation - Causes damage to organs through prolonged or repeated exposure. - Liver, Kidney

Aspiration hazard
No data available

11.2 Additional Information

RTECS: FG4900000
Vomiting, Diarrhea, Abdominal pain, Nausea, Dizziness, Headache, Damage to the eyes., Liver injury may occur., Kidney injury may occur., Exposure to and/or consumption of alcohol may increase toxic effects., Contact with skin can cause:, Pain, Erythema, hyperemia
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	mortality LC50 - Danio rerio (zebra fish) - 24.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 35 mg/l - 48 h (OECD Test Guideline 202)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Toxicity to algae	Growth inhibition EC50 - Algae - 20 mg/l - 72 h (OECD Test Guideline 201)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus (Bluegill) - 21 d - 52.3 µg/l(Carbon tetrachloride)
	Bioconcentration factor (BCF): 30

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1846 Class: 6.1 Packing group: II
Proper shipping name: Carbon tetrachloride
Reportable Quantity (RQ): 10 lbs
Reportable Quantity (RQ): 10 lbs
Reportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1846 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: CARBON TETRACHLORIDE
Marine pollutant : yes

IATA
UN number: 1846 Class: 6.1 Packing group: II
Proper shipping name: Carbon tetrachloride

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Carbon tetrachloride	56-23-5	2007-07-01

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

Reportable Quantity : D019 lbs

F001 lbs

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 8.3 Revision Date: 04/05/2022 Print Date: 08/09/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.3
Revision Date 04/18/2021
Print Date 11/27/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Chloroform

Product Number : 288306
Brand : Sigma-Aldrich
CAS-No. : 67-66-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Specific target organ toxicity - repeated exposure (Category 1), Liver, Kidney, H372
Short-term (acute) aquatic hazard (Category 3), H402
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Pictogram	
Signal word	Danger

Hazard statement(s)

H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H331	Toxic if inhaled.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs (Liver, Kidney) through prolonged or repeated exposure.
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/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	Trichloromethane Methylidyne trichloride
Formula	:	$CHCl_3$

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Molecular weight : 119.38 g/mol
CAS-No. : 67-66-3

Component	Classification	Concentration
Chloroform		
	Acute Tox. 4; Acute Tox. 3; Skin Irrit. 2; Eye Irrit. 2A; Carc. 2; Repr. 2; STOT SE 3; STOT RE 1; Aquatic Acute 3; H302, H331, H315, H319, H351, H361, H336, H372, H402 Concentration limits: 20 %: STOT SE 3, H336;	<= 100 %

ethanol		
	Flam. Liq. 2; Eye Irrit. 2A; H225, H319 Concentration limits: >= 50 %: Eye Irrit. 2A, H319;	>= 1 - < 5 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Hydrogen chloride gas
Not combustible.

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Chloroform	67-66-3	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans		
		ST	2 ppm 9.78 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		
		C	50 ppm 240 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	2 ppm 9.78 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
ethanol	64-17-5	TWA	1,000 ppm 1,900 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	1,000 ppm 1,900 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		STEL	1,000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Confirmed animal carcinogen with unknown relevance to humans		
		TWA	1,000 ppm 1,900 mg/m3	USA. NIOSH Recommended Exposure Limits
		PEL	1,000 ppm 1,900 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls

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).

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless
b)	Odor	sweet
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -63 °C (-81 °F) - lit.
f)	Initial boiling point	60.5 - 61.5 °C 140.9 - 142.7 °F - lit.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	and boiling range	
g)	Flash point	() - Regulation (EC) No. 440/2008, Annex, A.9does not flash
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	210 hPa at 20 °C (68 °F)
l)	Vapor density	4.12 - (Air = 1.0)
m)	Relative density	No data available
n)	Water solubility	8.7 g/l at 23 °C (73 °F) - OECD Test Guideline 105
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	Distillable in an undecomposed state at normal pressure.
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Solubility in other solvents	organic solvent at 20 °C (68 °F) - miscible
Relative vapor density	4.12 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.
Contains the following stabilizer(s):
ethanol (>=0.5 - <=1 %)

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
various plastics, RubberStrong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available

LD50 Oral - Rat - male - 908 mg/kg
(OECD Test Guideline 401)

Inhalation: No data available

Acute toxicity estimate Inhalation - Expert judgment - 4 h - 3.1 mg/l

Dermal: No data available

Dermal: No data available
No data available
No data available

Skin corrosion/irritation
No data available

Skin - Rabbit
Result: Irritating to skin. - 24 h
Remarks: (ECHA)
Drying-out effect resulting in rough and chapped skin.
Skin - Rabbit
Result: slight irritation
Remarks: (IUCLID)

Serious eye damage/eye irritation
No data available
Eyes - Rabbit
Result: Irritating to eyes.
Remarks: (ECHA)
(Regulation (EC) No 1272/2008, Annex VI)

Respiratory or skin sensitization
No data available
Maximization Test - Guinea pig
Result: negative
(Regulation (EC) No. 440/2008, Annex, B.6)

Germ cell mutagenicity

No data available

Test Type: Ames test
Test system: Escherichia coli/Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Result: negative
Remarks: (ECHA)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Test Type: unscheduled DNA synthesis assay
Test system: Liver
Metabolic activation: without metabolic activation
Result: negative
Remarks: (ECHA)

Test Type: Micronucleus test
Species: Rat
Cell type: Red blood cells (erythrocytes)
Application Route: Oral
Method: OECD Test Guideline 474
Result: negative

Test Type: unscheduled DNA synthesis assay
Species: Rat
Cell type: Liver cells
Application Route: Oral
Method: OECD Test Guideline 486
Result: negative

Test Type: in vivo assay
Species: Mouse

Application Route: Inhalation

Result: negative
Remarks: (ECHA)

Carcinogenicity
Suspected of causing cancer.

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Chloroform)
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
Suspected of damaging the unborn child.
No data available

Specific target organ toxicity - single exposure
No data available**Specific target organ toxicity - repeated exposure**
No data available

Aspiration hazard
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

11.2 Additional Information

Repeated dose toxicity - Rat - female - Oral - NOAEL (No observed adverse effect level) - 34 mg/kg
Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Vomiting, Cough, irritant effects, Shortness of breath, respiratory arrest, narcosis, Dizziness, Nausea, agitation, spasms, inebriation, Headache, Stomach/intestinal disorders, ataxia (impaired locomotor coordination), cardiovascular disorders
Drying-out effect resulting in rough and chapped skin.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

No data available

Toxicity to algae	static test ErC50 - Chlamydomonas reinhardtii (green algae) - 13.3 mg/l - 72 h Remarks: (ECHA) (Chloroform)
Toxicity to bacteria	Remarks: (ECHA) (Chloroform)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
UN number: 1888 Class: 6.1 Packing group: III
Proper shipping name: Chloroform
Reportable Quantity (RQ): 10 lbs
Reportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1888 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: CHLOROFORM

IATA
UN number: 1888 Class: 6.1 Packing group: III
Proper shipping name: Chloroform

SECTION 15: Regulatory information

SARA 302 Components
The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Chloroform	67-66-3	2008-11-03

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Chloroform	67-66-3	2008-11-03

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

Reportable Quantity : D022 lbs

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 16: Other information

Further information

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.3 Revision Date: 04/18/2021 Print Date: 11/27/2021

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.7
Revision Date 03/30/2022
Print Date 08/06/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : *cis*-1,2-Dichloroethylene

Product Number : D62004
Brand : Aldrich
Index-No. : 602-026-00-3
CAS-No. : 156-59-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Skin irritation (Category 2), H315
Short-term (acute) aquatic hazard (Category 3), H402
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Signal word	Danger

Hazard statement(s)

H225	Highly flammable liquid and vapor.
H302 + H332	Harmful if swallowed or if inhaled.
H315	Causes skin irritation.
H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	cis-Acetylene dichloride
Formula	:	$C_2H_2Cl_2$
Molecular weight	:	96.94 g/mol
CAS-No.	:	156-59-2
EC-No.	:	205-859-7
Index-No.	:	602-026-00-3

Component	Classification	Concentration
cis-Dichloroethylene		
	Flam. Liq. 2; Acute Tox. 4; Skin Irrit. 2; Aquatic Acute 3; Aquatic Chronic 3;	<= 100 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	H225, H302, H332, H315, H402, H412	

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. If breathing stops: mouth-to-mouth breathing or artificial respiration. Oxygen if necessary. Immediately call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

5.4 Further information

Remove container from danger zone and cool with water. Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Handle and store under inert gas. Air and moisture sensitive. Light sensitive.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
cis-Dichloroethylene	156-59-2	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Eye irritation		

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
required

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: light yellow
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -80 °C (-112 °F) - lit.
f)	Initial boiling point and boiling range	60 °C 140 °F - lit.
g)	Flash point	6.0 °C (42.8 °F) - closed cup

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	1.284 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Warming.

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 770 mg/kg
Remarks: (RTECS)
LC50 Inhalation - Rat - 6 h - 13700 ppm

Remarks: Behavioral:Somnolence (general depressed activity).
Liver:Fatty liver degeneration.
(RTECS)
(Regulation (EC) No 1272/2008, Annex VI)
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Moderate skin irritation - 24 h
Remarks: (RTECS)

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: KV9420000
narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Lepomis macrochirus (Bluegill sunfish) - 140 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 40.2 mg/l Remarks: (ECOTOX Database)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
UN number: 1150 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROETHYLENE

IATA
UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Fire Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.7 Revision Date: 03/30/2022 Print Date: 08/06/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.14
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Cyclohexane

Product Number : 227048
Brand : Sigma-Aldrich
Index-No. : 601-017-00-1
CAS-No. : 110-82-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Aspiration hazard (Category 1), H304
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing mist or vapors.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C_6H_{12}
Molecular weight	:	84.16 g/mol
CAS-No.	:	110-82-7
EC-No.	:	203-806-2
Index-No.	:	601-017-00-1

Component	Classification	Concentration
Cyclohexane		
	Flam. Liq. 2; Skin Irrit. 2; STOT SE 3; Asp. Tox. 1; Aquatic Acute 1; Aquatic Chronic 1; H225, H315, H336, H304, H400, H410 Concentration limits: 20 %: STOT SE 3, H336; M-Factor - Aquatic Acute: 1	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Store under inert gas.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Cyclohexane	110-82-7	TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
		TWA	300 ppm 1,050 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	300 ppm 1,050 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	300 ppm 1,050 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Cyclohexane	110-82-7	1,2-Cyclohexanediol	50mg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

8.2 Exposure controls

Appropriate engineering controls

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 30 min
Material tested:KCL 741 Dermatril® L

Body Protection

Flame retardant antistatic protective clothing.

Respiratory protection

Recommended Filter type: Filter A (acc. to DIN 3181) for vapours of organic compounds
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure

Do not let product enter drains. Risk of explosion.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: colorless
b)	Odor	sweet
c)	Odor Threshold	0.5 ppm
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 4 - 7 °C (39 - 45 °F) - lit.
f)	Initial boiling point and boiling range	80.7 °C 177.3 °F - lit.
g)	Flash point	-20 °C (-4 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 8.3 %(V) Lower explosion limit: 1.2 %(V)
k)	Vapor pressure	124 hPa at 24 °C (75 °F)
l)	Vapor density	No data available
m)	Density	0.779 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	52 g/l at 23.5 °C (74.3 °F) - partly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.44 at 25 °C (77 °F) - Bioaccumulation is not expected.
p)	Autoignition temperature	260.0 °C (500.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Risk of explosion with:
nitrogen dioxide
Risk of ignition or formation of inflammable gases or vapours with:
Strong oxidizing agents

10.4 Conditions to avoid
Warming.

10.5 Incompatible materials
rubber, various plastics

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - > 5,000 mg/kg
(OECD Test Guideline 401)
Symptoms: gastric pain, Stomach/intestinal disorders
LC50 Inhalation - Rat - male and female - 4 h - 19.07 mg/l - vapor

(OECD Test Guideline 403)
Symptoms: Possible damages:, Irritation symptoms in the respiratory tract., Inhalation may lead to the formation of oedemas in the respiratory tract.
LD50 Dermal - Rabbit - male and female - > 2,000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Remarks: Causes skin irritation.
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Serious eye damage/eye irritation
Remarks: No data available

Respiratory or skin sensitization
Buehler Test - Guinea pig
Result: negative
(Regulation (EC) No. 440/2008, Annex, B.6)

Germ cell mutagenicity
Test Type: Ames test
Test system: Salmonella typhimurium

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Mouse lymphoma test
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Test Type: Chromosome aberration test
Species: Rat
Cell type: Bone marrow
Application Route: inhalation (vapor)
Method: OECD Test Guideline 475
Result: negative

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.
Aspiration hazard, Aspiration may cause pulmonary edema and pneumonitis.

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Inhalation - 90 d
Remarks: Subchronic toxicity

RTECS: GU6300000
Central nervous system depression, Drowsiness, Irritability, Dizziness, Gastrointestinal disturbance, Lung irritation, chest pain, pulmonary edema
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

After uptake of large quantities:

Unconsciousness

Damage to:

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Lungs

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 4.53 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 0.9 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	ErC50 - Pseudokirchneriella subcapitata (green algae) - > 4.425 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	IC50 - Bacteria - 29 mg/l - 15 h Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 77 % - Readily biodegradable. (OECD Test Guideline 301F)

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

Biological effects:
Endangers drinking-water supplies if allowed to enter soil and/or waters in large quantities.
Change in the flavour characteristics of fish protein.
Discharge into the environment must be avoided.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1145 Class: 3 Packing group: II
Proper shipping name: Cyclohexane
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1145 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: CYCLOHEXANE
Marine pollutant : yes

IATA
UN number: 1145 Class: 3 Packing group: II
Proper shipping name: Cyclohexane

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Cyclohexane	110-82-7	1000	1000

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Cyclohexane 110-82-7 >= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Cyclohexane 110-82-7

Pennsylvania Right To Know

Cyclohexane 110-82-7

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

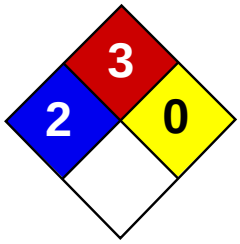
The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.14 Revision Date: 09/06/2024 Print Date: 09/07/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C8H10

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (irritant, sensitizer). CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:
CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m3) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in diethyl ether. Very slightly soluble in cold water or practically insoluble in water. Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene. Insoluble in Ammonia. Slightly soluble in Chloroform. Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:
Lethal Dose/Conc 50% Kill: LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg Lowest Published Lethal Dose/Conc: LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate. May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Can cause mild skin irritation. It can be absorbed through intact skin. Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm , it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS) Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include

headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and conciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987). Ingestion: Do not drink, pipet or siphon by mouth. May cause gastroinestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Ethylbenzene Illinois toxic substances disclosure to employee act: Ethylbenzene Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene Rhode Island RTK hazardous substances: Ethylbenzene Pennsylvania RTK: Ethylbenzene Minnesota: Ethylbenzene Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene New Jersey: Ethylbenzene New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene California Director's List of Hazardous Substances: Ethylbenzene TSCA 8(b) inventory: Ethylbenzene TSCA 4(a) proposed test rules: Ethylbenzene TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97 SARA 313 toxic chemical notification and release reporting: Ethylbenzene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S24/25- Avoid contact with skin and eyes. S29- Do not empty into drains.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References:
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

Other Special Considerations: Not available.

Created: 10/09/2005 05:28 PM

Last Updated: 05/21/2013 12:00 PM

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 event shall ScienceLab.com 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, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

SAFETY DATA SHEET

Version 6.15
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : *tert*-Butyl methyl ether

Product Number : 306975
Brand : Sigma-Aldrich
Index-No. : 603-181-00-X
CAS-No. : 1634-04-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H315	Causes skin irritation.

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	MTBE Methyl tert-butyl ether
Formula	:	$C_5H_{12}O$
Molecular weight	:	88.15 g/mol
CAS-No.	:	1634-04-4
EC-No.	:	216-653-1
Index-No.	:	603-181-00-X

Component	Classification	Concentration
tert-butyl methyl ether		
	Flam. Liq. 2; Skin Irrit. 2; H225, H315	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up with liquid-absorbent material (e.g. Chemizorb®).
Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Component	CAS-No.	Value	Control parameters	Basis
tert-butyl methyl ether	1634-04-4	TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans		
		PEL	40 ppm 144 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 120 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type AX
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: colorless
b)	Odor	characteristic
c)	Odor Threshold	0.053 ppm
d)	pH	No data available
e)	Melting point/freezing point	Melting point: -108.6 °C (-163.5 °F) at 1,013 hPa
f)	Initial boiling point and boiling range	55 - 56 °C 131 - 133 °F - lit.
g)	Flash point	-28 °C (-18 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 8.5 %(V) Lower explosion limit: 1.6 %(V)
k)	Vapor pressure	330 hPa at 25 °C (77 °F) - OECD Test Guideline 104
l)	Vapor density	No data available
m)	Density	0.74 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	0.7420 °C
n)	Water solubility	42 g/l at 20 °C (68 °F) - OECD Test Guideline 105
o)	Partition coefficient: n-octanol/water	log Pow: 1.06 at 20 °C (68 °F) - OECD Test Guideline 107 - Bioaccumulation is not expected.
p)	Autoignition temperature	460 °C (860 °F) at 1013.0 hPa - DIN 51794
q)	Decomposition temperature	Distillable in an undecomposed state at normal pressure.
r)	Viscosity	0.409 mm2/s at 40 °C (104 °F) - OECD Test Guideline 114 - 0.464 mm2/s at 20 °C (68 °F) - OECD Test Guideline 114 -
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	72.5 mN/m at 1.07g/l at 21.5 °C (70.7 °F) - Surface tension

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Oxidizing agents
Strong acids
halogens
Strong bases

10.4 Conditions to avoid
Heat, flames and sparks.
Warming.

10.5 Incompatible materials
rubber, various plastics

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - > 2,000 mg/kg
(OECD Test Guideline 401)
Symptoms: Nausea, Vomiting, Pulmonary failure possible after aspiration of vomit., Aspiration may cause pulmonary edema and pneumonitis.
LC50 Inhalation - Rat - male and female - 4 h - 85 mg/l - vapor

(OECD Test Guideline 403)
Symptoms: Possible damages:, mucosal irritations
LD50 Dermal - Rat - male and female - > 2,000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation - 4 h
(OECD Test Guideline 404)
Remarks: Drying-out effect resulting in rough and chapped skin.

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster lung cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: Mutagenicity (mammal cell test): micronucleus.
Test system: mouse lymphoma cells
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 473
Result: negative

Test Type: unscheduled DNA synthesis assay
Species: Mouse
Cell type: Liver cells
Application Route: inhalation (vapor)
Method: OECD Test Guideline 486
Result: negative

Test Type: Micronucleus test
Species: Mouse
Cell type: Bone marrow
Application Route: inhalation (vapor)
Method: US-EPA
Result: negative

Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Species: Rat
Cell type: Bone marrow
Application Route: inhalation (vapor)
Method: US-EPA
Result: negative

Test Type: Transgenic rodent somatic cell gene mutation assay
Species: Rat
Cell type: Bone marrow
Application Route: inhalation (vapor)
Method: OECD Test Guideline 488
Result: negative

Carcinogenicity

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 90 d - NOAEL (No observed adverse effect level) - 3,000 mg/kg
Remarks: Subchronic toxicity

RTECS: KN5250000
Nausea, Vomiting, Dizziness, Central nervous system depression, Aspiration or inhalation may cause chemical pneumonitis., MTBE (methyl-tert-butyl ether) is reported to metabolize to tert-butyl alcohol and formaldehyde by microsomal demethylation, MTBE (methyl-tert-butyl ether) should be considered a "potential human carcinogen" due to an increase in leydig interstitial cell tumors of testes in male rats and an increase in lymphomas, leukemias, and uterine sarcomas in female rats., In another unpublished study MTBE was shown to be carcinogenic due to "increased incidence of a rare type of kidney tumor" in male rats and an "increase in the incidence of hepatocellular adenomas" in female mice.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Systemic effects:

After absorption of large quantities:

somnolence
Dizziness
agitation, spasms
CNS disorders
narcosis
Unconsciousness

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Menidia beryllina - 574 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	flow-through test EC50 - Americamysis bahia (Mysid) - 187 mg/l - 96 h (US-EPA OPPTS 850.1035)
Toxicity to algae	static test IC50 - Pseudokirchneriella subcapitata (green algae) - 491 mg/l - 96 h
Toxicity to bacteria	static test EC10 - Pseudomonas putida - 710 mg/l - 18 h Remarks: (ECHA)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Pimephales promelas (fathead minnow) - 299 mg/l - 31 d Remarks: (ECHA)
	flow-through test NOEC - Pimephales promelas (fathead minnow) - 450 mg/l - 31 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	flow-through test NOEC - Daphnia magna (Water flea) - 51 mg/l - 21 d (OPPTS 850.1300)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 0 % - Not readily biodegradable. (OECD Test Guideline 301D)

12.3 Bioaccumulative potential

Bioaccumulation	Cyprinus carpio (Carp) - 28 d at 25 °C(tert-butyl methyl ether) Bioconcentration factor (BCF): 1.5

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 2398 Class: 3 Packing group: II
Proper shipping name: Methyl tert-butyl ether
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 2398 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: METHYL tert-BUTYL ETHER

IATA
UN number: 2398 Class: 3 Packing group: II
Proper shipping name: Methyl tert-butyl ether

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
tert-butyl methyl ether	1634-04-4	1000	1000

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

tert-butyl methyl ether	1634-04-4	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

tert-butyl methyl ether 1634-04-4

Pennsylvania Right To Know

tert-butyl methyl ether 1634-04-4

Maine Chemicals of High Concern

tert-butyl methyl ether 1634-04-4

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.15 Revision Date: 09/07/2024 Print Date: 09/08/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Creation Date 27-Jan-2010 **Revision Date** 24-Dec-2021 **Revision Number** 8

1. Identification

Product Name **Methylene chloride**

Cat No. : **D37-1; D37-4; D37-20; D37-200; D37-200LC; D37-500; D37FB-19; D37FB-50; D37FB-115; D37FB-200; D37POP-19; D37POPB-50; D37POPB-200; D37RB-19; D37RB-50; D37RB-115; D37RB-200; D37RS-19; D37RS-28; D37RS-50; D37RS-115; D37RS-200; D37SK-4; D37SK-4LC; D37SS-28; D37SS-50; D37SS-115; D37SS-200; D37SS-1350; D37RS1000ASME; NC1485726; D37RE200ASME; NC1568702; NC1641358; XXMECLDOW2000; XXMECLDOW200LI; NC1870181; D37ETSS1350; XXD37ET200LI; NC1948847; D37SS-19; NC2047457; NC1561768**

CAS No 75-09-2
Synonyms Dichloromethane; DCM

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use. This chemical/product is not and cannot be distributed in commerce (as defined in TSCA section 3(5)) or processed (as defined in TSCA section 3(13)) for consumer paint or coating removal.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 1B

Specific target organ toxicity (single exposure) Target Organs - Central nervous system (CNS).	Category 3
Specific target organ toxicity - (repeated exposure) Target Organs - Liver, Kidney, Blood.	Category 2

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)

Other hazards
Contains a known or suspected endocrine disruptor.
WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Methylene chloride	75-09-2	>99.5

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water.

Most important symptoms and effects . Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Causes central nervous system depression: Continued or high exposures by inhalation will cause anaesthetic effects. This may result in a loss of consciousness and could prove fatal: Causes formation of carbon monoxide in the blood. Carbon monoxide may cause adverse effects on the cardiovascular system and the central nervous system

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature 556 °C / 1032.8 °F

Explosion Limits
Upper 23 vol %
Lower 13 vol %
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2). Phosgene. Hydrogen chloride gas.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment as required. Ensure adequate ventilation.

Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Vapors are heavier than air and may spread along floors. Handle product only in closed system or provide appropriate exhaust ventilation. Reacts with aluminum and its alloys.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Do not store in aluminum containers. Incompatible Materials. Strong oxidizing agents. Strong acids. Amines.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Methylene chloride	TWA: 50 ppm	(Vacated) TWA: 500 ppm (Vacated) STEL: 2000 ppm (Vacated) Ceiling: 1000 ppm TWA: 25 ppm STEL: 125 ppm	IDLH: 2300 ppm	TWA: 50 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-97 °C / -142.6 °F

Boiling Point/Range	39 °C / 102.2 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	23 vol %
Lower	13 vol %
Vapor Pressure	350 mbar @ 20°C
Vapor Density	2.93 (Air = 1.0)
Specific Gravity	1.33
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	556 °C / 1032.8 °F
Decomposition Temperature	No information available
Viscosity	0.42 mPas @ 25°C
Molecular Formula	C H2 Cl2
Molecular Weight	84.93

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions. Decomposes on exposure to light.

Conditions to Avoid Excess heat. Protect from direct sunlight.

Incompatible Materials Strong oxidizing agents, Strong acids, Amines

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Phosgene, Hydrogen chloride gas

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions Forms a detonable mixture with nitric acid.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Methylene chloride	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rat)	53 mg/L (Rat) 6 h 76000 mg/m³ (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Methylene chloride	75-09-2	Group 2A	Reasonably Anticipated	A3	X	A3

IARC (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans
NTP: (National Toxicity Program)

	Known - Known Carcinogen *Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen*
ACGIH: (American Conference of Governmental Industrial Hygienists)	*A1 - Known Human Carcinogen* *A2 - Suspected Human Carcinogen* *A3 - Animal Carcinogen*
	ACGIH: (American Conference of Governmental Industrial Hygienists)
Mexico - Occupational Exposure Limits - Carcinogens	*Mexico - Occupational Exposure Limits - Carcinogens* *A1 - Confirmed Human Carcinogen* *A2 - Suspected Human Carcinogen* *A3 - Confirmed Animal Carcinogen* *A4 - Not Classifiable as a Human Carcinogen* *A5 - Not Suspected as a Human Carcinogen*

Mutagenic Effects Mutagenic effects have occured in microorganisms.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Liver Kidney Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Causes central nervous system depression: Continued or high exposures by inhalation will cause anaesthetic effects. This may result in a loss of consciousness and could prove fatal: Causes formation of carbon monoxide in the blood. Carbon monoxide may cause adverse effects on the cardiovascular system and the central nervous system

Endocrine Disruptor Information No information available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

12. Ecological information

Ecotoxicity

.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Methylene chloride	EC50:>660 mg/L/96h	Pimephales promelas: LC50:193 mg/L/96h	EC50: 1 mg/L/24 h EC50: 2.88 mg/L/15 min	EC50: 140 mg/L/48h

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Methylene chloride	1.25

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Methylene chloride - 75-09-2	U080	-

14. Transport information

DOT

UN-No	UN1593
Proper Shipping Name	DICHLOROMETHANE
Hazard Class	6.1
Packing Group	III

TDG

UN-No	UN1593
Proper Shipping Name	DICHLOROMETHANE
Hazard Class	6.1
Packing Group	III

IATA

UN-No	UN1593
Proper Shipping Name	Dichloromethane
Hazard Class	6.1
Packing Group	III

IMDG/IMO

UN-No	UN1593
Proper Shipping Name	Dichloromethane
Hazard Class	6.1
Packing Group	III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Methylene chloride	75-09-2	X	ACTIVE	R

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

Section 6(a) of the Toxic Substances Control Act (TSCA) This chemical/product is not and cannot be distributed in commerce (as defined in TSCA section 3(5)) or processed (as defined in TSCA section 3(13)) for consumer paint or coating removal.

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

Component	CAS No	**TSCA 12(b)** - Notices of Export
Methylene chloride	75-09-2	Section 6

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Methylene chloride	75-09-2	X	-	200-838-9	X	X	X	X	X	KE-23893

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Methylene chloride	75-09-2	>99.5	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Methylene chloride	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methylene chloride	X		-

OSHA - Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Methylene chloride	125 ppm STEL 12.5 ppm Action Level 25 ppm TWA	-

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Methylene chloride	1000 lb 1 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Methylene chloride	75-09-2	Carcinogen	200 µg/day 50 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methylene chloride	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Methylene chloride	75-09-2	-	Use restricted. See item 59.	-

			(see link for restriction details) Use restricted. See item 75. (see link for restriction details)	

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Methylene chloride	75-09-2	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Methylene chloride	75-09-2	Not applicable	Not applicable	Not applicable	Annex I - Y45

16. Other information

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

Creation Date 27-Jan-2010
Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 6.5
Revision Date 05/07/2021
Print Date 11/27/2021

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Naphthalene

Product Number : 147141
Brand : Aldrich
Index-No. : 601-052-00-2
CAS-No. : 91-20-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable solids (Category 2), H228
Acute toxicity, Oral (Category 4), H302
Carcinogenicity (Category 2), H351
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Hazard statement(s)

H228	Flammable solid.
H302	Harmful if swallowed.
H351	Suspected of causing cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C10H8
Molecular weight	:	128.17 g/mol
CAS-No.	:	91-20-3
EC-No.	:	202-049-5
Index-No.	:	601-052-00-2

Component	Classification	Concentration
Naphthalene		
	Flam. Sol. 2; Acute Tox. 4; Carc. 2; Aquatic Acute 1; Aquatic Chronic 1; H228, H302, H351, H400, H410	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air on intense heating.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep away from heat and sources of ignition.
Storage class (TRGS 510): 4.1B: Flammable solid hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Naphthalene	91-20-3	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		TWA	10 ppm 50 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	15 ppm 75 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	10 ppm 50 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.1 ppm 0.5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Naphthalene	91-20-3	1-Naphthol + 2-Naphthol			ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
required when dusts are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: flakes, granules Color: white
b)	Odor	aromatic
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 80 - 82 °C (176 - 180 °F) - lit.
f)	Initial boiling point and boiling range	218 °C 424 °F - lit.
g)	Flash point	78.5 °C (173.3 °F) - closed cup - ISO 2719
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The substance or mixture is a flammable solid with the category 2. - Flammability (solids)
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 5.9 %(V) Lower explosion limit: 0.9 %(V)
k)	Vapor pressure	0.072 hPa at 20 °C (68 °F) - OECD Test Guideline 104
l)	Vapor density	No data available
m)	Relative density	No data available
n)	Water solubility	0.0308 g/l at 25 °C (77 °F) - OECD Test Guideline 105 - slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 3.4 at 25 °C (77 °F) - OECD Test Guideline 107 - Bioaccumulation is not expected.
p)	Autoignition temperature	526 - 587 °C (979 - 1089 °F) at 1,013 hPa - DIN 51794
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Surface tension	31.8 mN/m at 100.0 °C (212.0 °F)

SECTION 10: Stability and reactivity

10.1 Reactivity

Forms explosive mixtures with air on intense heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions

Violent reactions possible with:
Oxidizing agents
chromium(VI) oxide
benzoyl chloride
aluminium chloride
Risk of explosion with:
nitrogen oxides

10.4 Conditions to avoid

Heat, flames and sparks.
Strong heating.

10.5 Incompatible materials

No data available

10.6 Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Mouse - female - 710 mg/kg
(OECD Test Guideline 401)
LC50 Inhalation - Rat - male and female - 4 h - > 0.4 mg/l
(OECD Test Guideline 403)
LD50 Dermal - Rabbit - 20,000 mg/kg
Remarks: (RTECS)
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 24 h
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 24 h

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Remarks: (ECHA)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: Metabolic activation
Method: OECD Test Guideline 473
Result: positive
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: unscheduled DNA synthesis assay
Species: Rat
Cell type: Liver cells
Application Route: Oral
Method: OECD Test Guideline 486
Result: negative
Test Type: Micronucleus test
Species: Mouse
Cell type: Bone marrow
Application Route: Intraperitoneal
Method: US-EPA
Result: negative
Remarks: (ECHA)

Carcinogenicity
Suspected of causing cancer.

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Naphthalene)
	No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC. (Naphthalene)
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 91 Days - NOAEL (No observed adverse effect level) - 200 mg/kg - LOAEL (Lowest observed adverse effect level) - 400 mg/kg

Repeated dose toxicity - Mouse - male and female - Oral - 90 Days - NOAEL (No observed adverse effect level) - 100 mg/kg

Repeated dose toxicity - Rat - male and female - Dermal - 90 Days - NOAEL (No observed adverse effect level) - 1,000 mg/kg

Repeated dose toxicity - Rat - male and female - inhalation (vapor) - 90 Days - NOAEL (No observed adverse effect level) - 300 mg/kg

RTECS: QJ0525000
Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer., Naphthalene is retinotoxic and systemic absorption of its vapors above 15ppm, may result in:, cataracts, optic neuritis, corneal injury, Eye irritation, Ingestion may provoke the following symptoms:, hemolytic anemia, hemoglobinuria, Nausea, Headache, Vomiting, Gastrointestinal disturbance, Convulsions, anemia, Kidney injury may occur., Seizures., Coma.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Heart -

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Oncorhynchus mykiss (rainbow trout) - 1.6 mg/l - 96 h (OECD Test Guideline 203)
	flow-through test LC50 - Pimephales promelas (fathead minnow) - 7.9 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 2.16 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test EC50 - Pseudokirchneriella subcapitata (green algae) - 2.96 mg/l - 4 h Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 2 % - Not readily biodegradable. (OECD Test Guideline 302C)

12.3 Bioaccumulative potential

Bioaccumulation	Cyprinus carpio (Carp) - 56 d

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

at 25 °C(Naphthalene)

Bioconcentration factor (BCF): 36.5 - 168
(OECD Test Guideline 305)

Remarks: Bioaccumulation is unlikely.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1334 Class: 4.1 Packing group: III
Proper shipping name: Naphthalene, refined
Reportable Quantity (RQ): 100 lbs
1) Marine pollutant: yesPoison Inhalation Hazard: No

IMDG
UN number: 1334 Class: 4.1 Packing group: III EMS-No: F-A, S-G
Proper shipping name: NAPHTHALENE, REFINED
Marine pollutant : yes

IATA
UN number: 1334 Class: 4.1 Packing group: III
Proper shipping name: Naphthalene, refined

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.5 Revision Date: 05/07/2021 Print Date: 11/27/2021

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Revision Date 24-Dec-2021 **Revision Number** 4

1. Identification

Product Name **n-Butylbenzene**

Cat No. : **AC107850000; AC107850010; AC107850050; AC107850500; AC107852500**

CAS No 104-51-8
Synonyms 1-Phenylbutane

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3

Label Elements

Signal Word
Warning

Hazard Statements
Flammable liquid and vapor

Precautionary Statements
Prevention
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Wear protective gloves/protective clothing/eye protection/face protection
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
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 %
Butyl benzene	104-51-8	> 99

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention.

Inhalation Remove from exposure, lie down. Remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Ingestion Do NOT induce vomiting. Clean mouth with water. Aspiration hazard. Get medical attention.

Most important symptoms and effects Difficulty in breathing. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Water mist may be used to cool closed containers. Chemical foam.

Unsuitable Extinguishing Media No information available

Flash Point	59 °C / 138.2 °F
Method -	No information available
Autoignition Temperature	412 °C / 773.6 °F

Explosion Limits

Upper	5.80%
Lower	.80%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Combustible material. Flammable. Vapors may travel to source of ignition and flash back. Containers may explode when heated.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
0	2	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required.
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	Avoid contact with skin and eyes. Do not breathe dust. Do not breathe mist/vapors/spray. Use spark-proof tools and explosion-proof equipment. Use only non-sparking tools.
Storage.	Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat, sparks and flame. Incompatible Materials. Strong oxidizing agents. oxygen.

8. Exposure controls / personal protection

Exposure Guidelines	This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.
Engineering Measures	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	Liquid
Appearance	Colorless
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-88 °C / -126.4 °F
Boiling Point/Range	183 °C / 361.4 °F @ 760 mmHg
Flash Point	59 °C / 138.2 °F
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	5.80%
Lower	.80%
Vapor Pressure	1.33 hPa @ 23 °C
Vapor Density	4.6
Specific Gravity	0.860
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	412 °C / 773.6 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C10 H14
Molecular Weight	134.22

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. Incompatible products.

Incompatible Materials Strong oxidizing agents, oxygen

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Toxicologically Synergistic 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
Butyl benzene	104-51-8	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Butyl benzene	Group III Chemical	Not applicable	Not applicable

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility .

Component	log Pow
Butyl benzene	4.6

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 UN2709
Hazard Class 3
Packing Group III

TDG
UN-No UN2709
Hazard Class 3
Packing Group III

IATA
UN-No UN2709
Proper Shipping Name BUTYLBENZENES
Hazard Class 3

Packing Group III

IMDG/IMO

UN-No UN2709
Proper Shipping Name BUTYLBENZENES
Hazard Class 3
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Butyl benzene	104-51-8	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Butyl benzene	104-51-8	X	-	203-209-7	X	X	X	X	X	-

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Butyl benzene	X	X	X	-	-

U.S. Department of Transportation
Reportable Quantity (RQ): N
DOT Marine Pollutant Y
DOT Severe Marine Pollutant N

U.S. Department of Homeland This product does not contain any DHS chemicals.

Security

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Butyl benzene	104-51-8	Not applicable	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Butyl benzene	104-51-8	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

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

Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 6.10
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Heptane

Product Number : 650536
Brand : SIGALD
Index-No. : 601-008-00-2
CAS-No. : 142-82-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Aspiration hazard (Category 1), H304
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word: Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing mist or vapors.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C_7H_{16}
Molecular weight	:	100.20 g/mol
CAS-No.	:	142-82-5
EC-No.	:	205-563-8
Index-No.	:	601-008-00-2

Component	Classification	Concentration
n-heptane		
	Flam. Liq. 2; Skin Irrit. 2; STOT SE 3; Asp. Tox. 1; Aquatic Acute 1; Aquatic Chronic 1; H225, H315, H336, H304, H400, H410 Concentration limits: 20 %: STOT SE 3, H336; M-Factor - Aquatic Acute: 1 - Aquatic Chronic: 1	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Flash back possible over considerable distance.
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Store under inert gas.
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Component	CAS-No.	Value	Control parameters	Basis
n-heptane	142-82-5	TWA	85 ppm 350 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	440 ppm 1,800 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	500 ppm 2,000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	400 ppm 1,600 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	500 ppm 2,000 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	400 ppm	USA. ACGIH Threshold Limit Values (TLV)
		STEL	500 ppm	USA. ACGIH Threshold Limit Values (TLV)

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Break through time: 60 min
Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type ABEK
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer.
These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point: -91.0 °C (-131.8 °F)
f)	Initial boiling point and boiling range	98.2 - 98.4 °C 208.8 - 209.1 °F at 1,000 hPa
g)	Flash point	-4 °C (25 °F) - closed cup - c.c.
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.1 %(V)
k)	Vapor pressure	48 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	No data available
m)	Density	0.68 g/cm3 at 15 °C (59 °F)
	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: > 3 - Bioaccumulation is not expected.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

p)	Autoignition temperature	223.0 °C (433.4 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	0.64 mm2/s at 20 °C (68 °F) -
s)	Explosive properties	Not classified as explosive.
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Risk of ignition or formation of inflammable gases or vapours with:
Strong oxidizing agents
phosphorus
in the presence of:
Chlorine

10.4 Conditions to avoid
Warming.

10.5 Incompatible materials
rubber, various plastics

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - > 5,000 mg/kg
(OECD Test Guideline 401)
Remarks: The value is given in analogy to the following substances: isooctane
LC50 Inhalation - Rat - male and female - 4 h - > 29.29 mg/l - vapor

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

(OECD Test Guideline 403)
LD50 Dermal - Rabbit - male and female - > 2,000 mg/kg
(OECD Test Guideline 402)
Remarks: The value is given in analogy to the following substances: isooctane

Skin corrosion/irritation
Skin - Rabbit
Result: Irritating to skin. - 24 h
(OECD Test Guideline 404)
Remarks: The value is given in analogy to the following substances: isooctane
Remarks: Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)
Remarks: The value is given in analogy to the following substances: isooctane

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)
Remarks: **Germ cell mutagenicity**
Test Type: Ames test
Test system: Escherichia coli/Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: Chromosome aberration test in vitro
Test system: rat hepatocytes
Method: OECD Test Guideline 473
Result: negative

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause drowsiness or dizziness.
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Specific target organ toxicity - repeated exposure
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Aspiration hazard
May be fatal if swallowed and enters airways.
Aspiration hazard, Aspiration may cause pulmonary edema and pneumonitis.

11.2 Additional Information

RTECS: MI7700000
Prolonged or repeated exposure to skin causes defatting and dermatitis., Central nervous system depression, narcosis, Damage to the lungs.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LL50 - Rainbow darter (Etheostoma caeruleum) - > 13.4 mg/l - 96 h (OECD Test Guideline 203) Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 0.23 mg/l - 21 d Remarks: (ECHA) (in analogy to similar products)
Toxicity to algae	EL50 - Pseudokirchneriella subcapitata (green algae) - 29 mg/l - 72 h (OECD Test Guideline 201) Remarks: (ECHA)
	NOELR - Pseudokirchneriella subcapitata (green algae) - 6.3 mg/l - 72 h (OECD Test Guideline 201) Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 10 d Result: 70 % - Readily biodegradable. Remarks: (ECHA)
Biochemical Oxygen Demand (BOD)	1,920 mg/g Remarks: (IUCLID)
Theoretical oxygen demand	3,500 mg/g Remarks: (Lit.)
Ratio BOD/ThBOD	55 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Remarks: (Lit.)

12.3 Bioaccumulative potential
Indication of bioaccumulation.

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects

Additional ecological information: Do not empty into drains. Avoid release to the environment.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1206 Class: 3 Packing group: II
Proper shipping name: Heptanes
Reportable Quantity (RQ):
Marine pollutant: yes Poison Inhalation Hazard: No

IMDG
UN number: 1206 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: HEPTANES
Marine pollutant : yes
Marine pollutant : yes

IATA
UN number: 1206 Class: 3 Packing group: II
Proper shipping name: Heptanes

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

n-heptane	142-82-5

Pennsylvania Right To Know

n-heptane	142-82-5

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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.
Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.
Version: 6.10 Revision Date: 09/07/2024 Print Date: 09/08/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

N-Hexane

Section 1. Identification

GHS product identifier : N-Hexane

Chemical name : n-hexane

Other means of identification : Hexane; Hexane (n-Hexane)

Product use : Synthetic/Analytical chemistry.

Synonym : Hexane; Hexane (n-Hexane)

SDS # : 001060

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 2
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 2
AQUATIC HAZARD (LONG-TERM) - Category 2

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Highly flammable liquid and vapor.
May form explosive mixtures with air.
Suspected of damaging fertility or the unborn child.
May cause drowsiness and dizziness.
May cause damage to organs through prolonged or repeated exposure.
Toxic 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.

Powered by IHS

Section 2. Hazards identification

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Do not breathe vapor. Wash hands thoroughly after handling.

Response : Collect spillage. Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : n-hexane

Other means of identification : Hexane; Hexane (n-Hexane)

CAS number/other identifiers

CAS number : 110-54-3

Product code : 001060

Ingredient name	%	CAS number
n-hexane	100	110-54-3

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention following exposure or if feeling unwell.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. 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 necessary, call a poison center or physician. 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.

Powered by IHS

Section 4. First aid measures

Skin contact : Wash contaminated skin with soap and 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 necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

- ost important symptomsveffects, acute and delayed

Potential acute health effects

Eye contact : Causes eye irritation.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : Can cause central nervous system (CNS) depression. May be irritating to mouth, throat and stomach.

OReNexposure signsvsymptoms

Eye contact : Adverse symptoms may include the following:
irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
reduced fetal weight
increase in fetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

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.

Powered by IHS

Section 4. First aid measures

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.

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.

Specific hazards arising from the chemical : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

- ethods and materials for containment and cleaning up

Powered by IHS

Section 6. Accidental release measures

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Powered by IHS

Section 8. Exposure controls/personal protection

Ingredient name	Exposure limits
n-hexane	**ACGIH TLV (United States, 3/2012).** **Absorbed through skin.** TWA: 50 ppm 8 hours. **NIOSH REL (United States, 1/2013).** 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. **OSHA PEL 1989 (United States, 3/1989).** TWA: 180 mg/m³ 8 hours. TWA: 50 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: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Powered by IHS

Section 9. Physical and chemical properties

Appearance

Physical state	:	Liquid. [COLORLESS LIQUID WITH A MILD GASOLINE-LIKE ODOR]
Color	:	Colorless.
- olecular weight	:	86.18 g/mole
- olecular formula	:	C6-H14
Boilingvcondensation point	:	68.73°C (155.7°F)
- eltingvfreezing point	:	-95.35°C (-139.6°F)
Critical temperature	:	234.25°C (453.6°F)
Odor	:	Characteristic.
Odor threshold	:	Not available.
pH	:	Not available.
Flash point	:	Closed cup: -22°C (-7.6°F)
Burning time	:	Not applicable.
Burning rate	:	Not applicable.
ERaporation rate	:	6.82 (butyl acetate = 1)
Flammability (solid, gas)	:	Extremely flammable in the presence of the following materials or conditions: oxidizing materials.
Lower and upper explosiRe (flammable) limits	:	Lower: 1.1% Upper: 7.5%
Vapor pressure	:	17 kPa (127.510360216 mm Hg) [room temperature]
Vapor density	:	3 (Air = 1)
Specific Volume (ft ^{3}Vlb)	:	1.5138
Gas Density (lbvft ^{3})	:	0.6606 (25°C / 77 to °F)
/ elatiRe density	:	0.7
Solubility	:	Not available.
Solubility in water	:	0.0098 g/l
Partition coefficient: nN octanolwater	:	4
AutoNignition temperature	:	225°C (437°F)
Decomposition temperature	:	Not available.
SADT	:	Not available.
Viscosity	:	Dynamic (room temperature): 0.3 mPa·s (0.3 cP)

Section 10. Stability and reactiRity

/ eactiRity	:	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 aRoid	:	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.

Powered by IHS

Section 10. Stability and reactivity

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
n-hexane	LC50 Inhalation Gas. LC50 Inhalation Vapor LD50 Oral	Rat Rat Rat	48000 ppm 96000 ppm 15840 mg/kg	4 hours 1 hours -

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
n-hexane	Eyes - Mild irritant	Rabbit	-	10 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
n-hexane	Category 3	Not applicable.	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
n-hexane	Category 2	Not determined	Not determined

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Powered by IHS

Section 11. Toxicological information

Eye contact : Causes eye irritation.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness.

Skin contact : No known significant effects or critical hazards.

Ingestion : Can cause central nervous system (CNS) depression. May be irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
reduced fetal weight
increase in fetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
reduced fetal weight
increase in fetal deaths
skeletal malformations

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 : No known significant effects or critical hazards.

- utagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

DeRelopmental effects : No known significant effects or critical hazards.

Fertility effects : Suspected of damaging fertility.

Mumerical measures of toxicity

Acute toxicity estimates

Powered by IHS

Section 11. Toxicological information

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
n-hexane	Acute LC50 113000 µg/l Fresh water	Fish - Oreochromis mossambicus	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
n-hexane	4	501.187	high

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1208	UN1208	UN1208	UN1208	UN1208
UN proper shipping name	Hexanes	Hexanes	Hexanes	Hexanes	Hexanes
Transport hazard class(es)	3	3	3	3	3

Powered by IHS

Section 14. Transport information

Packing group	II	II	II	II	II
Environment	No.	No.	No.	Yes.	No.
Additional information	**Reportable quantity** 5000 lbs / 2270 kg [907.77 gal / 3436.3 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.	**Explosive Limit and Limited Quantity Index** 1 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** 5	-	The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg.	The environmentally hazardous substance mark may appear if required by other transportation regulations.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Powered by IHS

Section 15. / egulatory information

Mame	%	Fire hazard	Sudden release of pressure	/ eactiRe	Immediate (acute) health hazard	Delayed (chronic) health hazard
n-hexane	100	Yes.	No.	No.	Yes.	Yes.

SA/ A 313

	Product name	CAS number	%
Form / N/ eporting requirements	n-hexane	110-54-3	100
Supplier notification	n-hexane	110-54-3	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

- assachusetts : This material is listed.
Mew York : This material is listed.
Mew Jersey : This material is listed.
PennsylRania : This material is listed.

Canada inRentory : This material is listed or exempted.

International regulations

International lists : **Australia inRentory (AICS)**: This material is listed or exempted.
China inRentory (IECSC): This material is listed or exempted.
Japan inRentory: This material is listed or exempted.
Korea inRentory: This material is listed or exempted.
- alaysia InRentory (EHS / egister): Not determined.
Mew Zealand InRentory of Chemicals (MZIoC): This material is listed or exempted.
Philippines inRentory (PICCS): This material is listed or exempted.
Taiwan inRentory (CSMM): Not determined.

Chemical Weapons ConRention List Schedule I Chemicals : Not listed

Chemical Weapons ConRention List Schedule II Chemicals : Not listed

Chemical Weapons ConRention List Schedule III Chemicals : Not listed

Canada

WH- IS (Canada) : Class B-2: Flammable liquid
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

CEPA Toxic substances: This material is not listed.
Canadian A/ ET: This material is not listed.
Canadian MP/ I: 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.

Powered by IHS

Section 16. Other information

Canada Label requirements : Class B-2: Flammable liquid
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

Hazardous - aterial Information System (U.S.A.)

Health	*	2
Flammability		3
Physical hazards		0

Caution: H- IS® ratings are based on a 0N4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although H- IS® ratings are not required on SDSs under 29 CF/ 1910. 1200, the preparer may choose to proRide them. H- IS® ratings are to be used with a fully implemented H- IS® program. H- IS® is a registered mark of the Mational Paint & Coatings Association (MPCA). H- IS® materials may be purchased exclusiReely from J. J. Keller (800) 327N6868.

The customer is responsible for determining the PPE code for this material.

Mational Fire Protection Association (U.S.A.)

/ eprinted with permission from MFPA 704N2001, Identification of the Hazards of - aterials for Emergency / esponse Copyright ©1997, Mational Fire Protection Association, Quincy, - A 02269. This reprinted material is not the complete and official position of the Mational Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, Mational Fire Protection Association, Quincy, - A 02269. This warning system is intended to be interpreted and applied only by properly trained indiRiduals to identify fire, health and reactiRity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in MFPA 49 and MFPA 325, which would be used as a guideline only. Whether the chemicals are classified by MFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 5/20/2015.

Date of issueVDate of reRision : 5/20/2015.

Date of preRious issue : 10/16/2014.

Version : 0.03

Key to abbreRiations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)

Powered by IHS

Section 16. Other information

CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

/ eferences : Not available.

Indicates information that has changed from preRiously issued Rersion.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. HoweRer, neither the aboRenamed supplier, nor any of its subsidiaries, assumes any liability whatsoeRer 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.

Powered by IHS

SAFETY DATA SHEET

Creation Date 26-Sep-2009 **Revision Date** 26-Dec-2021 **Revision Number** 5

1. Identification

Product Name **Propylbenzene**

Cat No. : **AC418430000; AC418430250; AC418431000; AC418435000**

CAS No 103-65-1
Synonyms 1-Phenyl Propane.

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Flammable liquid and vapor
May be fatal if swallowed and enters airways
May cause respiratory irritation

Precautionary Statements
Prevention
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
Wear protective gloves/protective clothing/eye protection/face protection
Keep cool
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Do NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Propyl benzene	103-65-1	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Get medical attention.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Get medical attention. Risk of serious damage to the lungs (by aspiration).

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately. If vomiting

occurs naturally, have victim lean forward.

Most important symptoms and effects Difficulty in breathing. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Water mist may be used to cool closed containers. Chemical foam. Water mist may be used to cool closed containers.

Unsuitable Extinguishing Media No information available

Flash Point 47 °C / 116.6 °F

Method - No information available

Autoignition Temperature 450 °C / 842 °F

Explosion Limits

Upper	6.00%
Lower	.80%
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. Containers may explode when heated. Vapors may form explosive mixtures with air.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	2	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions Do not flush into surface water or sanitary sewer system.

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/face protection. Avoid contact with skin and eyes. Do not breathe mist/vapors/spray. Use spark-proof tools and explosion-proof equipment. Use only non-sparking tools. Wash hands before breaks and immediately after handling the product. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges.

Storage. Keep away from heat, sparks and flame. Flammables area. Keep container tightly closed in a dry and well-ventilated place. Incompatible Materials. Strong oxidizing agents.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting equipment.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection No protective equipment is needed under normal use conditions.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Light yellow
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-99 °C / -146.2 °F
Boiling Point/Range	158 °C / 316.4 °F @ 760 mmHg
Flash Point	47 °C / 116.6 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	6.00%
Lower	.80%
Vapor Pressure	No information available
Vapor Density	4.1
Specific Gravity	0.860
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	450 °C / 842 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C9 H12
Molecular Weight	120.19

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability No information available.

Conditions to Avoid Keep away from open flames, hot surfaces and sources of ignition. Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information
Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Propyl benzene	LD50 = 6040 mg/kg (Rat)	Not listed	LC50 = 65000 ppm (Rat) 2 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 irritation of respiratory tract

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
Propyl benzene	103-65-1	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 Category 1

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 The toxicological properties have not been fully investigated.

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.

Persistence and Degradability Persistence is unlikely

Bioaccumulation/ Accumulation No information available.

Mobility Is not likely mobile in the environment due its low water solubility.

Component	log Pow
Propyl benzene	3.68

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	UN2364
Proper Shipping Name	N-PROPYL BENZENE
Hazard Class	3
Packing Group	III

TDG

UN-No	UN2364
Proper Shipping Name	N-PROPYL BENZENE
Hazard Class	3
Packing Group	III

IATA

UN-No	UN2364
Proper Shipping Name	n-PROPYLBENZENE
Hazard Class	3
Packing Group	III

IMDG/IMO

UN-No	UN2364
Proper Shipping Name	PROPYLBENZENE
Hazard Class	3
Packing Group	III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Propyl benzene	103-65-1	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Propyl benzene	103-65-1	X	-	203-132-9	X	X	X	X	X	KE-29781

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration: Not applicable

CERCLA: Not applicable

California Proposition 65: This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Propyl benzene	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

Authorisation/Restrictions according to EU REACH

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Propyl benzene	103-65-1	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Propyl benzene	103-65-1	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

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

Creation Date 26-Sep-2009
Revision Date 26-Dec-2021
Print Date 26-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information

relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Revision Date 24-Dec-2021 **Revision Number** 6

1. Identification

Product Name **p-Cymene**

Cat No. : **AC111760000; AC111760010; AC111760025; AC111760100; AC111762500**

CAS No 99-87-6
Synonyms Dolcymene; p-Isopropyltoluene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 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.	
Aspiration Toxicity	Category 1

Label Elements

Signal Word
Danger

Hazard Statements

Flammable liquid and vapor
May be fatal if swallowed and enters airways
Causes skin irritation
Causes serious eye irritation
May cause respiratory irritation

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
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
Keep cool
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 skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Do NOT induce vomiting
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
None identified

3. Composition/Information on Ingredients

Component	CAS No	Weight %
p-Cymene	99-87-6	>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. Get medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.
Inhalation	Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur. Risk of serious damage to the lungs (by aspiration).
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 and effects	Difficulty in breathing. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam. Water mist may be used to cool closed containers.
Unsuitable Extinguishing Media	No information available
Flash Point	47 °C / 116.6 °F
Method -	No information available
Autoignition Temperature	435 °C / 815 °F

Explosion Limits

Upper	5.60%
Lower	.70%
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Flammable. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated. Vapors may form explosive mixtures with air.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
3	2	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required. Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions	Should not be released into the environment.
Methods for Containment and Clean	Keep in suitable, closed containers for disposal. Soak up with inert absorbent material.

Up Remove all sources of ignition. Take precautionary measures against static discharges. Use spark-proof tools and explosion-proof equipment.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use spark-proof tools and explosion-proof equipment. Take precautionary measures against static discharges.

Storage. Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat, sparks and flame. Flammables area. Keep container tightly closed in a dry and well-ventilated place. Incompatible Materials. Strong oxidizing agents. Strong acids. Strong bases.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting equipment.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Clear
Odor	aromatic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-68 °C / -90.4 °F
Boiling Point/Range	176 - 178 °C / 348.8 - 352.4 °F @ 760 mmHg
Flash Point	47 °C / 116.6 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	5.60%
Lower	.70%
Vapor Pressure	1.5 mmHg @ 20 °C
Vapor Density	4.62 (Air = 1.0)
Specific Gravity	0.854
Solubility	No information available
Partition coefficient; n-octanol/water	No data available

Autoignition Temperature	435 °C / 815 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C10 H14
Molecular Weight	134.22

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. Excess heat. Incompatible products.

Incompatible Materials Strong oxidizing agents, Strong acids, Strong bases

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization No information available.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
p-Cymene	LD50 = 4750 mg/kg (Rat)	LD50 > 5000 mg/kg (Rabbit)	LC50 > 9.7 mg/L (Rat) 5 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
p-Cymene	99-87-6	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Not mutagenic in AMES Test

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

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 The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains. .

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
p-Cymene	Not listed	LC50: 48 mg/L/96h (sheepshead minnow)	Not listed	LC50: 6.5 mg/L/48h

Persistence and Degradability Insoluble in water May persist based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility.

Component	log Pow
p-Cymene	4.1

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 UN2046
Proper Shipping Name CYMENES
Hazard Class 3
Packing Group III

TDG

UN-No UN2046
Proper Shipping Name CYMENES
Hazard Class 3
Packing Group III

IATA

UN-No UN2046
Proper Shipping Name CYMENES
Hazard Class 3
Packing Group III

IMDG/IMO

UN-No UN2046
Proper Shipping Name CYMENES
Hazard Class 3
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
p-Cymene	99-87-6	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
p-Cymene	99-87-6	X	-	202-796-7	X	X	X	X	X	KE-21748

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
p-Cymene	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

Authorisation/Restrictions according to EU REACH

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
p-Cymene	99-87-6	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) -	Seveso III Directive (2012/18/EC) -	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)

		Qualifying Quantities for Major Accident Notification	Qualifying Quantities for Safety Report Requirements		
p-Cymene	99-87-6	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

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

Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Revision Date 24-Dec-2021 **Revision Number** 4

1. Identification

Product Name **sec-Butylbenzene**

Cat No. : **AC107860000; AC107860050; AC107860500; AC107862500**

CAS No 135-98-8
Synonyms 2-Phenylbutane

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids	Category 3
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2

Label Elements

Signal Word
Warning

Hazard Statements
Flammable liquid and vapor
Causes skin irritation
Causes serious eye irritation

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
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
Skin
If skin irritation occurs: Get medical advice/attention
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Fire
In case of fire: Use CO2, dry chemical, or foam for extinction
Storage
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 %
sec-Butylbenzene	135-98-8	> 99

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention.

Inhalation Remove from exposure, lie down. Remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Ingestion Clean mouth with water. Get medical attention.

Most important symptoms and effects Difficulty in breathing. . Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray. Carbon dioxide (CO_2). Dry chemical. Water mist may be used to cool closed containers. Chemical foam. Water mist may be used to cool closed containers.

Unsuitable Extinguishing Media No information available

Flash Point 45 °C / 113 °F

Method - No information available

Autoignition Temperature 415 °C / 779 °F

Explosion Limits

Upper	6.90%
Lower	0.80%
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. Containers may explode when heated. Vapors may form explosive mixtures with air.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	2	0	N/A

6. Accidental release measures

Personal Precautions Remove all sources of ignition. Take precautionary measures against static discharges.
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 Avoid contact with skin and eyes. Do not breathe mist/vapors/spray. Take precautionary measures against static discharges. Use spark-proof tools and explosion-proof equipment. Use only non-sparking tools. Keep away from open flames, hot surfaces and sources of ignition.

Storage. Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep away from heat, sparks and flame. Flammables area. Keep container tightly closed in a dry and well-ventilated place. Incompatible Materials. Strong oxidizing agents.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting equipment.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection No protective equipment is needed under normal use conditions.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-75 °C / -103 °F
Boiling Point/Range	173 - 174 °C / 343.4 - 345.2 °F @ 760 mmHg
Flash Point	45 °C / 113 °F
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	6.90%
Lower	0.80%
Vapor Pressure	1.33 hPa @ 19 °C
Vapor Density	4.62
Specific Gravity	0.860
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	415 °C / 779 °F
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C10 H14
Molecular Weight	134.22

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. Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization No information available.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
sec-Butylbenzene	LD50 = 2240 µL/kg (Rat)	Not listed	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
sec-Butylbenzene	135-98-8	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Persistence and Degradability Insoluble in water May persist based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility.

Component	log Pow
sec-Butylbenzene	4.24

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 UN2709
Hazard Class 3

Packing Group III

TDG

UN-No UN2709
Hazard Class 3
Packing Group III

IATA

UN-No UN2709
Proper Shipping Name BUTYLBENZENES
Hazard Class 3
Packing Group III

IMDG/IMO

UN-No UN2709
Proper Shipping Name BUTYLBENZENES
Hazard Class 3
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
sec-Butylbenzene	135-98-8	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
sec-Butylbenzene	135-98-8	X	-	205-227-0	X	X	X	X	X	KE-04204

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
sec-Butylbenzene	X	-	X	-	-

U.S. Department of Transportation
Reportable Quantity (RQ): N
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

Authorisation/Restrictions according to EU REACH

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
sec-Butylbenzene	135-98-8	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
sec-Butylbenzene	135-98-8	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

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

Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 7.2
Revision Date 08/30/2024
Print Date 08/31/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Styrene, ReagentPlus®, contains 4-tert-butylcatechol as stabilizer, ≥99%

Product Number : S4972
Brand : Sigma-Aldrich
Index-No. : 601-026-00-0
CAS-No. : 100-42-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 4), H332

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Reproductive toxicity (Category 2), H361
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), hearing organs, H372
Aspiration hazard (Category 1), H304
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word: Danger

Hazard Statements

H226	Flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H361	Suspected of damaging fertility or the unborn child.
H372	Causes damage to organs (hearing organs) through prolonged or repeated exposure if inhaled.
H401	Toxic to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe mist or vapors.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	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.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Lachrymator.

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C8H8
Molecular weight	:	104.15 g/mol
CAS-No.	:	100-42-5
EC-No.	:	202-851-5
Index-No.	:	601-026-00-0

Component	Classification	Concentration
styrene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; Repr. 2; STOT SE 3; STOT RE 1; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 3; H226, H332, H315, H319, H361, H335, H372, H304, H401, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice

Show this material safety data sheet to the doctor in attendance.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Carbon dioxide (CO2) Foam Dry powderCarbon dioxide (CO2) Foam Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Container explosion may occur under fire conditions., Vapors may form explosive mixture with air.
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage stability Recommended storage temperature
2 - 8 °C
Light sensitive.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
styrene	100-42-5	TWA	50 ppm 215 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	100 ppm 425 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	600 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		PEL	50 ppm 215 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
	Remarks	Skin		
		STEL	100 ppm 425 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		C	500 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Ototoxicant Confirmed animal carcinogen with unknown relevance to humans		
		STEL	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Ototoxicant Confirmed animal carcinogen with unknown relevance to humans		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
styrene	100-42-5	Mandelic acid plus phenylglyoxylic acid	150mg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		Styrene	20 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter type ABEK
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless, to, yellow
b)	Odor	sweet
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Freezing point: -31.0 °C (-23.8 °F)
f)	Initial boiling point and boiling range	145.0 - 146.0 °C 293.0 - 294.8 °F at 1,013 hPa
g)	Flash point	32.0 °C (89.6 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 8.9 %(V) Lower explosion limit: 1.1 %(V)
k)	Vapor pressure	6.67 hPa at 20 °C (68 °F)
l)	Vapor density	3.6

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

m)	Density	0.906 g/cm3 at 20 °C (68 °F)
	Relative density	0.9 - 0.9120 °C
n)	Water solubility	0.32 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 2.96 at 25 °C (77 °F) - Bioaccumulation is not expected.
p)	Autoignition temperature	490.0 °C (914.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	Not classified as explosive.
t)	Oxidizing properties	none

9.2 Other safety information

Relative vapor density	3.6

SECTION 10: Stability and reactivity

10.1 Reactivity

Vapor/air-mixtures are explosive at intense warming.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .
Contains the following stabilizer(s):
4-tert-butylpyrocatechol (<=0.005 %)

10.3 Possibility of hazardous reactions

Exothermic reaction with:
chlorosulfonic acid
Oxidizing agents
Chlorine
with
Iron
Violent polymerization may be caused by:
aluminium chloride
sodium
Risk of explosion with:
Strong acids
polymerisation initiators
Peroxides
Oxygen
with
Heat.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

10.4 Conditions to avoid
Heating.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
LD50 Oral - Rat - male - 5,000 mg/kg
Remarks: (ECHA)
Symptoms: Irritation of mucous membranes

Inhalation: No data available

LC50 Inhalation - Rat - 4 h - 11.8 mg/l - vapor

Remarks: (ECHA)
Symptoms: Possible damages:, mucosal irritations
Acute toxicity estimate Dermal - 2,500 mg/kg
(Calculation method)
LD50 Dermal - Rat - male and female - > 2,000 mg/kg
(OECD Test Guideline 402)

Skin corrosion/irritation
Remarks: Causes skin irritation.
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Serious eye damage/eye irritation
Remarks: Causes serious eye irritation.
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
Test Type: sister chromatid exchange assay
Test system: Human lymphocytes
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 479
Result: positive
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Result: negative
Test Type: Chromosome aberration test in vitro
Test system: Human lymphocytes
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 473
Result: positive

Test Type: Micronucleus test
Species: Mouse
Cell type: Red blood cells (erythrocytes)
Application Route: inhalation (vapor)
Method: OECD Test Guideline 474
Result: negative

Test Type: unscheduled DNA synthesis assay
Species: Mouse
Cell type: Liver cells
Application Route: inhalation (vapor)
Method: OECD Test Guideline 486
Result: negative

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

IARC:	2A - Group 2A: Probably carcinogenic to humans (styrene)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (styrene)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Suspected of damaging the unborn child.

Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation. - Nose

Specific target organ toxicity - repeated exposure
Inhalation - Causes damage to organs through prolonged or repeated exposure.
- hearing organs
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Aspiration hazard
Aspiration may cause pulmonary edema and pneumonitis.

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
Dermatitis, Central nervous system depression, Nausea, Dizziness, Headache, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Endocrine system. -

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 10 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	flow-through test EC50 - Daphnia magna (Water flea) - 4.7 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test ErC50 - Pseudokirchneriella subcapitata (green algae) - 4.9 mg/l - 72 h (US-EPA)
Toxicity to bacteria	static test EC50 - activated sludge - ca. 500 mg/l - 30 min (OECD Test Guideline 209)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia magna (Water flea) - 1.01 mg/l - 21 d (OECD Test Guideline 211)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 70.9 % - Readily biodegradable. Remarks: (ECHA)

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 2055 Class: 3 Packing group: III
Proper shipping name: Styrene monomer, stabilized
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 2055 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: STYRENE MONOMER, STABILIZED

IATA
UN number: 2055 Class: 3 Packing group: III
Proper shipping name: Styrene monomer, stabilized

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
styrene	100-42-5	1000	1000

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

styrene 100-42-5 >= 90 - <= 100 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 112 (40 CFR 61):

styrene	100-42-5	>= 90 - <= 100 %

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489):

styrene	100-42-5	>= 90 - <= 100 %

Clean Water Act

The following Hazardous Substances are listed under the U.S. CleanWater Act, Section 311, Table 116.4A:

styrene	100-42-5	>= 90 - <= 100 %

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:

styrene	100-42-5	>= 90 - <= 100 %

This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307
This product does not contain any priority pollutants related to the U.S. Clean Water Act

US State Regulations

Massachusetts Right To Know

styrene	100-42-5

Pennsylvania Right To Know

styrene	100-42-5

Maine Chemicals of High Concern

styrene	100-42-5

Vermont Chemicals of High Concern

styrene	100-42-5

Washington Chemicals of High Concern

styrene	100-42-5

California Prop. 65

WARNING: This product can expose you to chemicals including styrene, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 7.2 Revision Date: 08/30/2024 Print Date: 08/31/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Creation Date 10-December-2009 **Revision Date** 24-December-2021 **Revision Number** 6

1. Identification

Product Name **Tetrachloroethylene**

Cat No. : **C182-20; C182-4**

CAS-No 127-18-4
Synonyms Perchloroethylene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Importer/Distributor
Fisher Scientific
112 Colonnade Road,
Ottawa, ON K2E 7L6,
Canada
Tel: 1-800-234-7437

Manufacturer
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification

WHMIS 2015 Classification Classified as hazardous under the Hazardous Products Regulations (SOR/2015-17)

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 - 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
May cause an allergic skin reaction
Causes serious eye irritation
May cause drowsiness and 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
Wear protective gloves/protective clothing/eye protection/face protection
Do not breathe dust/fumes/gas/mist/vapours/spray
Wash face, hands and any exposed skin thoroughly after handling
Use only outdoors or in a well-ventilated area
Contaminated work clothing should not be allowed out of the workplace
Response
IF exposed or concerned: Get medical advice/attention
IF ON SKIN: Wash with plenty of soap and water
IF INHALED: Remove person to fresh air and keep comfortable for breathing
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Take off contaminated clothing
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

Other Hazards
Toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Tetrachloroethylene	127-18-4	>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. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water.

Most important symptoms/effects None reasonably foreseeable. 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 Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam.

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated.

Hazardous Combustion Products
Chlorine. Phosgene. Hydrogen chloride gas.
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 as required. Ensure adequate ventilation.
Environmental Precautions Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Ensure adequate ventilation. Avoid ingestion and inhalation.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from sunlight. Incompatible Materials. Strong acids. Strong oxidizing agents. Strong bases. Metals. Zinc. Amines. Aluminium.

8. Exposure controls / personal protection

Exposure Guidelines

Component	Alberta	British Columbia	Ontario TWAEV	Quebec	ACGIH TLV	OSHA PEL	NIOSH IDLH
Tetrachloroethylene	TWA: 25 ppm	TWA: 25 ppm	TWA: 25 ppm	TWA: 25 ppm	TWA: 25 ppm	(Vacated) TWA:	IDLH: 150 ppm

	TWA: 170 mg/m³ STEL: 100 ppm STEL: 678 mg/m³	STEL: 100 ppm	STEL: 100 ppm	TWA: 170 mg/m³ STEL: 100 ppm STEL: 685 mg/m³	STEL: 100 ppm	25 ppm (Vacated) TWA: 170 mg/m³ Ceiling: 200 ppm TWA: 100 ppm	

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures

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.

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 Goggles

Hand Protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Glove material	Breakthrough time	Glove thickness	Glove comments
Nitrile rubber	> 480 minutes	0.38 mm	As tested under EN374-3
Viton (R)	> 480 minutes	0.3 mm	Determination of Resistance to Permeation by Chemicals

Inspect gloves before use. observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information) 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. gloves with care avoiding skin contamination.

Respiratory Protection

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. 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.

To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly

Recommended Filter type: Organic gases and vapours filter Type A Brown conforming to EN14387

When RPE is used a face piece Fit Test should be conducted

Environmental exposure controls

Prevent product from entering drains. Do not allow material to contaminate ground water system.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice. Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wash hands before breaks and after work.

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
Density	1.619
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, Aluminium

Hazardous Decomposition Products Chlorine, Phosgene, Hydrogen chloride gas

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 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
Tetrachloroethylene	127-18-4	Group 2A	Reasonably Anticipated	A3	X	A3

IARC (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans
NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)	*A1 - Known Human Carcinogen* *A2 - Suspected Human Carcinogen* *A3 - Animal Carcinogen*
Mexico - Occupational Exposure Limits - Carcinogens	*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 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.

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: 12.4 - 14.4 mg/L, 96h flow-through (Pimephales promelas) LC50: 8.6 - 13.5 mg/L, 96h static (Pimephales promelas) LC50: 11.0 - 15.0 mg/L, 96h static (Lepomis macrochirus) LC50: 4.73 - 5.27 mg/L, 96h flow-through (Oncorhynchus mykiss)	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	CAS-No	DSL	NDSL	TSCA	TSCA Inventory notification - Active-Inactive	EINECS	ELINCS	NLP
Tetrachloroethylene	127-18-4	X	-	X	ACTIVE	204-825-9	-	-

Component	CAS-No	IECSC	KECL	ENCS	ISHL	TCSI	AICS	NZIoC	PICCS
Tetrachloroethylene	127-18-4	X	KE-33294	X	X	X	X	X	X

Legend:
X - Listed '-' - Not Listed
KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
IECSC - Chinese Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
ENCS - Japanese Existing and New Chemical Substances
AICS - Australian Inventory of Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances

Canada

SDS in compliance with provisions of information as set out in Canadian Standard - Part 4, Schedule 1 and 2 of the Hazardous Products Regulations (HPR) and meets the requirements of the HPR (Paragraph 13(1)(a) of the Hazardous Products Act (HPA)).

Component	Canada - National Pollutant Release Inventory (NPRI)	Canadian Environmental Protection Agency (CEPA)	Canada's Chemicals Management Plan (CEPA)

		- List of Toxic Substances	
Tetrachloroethylene	Part 1, Group A Substance Part 4 Substance	Schedule I	

Other International Regulations

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Tetrachloroethylene	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS-No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Tetrachloroethylene	127-18-4	Listed	Not applicable	Not applicable	Not applicable

Component	CAS-No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Tetrachloroethylene	127-18-4	Not applicable	Not applicable	Not applicable	Annex I - Y45

16. Other information

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

Creation Date 10-December-2009
Revision Date 24-December-2021
Print Date 24-December-2021
Revision Summary This document has been updated to comply with the requirements of WHMIS 2015 to align with the Globally Harmonised System (GHS) for the Classification and Labelling of Chemicals.

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 6.25
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Toluene

Product Number : 244511
Brand : Sigma-Aldrich
Index-No. : 601-021-00-3
CAS-No. : 108-88-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Skin irritation (Category 2), H315
Reproductive toxicity (Category 2), H361

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, H373
Aspiration hazard (Category 1), H304
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word: Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H336	May cause drowsiness or dizziness.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs (Central nervous system) through prolonged or repeated exposure if inhaled.
H401	Toxic to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe mist or vapors.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	C_7H_8
Molecular weight	:	92.14 g/mol
CAS-No.	:	108-88-3
EC-No.	:	203-625-9
Index-No.	:	601-021-00-3

Component	Classification	Concentration
Toluene		
	Flam. Liq. 2; Skin Irrit. 2; Repr. 2; STOT SE 3; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 3; H225, H315, H361, H336, H373, H304, H401, H412 Concentration limits: 20 %: STOT SE 3, H336;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Handle and store under inert gas.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Toluene	108-88-3	TWA	100 ppm 375 mg/m3	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		STEL	150 ppm 560 mg/m3	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		TWA	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z37.12-1967		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		CEIL	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.12-1967		
		Peak	500 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z37.12-1967		
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Visual impairment Female reproductive Pregnancy loss 2023 Adoption Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen		
		TWA	100 ppm 375 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	150 ppm 560 mg/m3	USA. NIOSH Recommended Exposure Limits

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Toluene	108-88-3	Toluene	0.02 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)
	Remarks	Prior to last shift of workweek			
		Toluene	0.03 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			
		o-Cresol	0.3mg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

Derived No Effect Level (DNEL)

Application Area	Routes of exposure	Health effect	Value
Workers	Inhalation	Acute systemic effects	384 mg/m3
Workers	Inhalation	Acute local effects	384 mg/m3
Workers	Skin contact	Long-term systemic effects	384mg/kg BW/d
Workers	Inhalation	Long-term systemic effects	192 mg/m3
Workers	Inhalation	Long-term local effects	192 mg/m3
Consumers	Inhalation	Acute systemic effects	226 mg/m3
Consumers	Inhalation	Acute local effects	226 mg/m3
Consumers	Skin contact	Long-term systemic effects	226mg/kg BW/d

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Consumers	Inhalation	Long-term systemic effects	56.5 mg/m3
Consumers	Ingestion	Long-term systemic effects	8.13mg/kg BW/d

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	2.89 mg/kg
Sea water	0.68 mg/l
Fresh water	0.68 mg/l
Sea sediment	16.39 mg/kg
Fresh water sediment	16.39 mg/kg
Sewage treatment plant	13.61 mg/l
Aquatic intermittent release	0.68 mg/l

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter A (acc. to DIN 3181) for vapours of organic compounds

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid
b)	Odor	benzene-like
c)	Odor Threshold	0.2 ppm
d)	pH	Not applicable
e)	Melting point/freezing point	Melting point/ range: -93 °C (-135 °F)
f)	Initial boiling point and boiling range	110 - 111 °C 230 - 232 °F
g)	Flash point	4.4 °C (39.9 °F) - closed cup - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 7.1 %(V) Lower explosion limit: 1.2 %(V)
k)	Vapor pressure	30.88 hPa at 21.1 °C (70.0 °F)
l)	Vapor density	3.18
m)	Density	0.865 g/mL at 25 °C (77 °F)
	Relative density	No data available
n)	Water solubility	0.58 g/l at 25 °C (77 °F) - partly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 2.73 at 20 °C (68 °F) - Bioaccumulation is not expected.
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	Not classified as explosive.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

t) Oxidizing properties none

9.2 Other safety information

Conductivity	< 0.01 µS/cm
Surface tension	27.73 mN/m at 0.516g/l at 25 °C (77 °F)
Relative vapor density	3.18

SECTION 10: Stability and reactivity

10.1 Reactivity
Vapors may form explosive mixture with air.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Risk of explosion with:
fuming sulfuric acid
Nitric acid
silver
perchlorates
nitrogen dioxide
nonmetallic halides
halogen-halogen compounds
uranium hexafluoride
organic nitro compounds
Violent reactions possible with:
Strong acids
Strong oxidizing agents
sulfur
with
Heat.

10.4 Conditions to avoid
Warming.

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male - 5,580 mg/kg
(Directive 67/548/EEC, Annex V, B.1.)
LC50 Inhalation - Rat - male - 4 h - 25.7 mg/l - vapor

(OECD Test Guideline 403)
LD50 Dermal - Rabbit - male - > 5,000 mg/kg
Remarks: (ECHA)

Skin corrosion/irritation
Skin - Rabbit
Result: irritating - 4 h
(Regulation (EC) No. 440/2008, Annex, B.4)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(Regulation (EC) No. 440/2008, Annex, B.6)

Germ cell mutagenicity
Test Type: In vitro mammalian cell gene mutation test
Test system: Mouse lymphoma test
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Ames test
Test system: S. typhimurium
Metabolic activation: with and without metabolic activation
Method: Regulation (EC) No. 440/2008, Annex, B.13/14 (Ames test)
Result: negative

Test Type: Chromosome aberration test
Species: Rat
Cell type: Bone marrow
Application Route: Intraperitoneal

Result: negative
Remarks: (ECHA)

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Suspected of damaging the unborn child.

Specific target organ toxicity - single exposure
Inhalation - May cause drowsiness or dizziness. - Central nervous system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Specific target organ toxicity - repeated exposure
Inhalation - May cause damage to organs through prolonged or repeated exposure.
- Central nervous system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Aspiration hazard
Aspiration may cause pulmonary edema and pneumonitis.

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 13 Weeks - NOAEL (No observed adverse effect level) - 625 mg/kg - LOAEL (Lowest observed adverse effect level) - 1,250 mg/kg

RTECS: XS5250000
Drowsiness, irritant effects, Dizziness, Convulsions, Headache, Nausea, Vomiting, Circulatory collapse, somnolence, inebriation, Unconsciousness, respiratory arrest, CNS disorders, respiratory paralysis, death
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Oncorhynchus kisutch (coho salmon) - 5.5 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	EC50 - Ceriodaphnia dubia (water flea) - 3.78 mg/l - 48 h (US-EPA)
Toxicity to bacteria	static test EC50 - Bacteria - 84 mg/l - 24 h Remarks: (ECHA)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Oncorhynchus kisutch (coho salmon) - 1.39 mg/l - 40 d Remarks: (ECHA)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	NOEC - Ceriodaphnia dubia (water flea) - 0.74 mg/l - 7 d (US-EPA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 20 d Result: 86 % - Readily biodegradable. Remarks: (IUCLID)

12.3 Bioaccumulative potential

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d - 0.05 mg/l(Toluene) Bioconcentration factor (BCF): 90

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 1294 Class: 3 Packing group: II
Proper shipping name: Toluene
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

UN number: 1294 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: TOLUENE

IATA
UN number: 1294 Class: 3 Packing group: II
Proper shipping name: Toluene

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Toluene	108-88-3	1000	1000

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Toluene 108-88-3 >= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

Toluene 108-88-3

Pennsylvania Right To Know

Toluene 108-88-3

Maine Chemicals of High Concern

Toluene 108-88-3

Vermont Chemicals of High Concern

Toluene 108-88-3

Washington Chemicals of High Concern

Toluene 108-88-3

California Prop. 65

WARNING: This product can expose you to chemicals including Toluene, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.25 Revision Date: 09/07/2024 Print Date: 09/08/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.4
Revision Date 04/18/2021
Print Date 08/06/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : trans-1,2-Dichloroethylene

Product Number : D62209
Brand : Aldrich
Index-No. : 602-026-00-3
CAS-No. : 156-60-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Acute toxicity, Inhalation (Category 4), H332
Short-term (acute) aquatic hazard (Category 3), H402
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Hazard statement(s)

H225	Highly flammable liquid and vapor.
H332	Harmful if inhaled.
H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	trans-1,2-Dichloroethene trans-Acetylene dichloride
Formula	:	$C_2H_2Cl_2$
Molecular weight	:	96.94 g/mol
CAS-No.	:	156-60-5
EC-No.	:	205-860-2
Index-No.	:	602-026-00-3

Component	Classification	Concentration
trans-Dichloroethylene		
	Flam. Liq. 2; Acute Tox. 4; Aquatic Acute 3; Aquatic Chronic 3; H225, H332, H402, H412	>= 90 - <= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Dry powder Dry sand

Unsuitable extinguishing media
Do NOT use water jet.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
Use water spray to cool unopened containers.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.
For personal protection see section 8.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Advice on protection against fire and explosion

Use explosion-proof equipment.**Advice on protection against fire and explosion**
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.

Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Light sensitive. Air and moisture sensitive. Refrigerate before opening.
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
trans-Dichloroethylene	156-60-5	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)

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.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: light yellow
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -50 °C (-58 °F) - lit.
f)	Initial boiling point and boiling range	48 °C 118 °F - lit.
g)	Flash point	6.0 °C (42.8 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 12.8 %(V) Lower explosion limit: 9.7 %(V)
k)	Vapor pressure	No data available
l)	Vapor density	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Vapors may form explosive mixture with air.

10.4 Conditions to avoid
Heat, flames and sparks.

10.5 Incompatible materials
Oxidizing agents, Bases

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Skin corrosion/irritation

Serious eye damage/eye irritation

Respiratory or skin sensitization

Germ cell mutagenicity

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity

Specific target organ toxicity - single exposure

Specific target organ toxicity - repeated exposure

Aspiration hazard

11.2 Additional Information

RTECS: KV9400000

SECTION 12: Ecological information

12.1 Toxicity

12.2 Persistence and degradability

12.3 Bioaccumulative potential

12.4 Mobility in soil

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 14: Transport information

DOT (US)

UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 1150 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: 1,2-DICHLOROETHYLENE

IATA

UN number: 1150 Class: 3 Packing group: II
Proper shipping name: 1,2-Dichloroethylene

SECTION 15: Regulatory information

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Fire Hazard

Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-02-16

SECTION 16: Other information

Further information

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.4 Revision Date: 04/18/2021 Print Date: 08/06/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 8.6
Revision Date 11/04/2021
Print Date 08/05/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Trichloroethylene

Product Number : 133124
Brand : Aldrich
Index-No. : 602-027-00-9
CAS-No. : 79-01-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Skin sensitization (Category 1), H317
Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336
Short-term (acute) aquatic hazard (Category 3), H402
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Pictogram	
Signal word	Danger

Hazard statement(s)

H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
H341	Suspected of causing genetic defects.
H350	May cause cancer.
H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing must not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	TCE Trichloroethene
Formula	:	C_2HCl_3
Molecular weight	:	131.39 g/mol
CAS-No.	:	79-01-6
EC-No.	:	201-167-4
Index-No.	:	602-027-00-9

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Component	Classification	Concentration
trichloroethylene		
	Skin Irrit. 2; Eye Irrit. 2A; Skin Sens. 1; Muta. 2; Carc. 1B; STOT SE 3; Aquatic Acute 3; Aquatic Chronic 3; H315, H319, H317, H341, H350, H336, H402, H412 Concentration limits: >= 20 %: STOT SE 3, H336;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Hydrogen chloride gas
Not combustible.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Light sensitive. Handle and store under inert gas.

Storage class
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
trichloroethylene	79-01-6	TWA	10 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Suspected human carcinogen		
		STEL	25 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Suspected human carcinogen		
		Potential Occupational Carcinogen		
		TWA	100 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	200 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	300 ppm	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	50 ppm 270 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		
		STEL	200 ppm 1,080 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		
		C	300 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	25 ppm 135 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	100 ppm 537 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
trichloroethylene	79-01-6	Trichloroacetic acid	15 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Trichloroethanol	0.5 mg/l	In blood	ACGIH - Biological Exposure Indices (BEI)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		End of shift at end of workweek			
		Trichloroethylene		In blood	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			
		Trichloroethylene		In end-exhaled air	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
protective clothing

Respiratory protection
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Color: colorless
b)	Odor	characteristic
c)	Odor Threshold	28 ppm
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -84.8 °C (-120.6 °F) - lit.
f)	Initial boiling point and boiling range	86.7 °C 188.1 °F - lit.
g)	Flash point	() - closed cupdoes not flash
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: > 99 %(V) - (Saturation - at high volume fractions, explosion turns into a decomposition reaction) Lower explosion limit: 7.9 %(V)
k)	Vapor pressure	81.3 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	No data available
m)	Density	1.463 g/mL at 25 °C (77 °F) - lit.
	Relative density	1.46 at 20 °C (68 °F)
n)	Water solubility	1.1 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 2.53 at 20 °C (68 °F) - Bioaccumulation is not expected.
p)	Autoignition temperature	410.0 °C (770.0 °F)
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Oxygen
(as liquefied gas)
Alkaline earth metals
alkali amides
semimetallic hydrogen compounds
perchloric acid
Light metals
aluminium chloride
Strong oxidizing agents
potassium nitrate
Risk of explosion with:
Alkali metals
Aluminum
Barium
alkali hydroxides
Lithium
magnesium
Powdered metals
sodium amide
Strong oxidizing agents
nitrogen dioxide
Boranes
Oxygen
with
alkali hydroxides
Oxygen
with
Pressure
Risk of ignition or formation of inflammable gases or vapours with:
Titanium
Beryllium
Epoxy constituents

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
various plastics

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
LC50 Inhalation - Rat - male - 4 h - 67.41 mg/l

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Remarks: (ECHA)
LD50 Dermal - Rabbit - > 20,000 mg/kg
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation - 24 h
Remarks: (RTECS)

Respiratory or skin sensitization
Local lymph node assay (LLNA) - Mouse
Result: positive
(OECD Test Guideline 429)

Germ cell mutagenicity
In vitro tests showed mutagenic effects
Test Type: Ames test
Test system: S. typhimurium
Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: mouse lymphoma cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Chromosome aberration test in vitro
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Result: negative
Remarks: (ECHA)

Test Type: in vivo assay
Species: Mouse

Result: negative
Remarks: (ECHA)

Carcinogenicity
Possible human carcinogen

IARC:	1 - Group 1: Carcinogenic to humans (trichloroethylene)
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Exposure to and/or consumption of alcohol may increase toxic effects., Gastrointestinal disturbance, Kidney injury may occur., narcosis
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Jordanella floridae - 28.3 mg/l - 96 h (US-EPA)
Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available (trichloroethylene)
Toxicity to algae	ErC50 - Chlamydomonas reinhardtii (green algae) - 36.5 mg/l - 72 h Remarks: (ECHA) (trichloroethylene)
Toxicity to bacteria	

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 28 d Result: 19 % - Not readily biodegradable. (OECD Test Guideline 301D)

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus - 14 d (trichloroethylene) Bioconcentration factor (BCF): 17

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1710 Class: 6.1 Packing group: III
Proper shipping name: Trichloroethylene
Reportable Quantity (RQ): 100 lbs
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1710 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TRICHLOROETHYLENE

IATA
UN number: 1710 Class: 6.1 Packing group: III
Proper shipping name: Trichloroethylene

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
trichloroethylene	79-01-6	2007-07-01

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

Reportable Quantity : D040 lbs

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 16: Other information

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 8.6 Revision Date: 11/04/2021 Print Date: 08/05/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Vinyl Chloride

Airgas
an Air Liquide company

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.

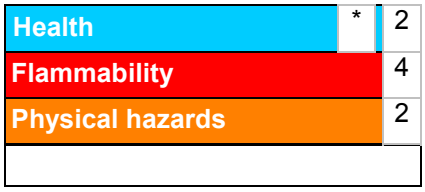
Section 15. Regulatory information

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

Version 6.17
Revision Date 09/08/2024
Print Date 09/09/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 1,4-Dioxane

Product Number : 296309
Brand : Sigma-Aldrich
Index-No. : 603-024-00-5
CAS-No. : 123-91-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225
Eye irritation (Category 2A), H319
Carcinogenicity (Category 1B), H350

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word: Danger

Hazard Statements

H225	Highly flammable liquid and vapor.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H350	May cause cancer.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing mist or vapors.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.
Repeated exposure may cause skin dryness or cracking.
May form explosive peroxides.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Dioxane
Diethylene oxide

Formula : $C_4H_8O_2$
Molecular weight : 88.11 g/mol
CAS-No. : 123-91-1
EC-No. : 204-661-8
Index-No. : 603-024-00-5

Component	Classification	Concentration
1,4-Dioxane		
	Flam. Liq. 2; Eye Irrit. 2A; Carc. 1B; STOT SE 3; H225, H319, H350, H335 Concentration limits: >= 20 %: STOT SE 3, H335;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Combustible.
Pay attention to flashback.
Vapors are heavier than air and may spread along floors.
Development of hazardous combustion gases or vapours possible in the event of fire.
Forms explosive mixtures with air at ambient temperatures.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Risk of explosion.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons.

Test for peroxide formation periodically and before distillation.

Storage class
Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,4-Dioxane	123-91-1	TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	25 ppm 90 mg/m3	USA. Table Z-1-A Limits for Air Contaminants (1989 vacated values)
		Skin notation		
		TWA	100 ppm 360 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		C	1 ppm 3.6 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		
		PEL	0.28 ppm 1 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Derived No Effect Level (DNEL)

Application Area	Routes of exposure	Health effect	Value
Workers	Inhalation	Long-term local effects	144 mg/m3
Workers	Inhalation	Long-term systemic effects	73 mg/m3
Workers	Skin contact	Long-term systemic effects	21 mg/m3

Predicted No Effect Concentration (PNEC)

Compartment	Value
Soil	0.153 mg/kg
Sea water	0.67 mg/l
Fresh water	10 mg/l
Fresh water sediment	37 mg/kg
Sewage treatment plant	2700 mg/l
Aquatic intermittent release	10 mg/l

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: butyl-rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Butoject® (KCL 898)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 120 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Body Protection
Flame retardant antistatic protective clothing.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Respiratory protection
Recommended Filter type: Filter A (acc. to DIN 3181) for vapours of organic compounds
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: colorless
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	6.0 - 8 at 500 g/l at 20 °C (68 °F)
e)	Melting point/freezing point	Melting point/ range: 10 - 12 °C (50 - 54 °F) - lit.
f)	Initial boiling point and boiling range	100 - 102 °C 212 - 216 °F - lit.
g)	Flash point	11 °C (52 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 22 %(V) Lower explosion limit: 2 %(V)
k)	Vapor pressure	36 hPa at 20 °C (68 °F) 53 hPa at 25.20 °C(77.36 °F)
l)	Vapor density	3.04 - (Air = 1.0)
m)	Density	1.034 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	1.0320 °C
n)	Water solubility	1,000 g/l at 20 °C (68 °F) - completely miscible
o)	Partition coefficient: n-octanol/water	log Pow: -0.42 - Bioaccumulation is not expected.
p)	Autoignition temperature	190.55 °C (374.99 °F)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

q)	Decomposition temperature	No data available
r)	Viscosity	1.27 mm2/s at 20 °C (68 °F) - OECD Test Guideline 114 - 0.93 mm2/s at 40 °C (104 °F) - OECD Test Guideline 114 -
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information

Surface tension	36.9 mN/m at 25 °C (77 °F)
Relative vapor density	3.04 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity

Formation of peroxides possible.
Vapors may form explosive mixture with air.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .
Stable under recommended storage conditions.
Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.
Contains the following stabilizer(s):
butyl hydroxytoluene (BHT) (0.0025 %)

10.3 Possibility of hazardous reactions

Vapors may form explosive mixture with air.

10.4 Conditions to avoid

Warming.
Moisture.

10.5 Incompatible materials

No data available

10.6 Hazardous decomposition products

Peroxides
In the event of fire: see section 5

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - 5,150 mg/kg
(OECD Test Guideline 401)
Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract, Lung edema
LD50 Dermal - Rabbit - 7,378 mg/kg
Remarks: (RTECS)

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 20 h
Remarks: (IUCLID)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation
(OECD Test Guideline 405)
Remarks: (Regulation (EC) No 1272/2008, Annex VI)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(Regulation (EC) No. 440/2008, Annex, B.6)

Germ cell mutagenicity
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Chromosome aberration test in vitro
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Result: negative
Remarks: (ECHA)

Test Type: unscheduled DNA synthesis assay
Species: Rat
Cell type: Liver cells
Application Route: Oral

Result: negative
Remarks: (ECHA)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Carcinogenicity
Presumed to have carcinogenic potential for humans

IARC: 2B - Group 2B: Possibly carcinogenic to humans (1,4-Dioxane)

NTP: RAHC - Reasonably anticipated to be a human carcinogen (1,4-Dioxane)

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation. - Respiratory system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male - Oral - 716 Days - NOAEL (No observed adverse effect level) - 9.6 mg/kg
Remarks: (ECHA)

RTECS: JG8225000
Nausea, Vomiting, Weakness, Dizziness, Vertigo, Headache, Sweating, loss of appetite, Kidney injury may occur., Liver injury may occur.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The substance has delayed effects.

After absorption:

Headache
Dizziness
Nausea
Vomiting

Absorption can result in damage to:

Liver
Kidney

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Stomach - Irregularities - Based on Human Evidence

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	semi-static test EC50 - Daphnia magna (Water flea) - > 1,000 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	static test ErC50 - Pseudokirchneriella subcapitata (green algae) - > 1,000 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Pimephales promelas (fathead minnow) - > 103 mg/l - 32 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	NOEC - Daphnia magna (Water flea) - 1,000 mg/l - 21 d (OECD Test Guideline 211)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 29 d Result: < 10 % - Not readily biodegradable. (OECD Test Guideline 301F)

12.3 Bioaccumulative potential

Bioaccumulation	Cyprinus carpio (Carp) - 10 mg/l(1,4-Dioxane) Bioconcentration factor (BCF): 0.3 - 0.7 (OECD Test Guideline 305C)

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

Forms toxic mixtures in water, dilution measures notwithstanding.
Discharge into the environment must be avoided.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1165 Class: 3 Packing group: II
Proper shipping name: Dioxane
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1165 Class: 3 Packing group: II EMS-No: F-E, S-D
Proper shipping name: DIOXANE

IATA
UN number: 1165 Class: 3 Packing group: II
Proper shipping name: Dioxane

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
1,4-Dioxane	123-91-1	100	100

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

1,4-Dioxane 123-91-1 >= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

1,4-Dioxane 123-91-1

Pennsylvania Right To Know

1,4-Dioxane 123-91-1

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

1,4-Dioxane 123-91-1

Washington Chemicals of High Concern

1,4-Dioxane 123-91-1

California Prop. 65

WARNING: This product can expose you to chemicals including 1,4-Dioxane, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.17 Revision Date: 09/08/2024 Print Date: 09/09/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.5
Revision Date 07/16/2021
Print Date 06/18/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Benz[*a*]anthracene

Product Number : B2209
Brand : Aldrich
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 Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 1B), H350
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	1,2-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

Component	Classification	Concentration
Benz[a]anthracene Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H400, H410 M-Factor - Aquatic Acute: 10 - Aquatic Chronic: 10	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice

Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Nature of decomposition products not known.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

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.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Avoid formation of dust and aerosols.

Advice on protection against fire and explosion
Provide appropriate exhaust ventilation at places where dust is formed.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
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.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 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)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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)
NTP:	RAHC - 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 on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Very toxic to aquatic life.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
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.Packages smaller than or equal to 5 kg / L , not dangerous goods of Class 9

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-02-16

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-02-16

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benz[a]anthracene	56-55-3	1993-02-16

California Prop. 65 Components

	CAS-No.	Revision Date
, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.Benz[a]anthracene	56-55-3	2007-09-28

SECTION 16: Other information

Further information

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.5 Revision Date: 07/16/2021 Print Date: 06/18/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.10
Revision Date 07/16/2021
Print Date 06/18/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Benzo[a]pyrene

Product Number : B1760
Brand : Sigma
Index-No. : 601-032-00-3
CAS-No. : 50-32-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Skin sensitization (Category 1), H317
Germ cell mutagenicity (Category 1B), H340
Carcinogenicity (Category 1B), H350
Reproductive toxicity (Category 1B), H360
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Signal word	Danger
Hazard statement(s)	
H317	May cause an allergic skin reaction.
H340	May cause genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H410	Very toxic to aquatic life with long lasting effects.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P272	Contaminated work clothing must not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
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.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	3,4-Benzpyrene 3,4-Benzopyrene Benzo[def]chrysene
Formula	:	$C_{20}H_{12}$
Molecular weight	:	252.31 g/mol
CAS-No.	:	50-32-8
EC-No.	:	200-028-5
Index-No.	:	601-032-00-3

Component	Classification	Concentration
benzo[a]pyrene		
	Skin Sens. 1; Muta. 1B; Carc. 1B; Repr. 1B; Aquatic Acute 1; Aquatic Chronic 1; H317, H340, H350, H360, H400, H410 Concentration limits: >= 0.01 %: Carc. 1B, H350; M-Factor - Aquatic Acute:	<= 100 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	10	

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Suspected human carcinogen		
benzo[a]pyrene	50-32-8	TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		OSHA specifically regulated carcinogen		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		TWA	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
benzo[a]pyrene	50-32-8	1-Hydroxypyrene	2.5 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		3-hydroxybenzo(a)pyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Body Protection
protective clothing

Respiratory protection
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid Color: yellow
b)	Odor	weakly aromatic
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 177 - 180 °C (351 - 356 °F) - lit.
f)	Initial boiling point and boiling range	495 °C 923 °F - lit.
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	1.35 g/cm3
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - Mouse
Result: Mild skin irritation
Remarks: (RTECS)

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
May cause allergic skin reaction. Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Germ cell mutagenicity
May cause genetic defects.
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Result: positive
Remarks: (Lit.)
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Result: positive
Remarks: (National Toxicology Program)
Test Type: sister chromatid exchange assay
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Result: positive
Remarks: (National Toxicology Program)

Test Type: Chromosome aberration test
Species: Mouse
Cell type: Bone marrow
Application Route: Intraperitoneal injection

Result: positive
Remarks: (National Toxicology Program)

Carcinogenicity
Presumed to have carcinogenic potential for humans

IARC:	1 - Group 1: Carcinogenic to humans (benzo[a]pyrene)
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May damage the unborn child.
May damage fertility.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: DJ3675000
burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

No data available

Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.25 mg/l - 48 h Remarks: (above the solubility limit in the test medium) (ECOTOX Database)
Toxicity to algae	static test ErC50 - Scenedesmus acutus - 0.005 mg/l - 72 h

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Remarks: (ECOTOX Database)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
Bioaccumulation Lepomis macrochirus (Bluegill) - 48 h
- 0.0005 mg/l(benzo[a]pyrene)

Bioconcentration factor (BCF): 3,208

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (benzo[a]pyrene)
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (benzo[a]pyrene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (benzo[a]pyrene)

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.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
benzo[a]pyrene	50-32-8	2007-03-01

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

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.10 Revision Date: 07/16/2021 Print Date: 06/18/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.7
Revision Date 12/22/2021
Print Date 06/18/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Benzo[b]fluoranthene

Product Number : 275336
Brand : Aldrich
Index-No. : 601-034-00-4
CAS-No. : 205-99-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 1B), H350
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : 3,4-Benzofluoranthene
Benz[e]acephenanthrylene
2,3-Benzfluoranthene
3,4-Benz[e]acephenanthrylene
Benzo[b]fluoranthene
Benzo[e]fluoranthene
NSC 89265

Formula : $C_{20}H_{12}$
Molecular weight : 252.31 g/mol
CAS-No. : 205-99-2
EC-No. : 205-911-9
Index-No. : 601-034-00-4

Component	Classification	Concentration
Benz[e]acephenanthrylene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H400, H410 M-Factor - Aquatic Acute: 10	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling

Work under hood. Do not inhale substance/mixture.

Hygiene measures

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class

Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Suspected human carcinogen		
Benz[e]acephenanthrylene	205-99-2	PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benz[e]acephenanthrylene	205-99-2	1-Hydroxypyrene	2.5 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		3-hydroxybenzo(a)pyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
protective clothing

Respiratory protection
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 163 - 165 °C (325 - 329 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
TDLo Oral - Mouse - 7.57 mg/kg
Remarks: Liver:Changes in liver weight.
Endocrine:Changes in thymus weight.
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that 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[e]acephenanthrylene)
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Aspiration hazard
No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - > 1.024 mg/l - 24 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benz[e]acephenanthrylene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benz[e]acephenanthrylene)
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.Packages smaller than or equal to 5 kg / L , not dangerous goods of Class 9

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Benz[e]acephenanthrylene	205-99-2	2007-03-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.7 Revision Date: 12/22/2021 Print Date: 06/18/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.6
Revision Date 07/16/2021
Print Date 07/27/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Benzo[*k*]fluoranthene

Product Number : 03323
Brand : Sigma-Aldrich
Index-No. : 601-036-00-5
CAS-No. : 207-08-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 1B), H350
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

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.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	$C_{20}H_{12}$
Molecular weight	:	252.31 g/mol
CAS-No.	:	207-08-9
EC-No.	:	205-916-6
Index-No.	:	601-036-00-5

Component	Classification	Concentration
Benzo[k]fluoranthene		
	Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H350, H400, H410 M-Factor - Aquatic Acute: 10 M-Factor - Aquatic Chronic: 10	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures
No data available

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 5: Firefighting measures

5.1 Extinguishing media
No data available

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
No data available

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
For personal protection see section 8.

6.2 Environmental precautions
No data available

6.3 Methods and materials for containment and cleaning up
No data available

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
No data available

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Component	CAS-No.	Value	Control parameters	Basis
Benzo[k]fluoranthene	207-08-9	PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Benzo[k]fluoranthene	207-08-9	1-Hydroxypyrene	2.5 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		3-hydroxybenzo(a)pyrene		Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Personal protective equipment

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Control of environmental exposure

Prevent product from entering drains.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Color: yellow
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point: 217 °C (423 °F)
f)	Initial boiling point and boiling range	480 °C 896 °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)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	1.286 g/cm3 at 20 °C (68 °F)
	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 6.188 at 25 °C (77 °F)
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: Irritating to respiratory system.
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
Presumed to have carcinogenic potential for humans

IARC:	2B - Group 2B: Possibly carcinogenic to humans (Benzo[k]fluoranthene)
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: DF6350000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods
No data available

SECTION 14: Transport information

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[k]fluoranthene)
Reportable Quantity (RQ): 5000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Benzo[k]fluoranthene)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Benzo[k]fluoranthene)

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.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Benzo[k]fluoranthene	207-08-9	1993-02-16

SECTION 16: Other information

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.6 Revision Date: 07/16/2021 Print Date: 07/27/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 8.0
Revision Date 07/14/2021
Print Date 06/18/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : CHRYSENE, 98%

Product Number : 245186
Brand : 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 Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Germ cell mutagenicity (Category 2), H341
Carcinogenicity (Category 1B), H350
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H341 Suspected of causing genetic defects.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula : $C_{18}H_{12}$

Molecular weight : 228.29 g/mol

Component	Classification	Concentration
chrysene Included in the Candidate List of Substances of Very High Concern (SVHC) according to Regulation (EC) No. 1907/2006 (REACH)		
	Muta. 2; Carc. 1B; Aquatic Acute 1; Aquatic Chronic 1; H341, H350, H400, H410 M-Factor - Aquatic Acute: 10 M-Factor - Aquatic Chronic: 10	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.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.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.**Advice on safe handling**

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Advice on protection against fire and explosion
Provide appropriate exhaust ventilation at places where dust is formed.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
	Remarks	Confirmed animal carcinogen with unknown relevance to humans		
chrysene	218-01-9	TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		OSHA specifically regulated carcinogen		
		TWA	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
chrysene	218-01-9	1-Hydroxypyrene	2.5 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		3-hydroxybenzo(a)pyrene		Urine	ACGIH - Biological Exposure Indices (BEI)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		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 EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
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.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid Color: white, light yellow
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	253.0 °C (487.4 °F)
f)	Initial boiling point and boiling range	448.0 °C 838.4 °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)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 5.73
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
Laboratory experiments have shown mutagenic effects.
In vitro tests showed mutagenic effects
Test Type: Ames test
Test system: Salmonella typhimurium
Result: positive
Remarks: (Lit.)

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 ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Aspiration hazard
No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Property that cannot be excluded on the basis of structure- effect considerations:

Nausea
Vomiting
Risk of methaemoglobin formation with headache, cardiac dysrhythmia, drop in blood pressure, dyspnoea and spasms, principal symptom: cyanosis (blue discolouration of the blood).

This substance should be handled with particular care.

SECTION 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 with long lasting effects.
Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, 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.

SECTION 15: Regulatory information

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Massachusetts Right To Know Components

	CAS-No.	Revision Date
chrysene	218-01-9	2015-11-23

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
chrysene	218-01-9	2015-11-23

	CAS-No.	Revision Date
chrysene	218-01-9	2015-11-23

New Jersey Right To Know Components

	CAS-No.	Revision Date
chrysene		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	218-01-9	2015-11-23

California Prop. 65 Components

WARNING! This product contains a chemical known in the State of California to cause cancer.chrysene	CAS-No. 218-01-9	Revision Date 2007-09-28

SECTION 16: Other information

Further information

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 8.0 Revision Date: 07/14/2021 Print Date: 06/18/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Revision Date 23-Jan-2018 **Revision Number** 3

1. Identification

Product Name **Dibenz[a,h]anthracene, 99% (UV-Vis)**

Cat No. : **AC406430010; AC406432500**

Synonyms 1,2:5,6-Dibenz(a)anthracene.

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)

Carcinogenicity	Category 1B

Label Elements

Signal Word
Danger

Hazard Statements
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
Response
IF exposed or concerned: Get medical attention/advice
Storage
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Dibenzo(a,h)anthracene	53-70-3	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 and effects No information available.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point
Method - No information available

Autoignition Temperature No information available

Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
1	1	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions	See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.
Methods for Containment and Clean Up	No information available.

7. Handling and storage

Handling	Ensure adequate ventilation.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Off-white
Odor	No information available
Odor Threshold	No information available
pH	
Melting Point/Range	265 °C
Boiling Point/Range	
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	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	C22H14
Molecular Weight	278.34

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
Dibenzo(a,h)anthracene	53-70-3	Group 2A	Reasonably Anticipated	Not listed	X	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects 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
Dibenzo(a,h)anthracene	6.50

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
Dibenzo(a,h)anthracene - 53-70-3	U063	-

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
Dibenzo(a,h)anthracene	X	-	X	200-181-8	-		-	-	-	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 %
Dibenzo(a,h)anthracene	53-70-3	99	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Dibenzo(a,h)anthracene	-	-	-	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Dibenzo(a,h)anthracene	1 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Dibenzo(a,h)anthracene	53-70-3	Carcinogen	0.2 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Dibenzo(a,h)anthracene	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 23-Jan-2018
Print Date 23-Jan-2018
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Creation Date 08-Nov-2010 **Revision Date** 09-Feb-2024 **Revision Number** 8

1. Identification

Product Name **Fluoranthene**

Cat No. : **AC119170000; AC119170250; AC119171000; AC119175000**

CAS No 206-44-0
Synonyms Benzo[j,k]fluorene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-227-6701 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No. **US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 4

Label Elements

Signal Word
Warning

Hazard Statements
Harmful if swallowed

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Fluoranthene	206-44-0	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water. Get medical attention if symptoms occur.

Most important symptoms and effects None reasonably foreseeable.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam.

Unsuitable Extinguishing Media No information available

Flash Point Not applicable
Method - No information available

Autoignition Temperature No information available
Explosion Limits

Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation.
Environmental Precautions	Should not be released into the environment.
Methods for Containment and Clean Up	Sweep up and shovel into suitable containers for disposal. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling	Ensure adequate ventilation. Wear personal protective equipment/face protection. Avoid dust formation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation.
Storage.	Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Incompatible Materials. Strong oxidizing agents.

8. Exposure controls / personal protection

Exposure Guidelines	This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.
Engineering Measures	Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Light green
Odor	Odorless
Odor Threshold	No information available
pH	Not applicable
Melting Point/Range	109 - 111 °C / 228.2 - 231.8 °F
Boiling Point/Range	384 °C / 723.2 °F
Flash Point	Not applicable
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
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C16 H10
Molecular Weight	202.25

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Fluoranthene	LD50 = 2 g/kg (Rat)	LD50 = 3180 mg/kg (Rabbit)	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Fluoranthene	206-44-0	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Fluoranthene	Not listed	Oncorhynchus mykiss: LC50=0.0077 mg/L 96h	Not listed	EC50: 0.78 mg/L 20h

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility .

Component	log Pow
Fluoranthene	5.1

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Fluoranthene - 206-44-0	U120	-

14. Transport information

DOT

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Technical Name Fluoranthene
Hazard Class 9
Packing Group III

TDG

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Hazard Class 9
Packing Group III

IATA

UN-No UN3077

Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Hazard Class 9
Packing Group III

IMDG/IMO

UN-No UN3077
Proper Shipping Name Environmentally hazardous substances, solid, n.o.s.
Hazard Class 9
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Fluoranthene	206-44-0	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Fluoranthene	206-44-0	-	X	205-912-4	-	X	X	X	X	-

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372. Note that PBT chemicals are not eligible for the de minimis exemption. For these chemicals, supplier notification limits are provided.
> 0 % = no low concentration cut-off set, supplier notification limit applies.

Component	CAS No	Weight %	SARA 313 - Threshold Values %	SARA 313 - Reporting threasholds
Fluoranthene	206-44-0	>95	> 0 %	RT = 100 lb

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Fluoranthene	-	-	X	X

Clean Air Act Not applicable

OSHA - Occupational Safety and Not applicable

Health Administration

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355).

Component	Hazardous Substances RQs	CERCLA Extremely Hazardous Substances RQs	SARA Reportable Quantity (RQ)
Fluoranthene	100 lb	-	100 lb 45.4 kg

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Fluoranthene	X	X	X	-	-

U.S. Department of Transportation
Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Fluoranthene	206-44-0	-	-	SHVC Candidate list - 205-912-4 - PBT (Article 57d) vPvB (Article 57e)

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

REACH links
https://echa.europa.eu/authorisation-list
https://echa.europa.eu/candidate-list-table

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Fluoranthene	206-44-0	Not applicable	Not applicable	Not applicable	Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?

Not applicable

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Fluoranthene	206-44-0	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

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

Creation Date 08-Nov-2010
Revision Date 09-Feb-2024
Print Date 09-Feb-2024
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/25/2019 Version Number 2 Reviewed on 03/25/2019

*
1 Identification

· **Product identifier**

· **Trade name: Hexachlorobutadiene**

· **Part number:** RHH-060
· **CAS Number:**
87-68-3
· **EC number:**
201-765-5
· **Application of the substance / the mixture** Reagents and Standards for Analytical Chemical Laboratory Use

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Agilent Technologies, Inc.
5301 Stevens Creek Blvd.
Santa Clara, CA 95051 USA

· **Information department:**
Telephone: 800-227-9770
e-mail: pdl-msds_author@agilent.com
· **Emergency telephone number:** CHEMTREC®: 1-800-424-9300

*
2 Hazard(s) identification

· **Classification of the substance or mixture**

GHS06 Skull and crossbones

Acute Tox. 3 H301 Toxic if swallowed.
Acute Tox. 2 H310 Fatal in contact with skin.

GHS08 Health hazard

Carc. 2 H351 Suspected of causing cancer.

GHS07

Skin Irrit. 2 H315 Causes skin irritation.

Flam. Liq. 4 H227 Combustible liquid.

· **Label elements**
· **GHS label elements** The substance is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**

GHS06 GHS07 GHS08

· **Signal word** Danger

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/25/2019 Version Number 2 Reviewed on 03/25/2019

Trade name: Hexachlorobutadiene

(Contd. of page 1)

· **Hazard-determining components of labeling:**
hexachlorobuta-1,3-diene
· **Hazard statements**
Combustible liquid.
Toxic if swallowed.
Fatal in contact with skin.
Causes skin irritation.
Suspected of causing cancer.
· **Precautionary statements**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from flames and hot surfaces. – No smoking.
Do not get in eyes, on skin, or on clothing.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/protective clothing/eye protection/face protection.
If swallowed: Immediately call a poison center/doctor.
Specific treatment (see on this label).
Rinse mouth.
If on skin: Wash with plenty of water.
IF exposed or concerned: Get medical advice/attention.
Take off immediately all contaminated clothing and wash it before reuse.
If skin irritation occurs: Get medical advice/attention.
In case of fire: Use for extinction: CO2, powder or water spray.
Store in a well-ventilated place. Keep cool.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.
· **Classification system:**
· **NFPA ratings (scale 0 - 4)**

Health = 3
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 3
Fire = 0
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**

· **PBT:**	
87-68-3	hexachlorobuta-1,3-diene

· **vPvB:**	
87-68-3	hexachlorobuta-1,3-diene

US

(Contd. on page 3)

Safety Data Sheet
acc. to OSHA HCS

Trade name: Hexachlorobutadiene

(Contd. of page 2)

3 Composition/information on ingredients

· **Chemical characterization: Substances**
· **CAS No. Description**
87-68-3 hexachlorobuta-1,3-diene
· **Identification number(s)**
· **EC number:** 201-765-5

*
4 First-aid measures

· **Description of first aid measures**
· **General information:**
Immediately remove any clothing soiled by the product.
In case of irregular breathing or respiratory arrest provide artificial respiration.
· **After inhalation:** In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** Do not induce vomiting; immediately call for medical help.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:** Use fire fighting measures that suit the environment.
· **Special hazards arising from the substance or mixture** No further relevant information available.
· **Advice for firefighters**
· **Protective equipment:** No special measures required.

*
6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
Wear protective equipment. Keep unprotected persons away.
· **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**
1 ppm

(Contd. on page 4)

(Contd. of page 3)

· PAC-2:
3 ppm

· PAC-3:
10 ppm

*

7 Handling and storage

· **Handling:**
· **Precautions for safe handling** Open and handle receptacle with care.
· **Information about protection against explosions and fires:**
Keep ignition sources away - Do not smoke.
Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Keep receptacle tightly sealed.
· **Specific end use(s)** No further relevant information available.

*

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**

· Components with limit values that require monitoring at the workplace:	
87-68-3 hexachlorobuta-1,3-diene	
REL	Long-term value: 0.24 mg/m³, 0.02 ppm Skin; See Pocket Guide App. A
TLV	Long-term value: 0.21 mg/m³, 0.02 ppm Skin

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the skin.
Avoid contact with the eyes and skin.
· **Breathing equipment:**
When used as intended with Agilent instruments, the use of the product under normal laboratory conditions and with standard practices does not result in significant airborne exposures and therefore respiratory protection is not needed.
Under an emergency condition where a respirator is deemed necessary, use a NIOSH or equivalent approved device/equipment with appropriate organic or acid gas cartridge.

(Contd. on page 5)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 4)

· **Protection of hands:**
Although not recommended for constant contact with the chemicals or for clean-up, nitrile gloves 11-13 mil thickness are recommended for normal use. The breakthrough time is 1 hr. For cleaning a spill where there is direct contact of the chemical, butyl rubber gloves are recommended 12-15 mil thickness with breakthrough times exceeding 4 hrs. Supplier recommendations should be followed.
· **Material of gloves**
For normal use: nitrile rubber, 11-13 mil thickness
For direct contact with the chemical: butyl rubber, 12-15 mil thickness
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· **Penetration time of glove material**
For normal use: nitrile rubber: 1 hour
For direct contact with the chemical: butyl rubber: >4 hours
· **Eye protection:** Goggles recommended during refilling.

*
9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Fluid
Color:	Not determined.
· **Odor:**	Characteristic
· **Odor threshold:**	Not determined.
· **pH-value:**	Not determined.
· **Change in condition**	
Melting point/Melting range:	-21 °C (-5.8 °F)
Boiling point/Boiling range:	215 °C (419 °F)
· **Flash point:**	≤93 °C (≤199.4 °F)
· **Flammability (solid, gaseous):**	Not applicable.
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Not determined.
· **Danger of explosion:**	Not determined.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapor pressure at 20 °C (68 °F):**	0.2 hPa (0.2 mm Hg)
· **Density at 20 °C (68 °F):**	1.665 g/cm³ (13.89443 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not determined.
· **Evaporation rate**	Not determined.
· **Solubility in / Miscibility with**	
Water at 20 °C (68 °F):	0.5 g/l
· **Partition coefficient (n-octanol/water):**	Not determined.

(Contd. on page 6)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 5)

· **Viscosity:**

Dynamic:	Not determined.
Kinematic:	Not determined.
Organic solvents:	100.0 %
VOC content:	100.00 % 1,665.0 g/l / 13.90 lb/gal

· **Other information** No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

*
11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

ATE (Acute Toxicity Estimate)		
Oral	LD50	82 mg/kg (rat)
Dermal	LD50	100 mg/kg (rabbit)
Inhalative	LC50/4 h	370 mg/L (mouse)

87-68-3 hexachlorobuta-1,3-diene		
Oral	LD50	82 mg/kg (rat)
Dermal	LD50	100 mg/kg (rabbit)
Inhalative	LC50/4 h	370 mg/L (mouse)

· **Primary irritant effect:**
· **on the skin:** Irritant to skin and mucous membranes.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**
3

· **NTP (National Toxicology Program)**
Substance is not listed.

(Contd. on page 7)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 6)

· **OSHA-Ca (Occupational Safety & Health Administration)**

Substance is not listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 3 (Assessment by list): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
· **Results of PBT and vPvB assessment**

· **PBT:**

87-68-3	hexachlorobuta-1,3-diene

· **vPvB:**

87-68-3	hexachlorobuta-1,3-diene

· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

*
14 Transport information

· **UN-Number**	
· **DOT, IMDG, IATA**	UN2279
· **UN proper shipping name**	
· **DOT**	Hexachlorobutadiene
· **IMDG**	HEXACHLOROBUTADIENE, MARINE POLLUTANT
· **IATA**	HEXACHLOROBUTADIENE

(Contd. on page 8)

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/25/2019 Version Number 2 Reviewed on 03/25/2019

Trade name: Hexachlorobutadiene

(Contd. of page 7)

· **Transport hazard class(es)**

· **DOT, IMDG**

· **Class**	6.1 Toxic substances
· **Label**	6.1

· **IATA**

· **Class**	6.1 Toxic substances
· **Label**	6.1
· **Packing group**	
· **DOT, IMDG, IATA**	III
· **Environmental hazards:**	
· **Marine pollutant:**	Yes (DOT) Symbol (fish and tree)
· **Special precautions for user**	Warning: Toxic substances
· **Danger code (Kemler):**	60
· **EMS Number:**	F-A,S-A
· **Segregation groups**	Liquid halogenated hydrocarbons
· **Stowage Category**	A
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	
· **DOT**	
· **Quantity limitations**	On passenger aircraft/rail: 60 L On cargo aircraft only: 220 L
· **Hazardous substance:**	1 lbs, 0.454 kg
· **Remarks:**	Special marking with the symbol (fish and tree).
· **IMDG**	
· **Limited quantities (LQ)**	5 L
· **Excepted quantities (EQ)**	Code: E1 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 1000 ml
· **UN "Model Regulation":**	UN 2279 HEXACHLOROBUTADIENE, 6.1, III

(Contd. on page 9)

Safety Data Sheet
acc. to OSHA HCS

(Contd. of page 8)

*
15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **Sara**

· **Section 355 (extremely hazardous substances):**
Substance is not listed.

· **Section 313 (Specific toxic chemical listings):**
Substance is listed.

· **TSCA (Toxic Substances Control Act):**
Substance is listed.

· **TSCA new (21st Century Act): (Substances not listed)**
87-68-3 | hexachlorobuta-1,3-diene

· **Proposition 65**

· **Chemicals known to cause cancer:**
Substance is listed.

· **Chemicals known to cause reproductive toxicity for females:**
Substance is not listed.

· **Chemicals known to cause reproductive toxicity for males:**
Substance is not listed.

· **Chemicals known to cause developmental toxicity:**
Substance is not listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**
C

· **TLV (Threshold Limit Value established by ACGIH)**
A3

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
Substance is listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

*
16 Other information

The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

· **Department issuing SDS:** Document Control / Regulatory
· **Contact:** regulatory@ultrasci.com
· **Date of preparation / last revision** 03/25/2019 / 1
· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)

(Contd. on page 10)

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/25/2019 Version Number 2 Reviewed on 03/25/2019

Trade name: Hexachlorobutadiene

(Contd. of page 9)

NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
Flam. Liq. 4: Flammable liquids – Category 4
Acute Tox. 3: Acute toxicity – Category 3
Acute Tox. 2: Acute toxicity – Category 2
Skin Irrit. 2: Skin corrosion/irritation – Category 2
Carc. 2: Carcinogenicity – Category 2

· *** Data compared to the previous version altered.**

SAFETY DATA SHEET

Version 6.5
Revision Date 10/30/2021
Print Date 06/18/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Indeno[1,2,3-*cd*]pyrene

Product Number : 48499
Brand : Supelco
CAS-No. : 193-39-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Carcinogenicity (Category 2), H351

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)
H351 Suspected of causing cancer.

Precautionary statement(s)
P201 Obtain special instructions before use.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

P202	Do not handle until all safety precautions have been read and understood.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	$C_{22}H_{12}$
Molecular weight	:	276.33 g/mol
CAS-No.	:	193-39-5
EC-No.	:	205-893-2

Component	Classification	Concentration
Indeno[1,2,3-cd]pyrene		
	Carc. 2; H351	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep locked up or in an area accessible only to qualified or authorized persons.

Store at room temperature.

Storage class
Storage class (TRGS 510): 11: Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
required when dusts are generated.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	163.6 °C (326.5 °F)
f)	Initial boiling point and boiling range	No data available
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

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

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Indeno[1,2,3-cd]pyrene)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Not dangerous goods

Further information
Not classified as dangerous in the meaning of transport regulations.

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Indeno[1,2,3-cd]pyrene	193-39-5	1993-02-16

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.5 Revision Date: 10/30/2021 Print Date: 06/18/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.10
Revision Date 09/06/2024
Print Date 09/06/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Phenol

Product Number : P5566
Brand : Sigma-Aldrich
Index-No. : 604-001-00-2
CAS-No. : 108-95-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Acute toxicity, Dermal (Category 3), H311

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Germ cell mutagenicity (Category 2), H341
Specific target organ toxicity - repeated exposure (Category 2), Nervous system, Kidney, Liver, Skin, H373
Short-term (acute) aquatic hazard (Category 2), H401
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word	Danger
Hazard Statements	
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H314	Causes severe skin burns and eye damage.
H341	Suspected of causing genetic defects.
H373	May cause damage to organs (Nervous system, Kidney, Liver, Skin) through prolonged or repeated exposure.
H411	Toxic to aquatic life with long lasting effects.
Precautionary Statements	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Vesicant., Rapidly absorbed through skin.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Hydroxybenzene

Formula : C_6H_6O
Molecular weight : 94.11 g/mol
CAS-No. : 108-95-2
EC-No. : 203-632-7
Index-No. : 604-001-00-2

Component	Classification	Concentration
Phenol		
	Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Muta. 2; STOT RE 2; Aquatic Acute 2; Aquatic Chronic 2; H301, H331, H311, H314, H318, H341, H373, H401, H411 Concentration limits: >= 3 %: Skin Corr. 1B, H314; 1 - < 3 %: Skin Irrit. 2, H315; 1 - < 3 %: Eye Irrit. 2, H319;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
After contact with skin: rinse out with polyethylene glycol 400 or a mixture of polyethylene glycol 300/ethanol 2:1 and wash with plenty of water. If neither is available wash with plenty of water. Immediately take off contaminated clothing. Call a physician immediately.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible. Do not attempt to neutralise.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air on intense heating.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Advice on protection against fire and explosion
Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.
Storage stability Recommended storage temperature
2 - 8 °C
Handle and store under inert gas. Light sensitive.

Storage class
Storage class (TRGS 510): 6.1A: Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Phenol	108-95-2	TWA	5 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		Danger of cutaneous absorption		
		TWA	5 ppm 19 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		C	15.6 ppm 60 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		
		TWA	5 ppm 19 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		PEL	5 ppm 19 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Phenol	108-95-2	Phenol	250mg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Viton®
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
Recommended Filter type: Filter A-(P3)
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts/vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	stinging
c)	Odor Threshold	0.005 ppm
d)	pH	6.0
e)	Melting point/freezing point	Melting point/ range: 38 - 43 °C (100 - 109 °F)
f)	Initial boiling point and boiling range	181.8 °C 359.2 °F at 1,013 hPa
g)	Flash point	79.0 °C (174.2 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 9.5 %(V) Lower explosion limit: 1.3 %(V)
k)	Vapor pressure	0.53 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	3.2 at 20 °C(68 °F) - (Air = 1.0)
m)	Density	1.13 g/cm3 at 25 °C (77 °F) - DIN 51757
	Relative density	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

n)	Water solubility	87 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	log Pow: 1.47 at 30 °C (86 °F) - (ECHA), Bioaccumulation is not expected.
p)	Autoignition temperature	715 °C (1319 °F) at 1,013 hPa
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Surface tension	38.2 mN/m at 50.0 °C (122.0 °F)
Relative vapor density	3.2 at 20 °C (68 °F) - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity

Forms explosive mixtures with air on intense heating.
A range from approx. 15 Kelvin below the flash point is to be rated as critical.
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .
Contains the following stabilizer(s):
Hypophosphorous acid (0.15 %)

10.3 Possibility of hazardous reactions

Exothermic reaction with:
Aluminum
Aldehydes
halogens
hydrogen peroxide
iron(III) compounds
Oxidizing agents
Strong acids
Strong bases
formaldehyde
Risk of explosion with:
nitrites
nitrates
salts of oxyhalogenic acids
peroxi compounds

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

10.4 Conditions to avoid
Strong heating.

10.5 Incompatible materials
rubber, various plastics, various alloys, various metals

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 100.1 mg/kg
(Calculation method)
Acute toxicity estimate Oral - 100.1 mg/kg
(Expert judgment)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Acute toxicity estimate Inhalation - 4 h - 0.51 mg/l - dust/mist(Calculation method)

Acute toxicity estimate Inhalation - 4 h - 0.51 mg/l - dust/mist

(Expert judgment)
Symptoms: Irritation, Lung edema
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Acute toxicity estimate Dermal - 660 mg/kg
(Calculation method)
LD50 Dermal - Rat - female - 660 mg/kg
(OECD Test Guideline 402)
No data available

Skin corrosion/irritation
Skin - In vitro study
Result: Causes burns.
(OECD Test Guideline 431)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive
(OECD Test Guideline 405)
Remarks: Causes serious eye damage.
Risk of blindness!

Respiratory or skin sensitization
Sensitisation test: - Guinea pig
Result: negative
Remarks: (IUCLID)

Germ cell mutagenicity
Suspected of causing genetic defects.
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: Metabolic activation

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Method: OECD Test Guideline 473
Result: positive
Test Type: Mutagenicity (mammal cell test): micronucleus.
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 487
Result: positive

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
May cause damage to organs through prolonged or repeated exposure.
- Nervous system, Kidney, Liver, Skin
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Aspiration hazard
No data available

11.2 Additional Information

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, Circulatory collapse, tachypnea, paralysis, Convulsions, Coma., necrosis of mouth and G.I. Tract, Jaundice, respiratory failure, cardiac arrest
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	flow-through test LC50 - Onchorhynchus clarki - 8.9 mg/l - 96 h

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	(US-EPA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Ceriodaphnia dubia (water flea) - 3.1 mg/l - 48 h (US-EPA)
Toxicity to algae	static test EC50 - Pseudokirchneriella subcapitata (algae) - 61.1 mg/l - 96 h (US-EPA)
Toxicity to bacteria	static test IC50 - microorganisms - 21 mg/l - 24 h Remarks: (ECHA)
Toxicity to fish(Chronic toxicity)	semi-static test NOEC - Fish - 0.077 mg/l - 60 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	semi-static test NOEC - Daphnia magna (Water flea) - 0.16 mg/l - 16 d Remarks: (ECHA)

12.2 Persistence and degradability

Biodegradability	aerobic - Exposure time 100 h Result: 62 % - Readily biodegradable. (OECD Test Guideline 301C)

12.3 Bioaccumulative potential

Bioaccumulation	Danio rerio (zebra fish) - 5 h at 25 °C - 2 mg/l(Phenol) Bioconcentration factor (BCF): 17.5 (OECD Test Guideline 305) Remarks: Does not bioaccumulate.

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1671 Class: 6.1 Packing group: II
Proper shipping name: Phenol, solid
Reportable Quantity (RQ): 1000 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1671 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: PHENOL, SOLID
Marine pollutant : yes

IATA
UN number: 1671 Class: 6.1 Packing group: II
Proper shipping name: Phenol, solid

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Phenol	108-95-2	1000	1000

SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Phenol	108-95-2	1000	1000

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

Components	CAS-No.	Component TPQ (lbs)
Phenol	108-95-2	10000
Phenol	108-95-2	500*

*: Solid in the molten or powdered form (particles < 100 microns), in solution, or meeting the NFPA reactivity criteria

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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Phenol	108-95-2	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.10 Revision Date: 09/06/2024 Print Date: 09/06/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.10
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Arsenic

Product Number : 202657
Brand : Aldrich
Index-No. : 033-001-00-X
CAS-No. : 7440-38-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Skin irritation (Category 2), H315

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Serious eye damage (Category 1), H318
Carcinogenicity (Category 1A), H350
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word	Danger
Hazard Statements	
H301 + H331	Toxic if swallowed or if inhaled.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.
Precautionary Statements	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	As
Molecular weight	:	74.92 g/mol
CAS-No.	:	7440-38-2
EC-No.	:	231-148-6
Index-No.	:	033-001-00-X

Component	Classification	Concentration
arsenic		
	Acute Tox. 3; Skin Irrit. 2; Eye Dam. 1; Carc. 1A; Aquatic Acute 1; Aquatic Chronic 1; H301, H331, H315, H318, H350, H400, H410 M-Factor - Aquatic Acute: 10 M-Factor - Aquatic Chronic: 1	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Nature of decomposition products not known.
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1A: Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
arsenic	7440-38-2	TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Lung cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen		
		C	0.0020 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A 15 minute ceiling value		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
arsenic	7440-38-2	inorganic arsenic plus methylated metabolites	15µg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	Remarks	End of shift			
		inorganic arsenic plus methylated metabolites	15µg/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of the workweek (After four or five consecutive working days with exposure)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Color: gray
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 817 °C (1503 °F) - lit.
f)	Initial boiling point and boiling range	613 °C 1135 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	5.727 g/mL at 25 °C (77 °F) - lit.
	Relative density	5.622.4 °C - OECD Test Guideline 109
n)	Water solubility	ca.0.0106 g/l at 20 °C (68 °F) - OECD Test Guideline 105 - slightly soluble
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Autoignition temperature	> 430 °C (> 806 °F)does not ignite
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Exothermic reaction with:
Aluminum
Bromine
bromates
chlorates
iodates
Nitric acid
Risk of ignition or formation of inflammable gases or vapours with:
nitrates
Alkali metals
Zinc
Reducing agents
Strong oxidizing agents
Risk of explosion with:
potassium permanganate
azides
halogen-halogen compounds
Peroxides
nitrogen trichloride

10.4 Conditions to avoid
Heat. Exposure to air may affect product quality.
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Mouse - 145 mg/kg
Remarks: Behavioral:Ataxia.
Diarrhea
(RTECS)
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - In vitro study
Result: Irritating to skin. - 15 min
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Causes serious eye damage. - 24 h
(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Ames test
Test system: Escherichia coli
Result: negative
Remarks: (ECHA)

Carcinogenicity
May cause cancer. Positive evidence from human epidemiological studies.

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

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: CG0525000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The following applies to arsenic and its compounds in general: they take effect as capillary and enzyme toxins. Symptoms of arsenic poisoning: acute: after inhalation, mucosal irritations with coughing, dyspnoea, pain in the thorax. Perforations within the respiratory tract are possible. After oral uptake, gastrointestinal disorders with vomiting, diarrhoea, and spasms, CNS disorders with headache, confusion, shaking fits and disturbed consciousness, cardiovascular disorders all the way to circulatory collapse. Chronic: exanthema, dermal lesions in the form of hyperkeratosis and hypermelanosis, loss of hair,

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

conjunctivitis and polyneuropathy, impaired hepatic function, and renal damage. After accumulation in the liver, kidneys, and skin, arsenic is eliminated from the organism only slowly. Experience has shown arsenic compounds to be carcinogenic in man.

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test LC50 - Oreochromis mossambicus (Mozambique tilapia) - 28.68 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Bosmina longirostris (water flea) - 0.85 mg/l - 48 h Remarks: (ECHA)
Toxicity to algae	static test NOEC - Macrocystis pyrifera (brown algae) - 0.04 mg/l - 42 h Remarks: (ECHA)
Toxicity to bacteria	static test EC50 - activated sludge - 10.6 mg/l - 10 Days Remarks: (ECHA)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Pimephales promelas (fathead minnow) - 2.13 mg/l - 35 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	flow-through test NOEC - Shrimp - 0.631 mg/l - 51 d Remarks: (ECHA)

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic
Reportable Quantity (RQ): 1 lbs
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG

UN number: 1558 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: ARSENIC
Marine pollutant : yes

IATA

UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
arsenic	7440-38-2	1	1
arsenic	7440-38-2	1	1 (D004)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

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

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

arsenic	7440-38-2	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

arsenic	7440-38-2

Pennsylvania Right To Know

arsenic	7440-38-2

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

arsenic	7440-38-2

Washington Chemicals of High Concern

arsenic	7440-38-2

California Prop. 65

WARNING: This product can expose you to chemicals including arsenic, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.
Version: 6.10 Revision Date: 09/06/2024 Print Date: 09/07/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.11
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Barium chloride

Product Number : 202738
Brand : Aldrich
Index-No. : 056-004-00-8
CAS-No. : 10361-37-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 4), H332
Eye irritation (Category 2A), H319

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word Danger

Hazard Statements

H301	Toxic if swallowed.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.

Precautionary Statements

P261	Avoid breathing dust.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	BaCl2
Molecular weight	:	208.23 g/mol
CAS-No.	:	10361-37-2
EC-No.	:	233-788-1
Index-No.	:	056-004-00-8

Component	Classification	Concentration
barium chloride		
	Acute Tox. 3; Acute Tox. 4; Eye Irrit. 2A; H301, H332, H319	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. If breathing stops: mouth-to-mouth breathing or artificial respiration. Oxygen if necessary. Immediately call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Hydrogen chloride gas
Barium oxide
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid inhalation of dusts. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Hygroscopic.

Storage class
Storage class (TRGS 510): 6.1D: Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
barium chloride	10361-37-2	TWA	0.5 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		PEL	0.5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Preventive skin protection recommended. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Color: white
b)	Odor	odorless
c)	Odor Threshold	Not applicable
d)	pH	0.8 at 510.4 g/l at 37 °C (99 °F)
e)	Melting point/freezing point	Melting point/ range: 963 °C (1765 °F) - lit.
f)	Initial boiling point and boiling range	1,560 °C 2,840 °F at 1,013 hPa
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	The product is not flammable.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	3.856 g/mL at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	375 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Risk of explosion with:
furan-2-percarbonic acid
Violent reactions possible with:
halogen-halogen compounds
Strong oxidizing agents
strong reducing agents
acids

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 118 mg/kg
Remarks: (RTECS)
Inhalation: No data available
Dermal: No data available
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Skin corrosion/irritation
Skin - reconstructed human epidermis (RhE)
Result: No skin irritation - 15 min
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: irritating
(OECD Test Guideline 405)

Respiratory or skin sensitization
Local lymph node assay (LLNA) - Mouse
Result: negative
(OECD Test Guideline 429)

Germ cell mutagenicity
Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative
Test Type: In vitro mammalian cell gene mutation test
Test system: Mouse lymphoma test
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

11.2 Additional Information

RTECS: CQ8750000
Vomiting, Diarrhea
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The following applies to soluble barium compounds in general: after swallowing: mucosal irritation, nausea, salivation, vomiting, dizziness, pain, colics, and diarrhoea. Systemic effects include: cardiac dysrhythmias, bradycardia (subdued cardiac activity), rise in blood pressure, shock and circulatory collapse as well as muscular rigidity.

Chronic intoxication:

damage of respiratory tract
conjunctivitis
Dermatitis
cardiovascular disorders

Other dangerous properties can not be excluded.

Handle in accordance with good industrial hygiene and safety practice.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test LC50 - Danio rerio (zebra fish) - > 174 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test LC50 - Daphnia magna (Water flea) - 14.5 mg/l - 48 h Remarks: (ECHA) (referred to the cation)
Toxicity to algae	static test ErC50 - Pseudokirchneriella subcapitata (algae) - > 100 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	static test EC50 - activated sludge - > 943.1 mg/l - 3 h (OECD Test Guideline 209)
Toxicity to fish(Chronic toxicity)	semi-static test NOEC - Danio rerio (zebra fish) - >= 1.26 mg/l - 33 d (OECD Test Guideline 210)

12.2 Persistence and degradability

The methods for determining the biological degradability are not applicable to inorganic substances.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.3 Bioaccumulative potential

Bioaccumulation Lepomis macrochirus - 0.065 mg/l(barium chloride)

Bioconcentration factor (BCF): 22.8

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 1564 Class: 6.1 Packing group: III

Proper shipping name: Barium compounds, n.o.s. (barium chloride)

Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG

UN number: 1564 Class: 6.1 Packing group: III EMS-No: F-A, S-A

Proper shipping name: BARIUM COMPOUND, N.O.S. (barium chloride)

IATA

UN number: 1564 Class: 6.1 Packing group: III

Proper shipping name: Barium compound, n.o.s. (barium chloride)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

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

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

barium chloride	10361-37-2	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know

barium chloride 10361-37-2

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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.
Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.
Version: 6.11 Revision Date: 09/07/2024 Print Date: 09/08/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Revision Date 24-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Cadmium**

Cat No. : **C3-500**

CAS No 7440-43-9
Synonyms No information available

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable solids	Category 2
Acute oral toxicity	Category 4
Acute dermal toxicity	Category 4
Acute Inhalation Toxicity - Dusts and Mists	Category 2
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1A
Reproductive Toxicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	
Specific target organ toxicity - (repeated exposure)	Category 1
Target Organs - Kidney, Blood.	
Combustible dust	Yes

Label Elements

Signal Word

Danger

Hazard Statements
Flammable solid
May form combustible dust concentrations in air
Fatal if inhaled
Harmful if swallowed
Harmful in contact with skin
May cause respiratory irritation
Suspected of causing genetic defects
May cause cancer
Suspected of damaging fertility. Suspected of damaging the unborn child
Causes damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting equipment
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER or doctor/physician
Skin
IF ON SKIN: Wash with plenty of soap and water
Wash contaminated clothing before reuse
Call a POISON CENTER or doctor/physician if you feel unwell
Ingestion
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
Rinse mouth
Fire
Fight fire with normal precautions from a reasonable distance
Evacuate area
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING. Cancer and Reproductive Harm - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Cadmium	7440-43-9	100

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects None reasonably foreseeable. . Kidney disorders: May cause harm to the unborn child: Blood disorders

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature No information available

Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Fine dust dispersed in air may ignite. Dust can form an explosive mixture with air. Pyrophoric properties of solids and liquids. Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products
Toxic fumes.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
4	1	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust

formation. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Sweep up and shovel into suitable containers for disposal. Avoid dust formation.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Use only under a chemical fume hood. Do not breathe (dust, vapor, mist, gas). Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Store under an inert atmosphere. Incompatible Materials. Strong oxidizing agents. Strong acids. Sulfur oxides.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Cadmium	TWA: 0.01 mg/m³ TWA: 0.002 mg/m³	Ceiling: 0.3 mg/m³ Ceiling: 0.6 mg/m³ (Vacated) STEL: 0.3 ppm TWA: 0.1 mg/m³ TWA: 0.2 mg/m³ TWA: 5 µg/m³	IDLH: 9 mg/m³	TWA: 0.01 mg/m³ TWA: 0.002 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures When using do not eat, drink or smoke. Provide regular cleaning of equipment, work area and clothing. Avoid contact with skin, eyes or clothing. Wash hands before breaks and immediately after handling the product. Keep away from food, drink and animal feeding stuffs.

9. Physical and chemical properties

Physical State Solid

Appearance	Silver
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	321 °C / 609.8 °F
Boiling Point/Range	765 °C / 1409 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	8.64 @ 25°C
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Cd
Molecular Weight	112.40

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under recommended storage conditions. Moisture sensitive. Air sensitive.

Conditions to Avoid Incompatible products. Excess heat. Avoid dust formation. Exposure to air or moisture over prolonged periods.

Incompatible Materials Strong oxidizing agents, Strong acids, Sulfur oxides

Hazardous Decomposition Products Toxic fumes

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Cadmium	LD50 = 2330 mg/kg (Rat)	Not listed	LC50 = 25 mg/m³ (Rat) 30 min

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Cadmium	7440-43-9	Group 1	Known	A2	X	A2

IARC (International Agency for Research on Cancer)	*IARC (International Agency for Research on Cancer)* *Group 1 - Carcinogenic to Humans* *Group 2A - Probably Carcinogenic to Humans* *Group 2B - Possibly Carcinogenic to Humans*
NTP: (National Toxicity Program)	*NTP: (National Toxicity Program)* *Known - Known Carcinogen* *Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen*
ACGIH: (American Conference of Governmental Industrial Hygienists)	*A1 - Known Human Carcinogen* *A2 - Suspected Human Carcinogen* *A3 - Animal Carcinogen* *ACGIH: (American Conference of Governmental Industrial Hygienists)*

Mutagenic Effects Possible risk of irreversible effects

Reproductive Effects Possible risk of impaired fertility. May cause harm to the unborn child.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system
STOT - repeated exposure Kidney Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Kidney disorders: May cause harm to the unborn child: Blood disorders

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

The product contains following substances which are hazardous for the environment. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Cadmium	Not listed	LC50: 0.0004 - 0.003 mg/L, 96h (Pimephales promelas) LC50: = 0.016 mg/L, 96h (Oryzias latipes) LC50: = 21.1 mg/L, 96h flow-through (Lepomis macrochirus) LC50: = 0.24 mg/L, 96h static (Cyprinus carpio) LC50: = 4.26 mg/L, 96h semi-static (Cyprinus carpio) LC50: = 0.002 mg/L, 96h	Not listed	EC50: = 0.0244 mg/L, 48h Static (Daphnia magna)

		(Cyprinus carpio) LC50: = 0.006 mg/L, 96h static (Oncorhynchus mykiss) LC50: = 0.003 mg/L, 96h flow-through (Oncorhynchus mykiss)		

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN2930
Proper Shipping Name	Toxic solid, flammable, organic, n.o.s.
Technical Name	Cadmium
Hazard Class	6.1
Subsidiary Hazard Class	4.1
Packing Group	I

TDG

UN-No	UN2930
Proper Shipping Name	Toxic solid, flammable, organic, n.o.s.
Hazard Class	6.1
Subsidiary Hazard Class	4.1
Packing Group	I

IATA

UN-No	UN2930
Proper Shipping Name	Toxic solid, flammable, organic, n.o.s.
Hazard Class	6.1
Subsidiary Hazard Class	4.1
Packing Group	I

IMDG/IMO

UN-No	UN2930
Proper Shipping Name	Toxic solid, flammable, organic, n.o.s.
Hazard Class	6.1
Subsidiary Hazard Class	4.1
Packing Group	I

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Cadmium	7440-43-9	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Cadmium	7440-43-9	X	-	231-152-8	X	X		X	X	KE-04397

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Cadmium	7440-43-9	100	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Cadmium	-	-	X	X

Clean Air Act

OSHA - Occupational Safety and Health Administration Not applicable

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Cadmium	5 µg/m³ TWA 2.5 µg/m³ Action Level	-

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Cadmium	10 lb	-

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Cadmium	7440-43-9	Carcinogen Developmental Male Reproductive	0.05 µg/day	Developmental Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Cadmium	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Cadmium	-	Use restricted. See item 72. (see link for restriction details) Use restricted. See item 23. (see link for restriction details) Use restricted. See item 28. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	SVHC Candidate list - 231-152-8 - Carcinogenic, Article 57a;Specific target organ toxicity after repeated exposure, Article 57(f) - human health

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

https://echa.europa.eu/authorisation-list
https://echa.europa.eu/substances-restricted-under-reach
https://echa.europa.eu/candidate-list-table

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Cadmium	7440-43-9	Listed	Not applicable	Not applicable	0.01% (Max. Conc.)

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Cadmium	7440-43-9	Not applicable	Not applicable	Not applicable	Annex I - Y26

16. Other information

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

Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

UNIFIEDALLOYS®

COPPER METAL – SAFETY DATA SHEET

COPPER METAL – SAFETY DATA SHEET

1. PRODUCT IDENTIFICATION

Importer / Supplier / Distributor:

UnifiedAlloys
8835 – 50th Avenue
Edmonton, Alberta CANADA
T6E 5H4
Emergency Phone #: (780) 468-5656 (on-call service)

The conditions or methods of handling, storage, use, and disposal of the product are beyond our control and may be beyond knowledge. For this and other reasons, we do not assume responsibility and expressidly disclaim liability for loss, damage, or expense arising out of or in any way connected with the handling, storage, use, or disposal of the product.

NOTE: This product contains no other hazardous ingredients requiring disclosure under current regulations.

2. HAZARD IDENTIFICATION

Classification: Copper and copper alloys are considered as non- hazardous in its soiled form. However, certain process such as cutting, milling, grinding and welding could result in some hazardous material being emitted.

SYMBOLS	HAZARD	HAZARD STATEMENTS
HEALTH HAZARD	Carcinogenicity Respiratory sensitizer Toxics to reproduction	May cause cancer May cause allergy or asthma symptoms or breathing difficulties if in haled May cause genetic effects.
EXCLAMATION	Skin Sensitizer repeated exposer	Amy cause skin allergies prolong exposer may damage internal organs
ENVIRONMENT	Acute toxic to aquatic life	Toxic to aquatic life with long lasting effects.

3. COMPOSITION INFORMATION ON INGREDIENTS

Component (*)	CAS Number	% Weight	OSHA PEL (mg/m3)	ACGIH TLV (mg/m3)
Copper (Cu)	7440-50-8	99.8	0.1 fume / 1.0 dust	0.2 fume / 1.0 dust

NOTE: This product contains no other hazardous ingredients requiring disclosure under current regulations.

4. FIRST-AID MEASURES

Inhalation: Dust may irritate nose and throat. If heated, copper fumes may cause metal fume fever, a benign transient flu-like condition.

Ingestion: Rare in industry. Dust may irritate mouth and gastrointestinal tract. If a substantial amount has been ingested, remove from exposure, treat as a foreign body and induce vomiting.

Eyes: Dust acts as a foreign body. Flush eyes thoroughly with clean, lukewarm water for 15 minutes. See medical attention if condition persists.

Note: Do not induce vomiting or give liquids to an unconscious person.

Respiratory disorders may be aggravated by exposure to metallic and/or organic/inorganic coating dust or fumes. Consult a Physician

5. FIRE AND EXPLOSION HAZARD

1. **Conditions of flammability:** Steel products (Copper Metal) does not present fire or explosion hazards under normal conditions. Fine metal particles such as those produced in grinding or sawing can burn. High concentrations of metal filings may present an explosion hazard.
2. **Means of extinction:** For molten metal use dry powder or sand. Do NOT use water on molten metals.
3. **Flashpoint and method of determination:** N/A (under normal conditions)

4. **Upper and Lower Flammable Limit:** N/A (under normal conditions)
5. **Auto-ignition temperature:** N/A (under normal conditions)
6. **Hazardous Combustion Products**: N/A (under normal conditions)
8. **Explosion Data**: sensitivity to mechanical impact: N/A (under normal conditions)
9. **Explosion Data:** sensitivity to static discharge: N/A (under normal conditions)

6. ACCIDENTAL RELEASE MEASURES

Leak and Spill Procedures: Not applicable to soiled state, no effect on Environment and Human lives. Solid metal does not pose any problems. Dust spills should be cleaned up avoiding dust generation. Collect and recycle to process. Wash down with water if in contact with acids.

7. HANDLING AND STORAGE

Storage Requirements: Store away from corrosive chemicals.
Special Shipping Information: N/A

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Personal Protective Equipment: Dependent upon processes being performed on material. Each operator must be addressed for suitable equipment.

Gloves: Protective gloves should be worn during welding, burning or handling operations.
Clothing: As required. Dependent on the operations and local welding codes.
Respiratory: NIOSH / MSHA approved dust and fume respirator should be used to avoid excessive inhalation of particles when exposure exceeds TLV's.
Footwear: CSA Z195-02 Steel Toed, safety shoes.
Eye: safety glasses, goggles or face shield should be worn as required by exposure.
Other: With molten metals, use full body cover clothing, including gloves, eyewear and footwear suitably treated to prevent burns

Engineering Controls: Engineering controls required if incase welding, milling, cutting and grinding work is performed. (e.g. ventilation, enclosures, specify) Depending on type of process performed a specific equipment and PPE's are required to perform the job safely.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical Properties

Physical State	Solid
Odor	NA
Evaporation Rate	NA
Boiling Point	2324 Degree Celsius
Melting Point	1083 Degree Celsius
PH	NA
Solubility in Water	NA
Vapor Pressure	1 mm at 1628 degree Celsius
Density	8.94
Appearance	Red Ductile
Volatility	NA
Odor threshold	NA
Specific gravity	(H20=1): 8.94
Freezing Point	NA
Coefficient of water / oil distribution	Negligible

10. STABILITY AND REACTIVITY

Reactivity: Not determined when it's in solid form**.**
Chemical stability: Yes, Copper and its alloys are stable under normal storage and handling condition.
Conditions of Reactivity: Hydrogen Peroxide
Hazardous Decomposition Products: Does not decompose. Reaction with acids could produce noxious gasses. In contact with acids, hydrogen may evolve.
Incompatibility to Other Substances: Copper reacts violently with acetylene, ammonium nitrate, bromates, chlorates, iodates. Copper foil burns spontaneously in gaseous chlorine. Avoid contact with chlorine and oxygen difluoride, ethylene oxide, fluoride, hydrogen peroxide, hydrazine mono-nitrate and hydrazoic acid. Incompatible with hydrogen sulfide, lead azide, potassium peroxide.
Possibility of hazardous Reactions: Hazardous polymerization cannot occur.

11. TOXICOLOGICAL PROPERTIES

Effects of Acute Exposure to Material:
Short term exposure to fumes / dust may produce irritation of eyes and respiratory system. Inhalation of high concentrations of freshly formed oxide fumes of iron, manganese, and copper may cause metal fume fever characterized by a metallic taste in the mouth, dryness and irritation of the throat and influenza – like symptoms. Dermal contact of filings could cause infection / blood poisoning.
Effects of Chronic Exposure to Material:
Chronic inhalation of high concentrations of iron – oxide fumes or dust may lead to a benign pneumoconiosis (siderosis). Inhalation of high concentrations of ferric oxide may possibly enhance the risk of lung cancer development in the workers exposed to pulmonary carcinogens.
Carcinogenicity of Material:
Chromium and nickel and their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP). Exposure to high concentrations of dust and fumes can cause sensitization dermatitis, inflammation, and / or ulceration of the upper respiratory tract and possibly cancer of nasal passages and lungs. Recent epidemiological studies of workers melting and working alloys containing nickel / chromium have found no increased risk of cancer.
Irritancy of Material: N/A
Sensitization to Material: N/A
Mutagenicity of Material: N/A
Reproductive Effects: N/A
Teratogenicity of Material: N/A
Carcinogenicity of Material: N/A

12. ECOLOGICAL INFORMATION

Eco-toxicity: No data available for copper and its alloys in their natural solid state.
Presence of Degradability: NO data available
Bioaccumulation Potential: NO data available
Mobility in soil: NO data available
Other adverse effects: None known.

13. DISPOSAL CONSIDERATION

Waste Disposal: Recover copper for recycling. Follow applicable regulations. Dispose of in compliance with local regulations.

14. TRANSPORT INFORMATION

General Shipping Information: Material not regulated for shipping.
Un Number: NA
Hazard Class: NA
Special Shipping Information: N/A

15. REGULATORY INFORMATION

Domestic Substances List: the components of this material are on the federal DSL inventory.
Other Canadian Regulations: NA
WHMIS: Class D2A / D2B: materials causing other Toxic effects when other processes are performed (Welding, cutting and grinding)

16. OTHER INFORMATION

Prepared By: UnifiedAlloy
Telephone: (780) 468-5656
Note: Contact Supplier (Quality Department) for additional information

Preparation Date: December / 20 / 2018

IMPORTANT! Read this SDS before use or disposal of this product. Pass along the information to employees and any other persons who could be exposed to the product to be sure that they are aware of the information before use or other exposure. This SDS has been prepared in accordance with the Globally Harmonized System of Chemical and Labeling of Chemicals (GHS) Fifth Edition and the OSHA Hazard Communication Standard **[29 CFR 1910.1200].** The SDS information is based on sources believed to be reliable. Available data, safety standards, and government regulations are subject to change and the conditions of handling and use, or misuse are beyond our control, Unified Alloys makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Additional information may be necessary or helpful for specific conditions and circumstances of use. It is the user's responsibility to determine the suitability of this product and to evaluate risks and exercise appropriate precautions for protection of employees and others prior to use.

SAFETY DATA SHEET

Version 6.8
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Chromium

Product Number : 266299
Brand : Aldrich
CAS-No. : 7440-47-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture.

2.2 GHS Label elements, including precautionary statements

Not a hazardous substance or mixture.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula : Cr
Molecular weight : 52.00 g/mol
CAS-No. : 7440-47-3
EC-No. : 231-157-5

Component	Classification	Concentration
chromium		
		<= 100 %

SECTION 4: First aid measures

4.1 Description of first-aid measures

If inhaled
After inhalation: fresh air.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.

In case of eye contact
After eye contact: rinse out with plenty of water. Remove contact lenses.

If swallowed
After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Chromium oxides

5.3 Advice for firefighters

In the event of fire, wear self-contained breathing apparatus.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

5.4 Further information
none

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid inhalation of dusts. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
No special precautionary measures necessary.

6.3 Methods and materials for containment and cleaning up
Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry.

Air sensitive.

Storage class
Storage class (TRGS 510): 11: Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Component	CAS-No.	Value	Control parameters	Basis
chromium	7440-47-3	TWA	0.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		PEL	0.5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
chromium	7440-47-3	Total chromium	0.7 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Change contaminated clothing. Wash hands after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

customers. It should not be construed as offering an approval for any specific use scenario.

Respiratory protection
Recommended Filter type: Filter type P1
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
No special precautionary measures necessary.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Color: light gray
b)	Odor	odorless
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 1,857 °C (3,375 °F) - lit.
f)	Initial boiling point and boiling range	2,672 °C 4,842 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	7.14 g/mL at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Strong acids, Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Remarks: No data available

Serious eye damage/eye irritation
Remarks: No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: GB4200000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinus carpio (Carp) - 14.3 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.07 mg/l - 48 h

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 30 d - 50 µg/l(chromium)
	Bioconcentration factor (BCF): 1.03 - 1.22

12.4 Mobility in soil

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 3077 Class: 9 Packing group: III

Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (chromium)

Reportable Quantity (RQ): 5000 lbs

Reportable Quantity (RQ): 10 lbs

Poison Inhalation Hazard: No

IMDG

Not dangerous goods

IATA

Not dangerous goods

Further information

Not classified as dangerous in the meaning of transport regulations.

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
chromium	7440-47-3	5000	5000

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Chronic Health Hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

chromium	7440-47-3	>= 90 - <= 100 %

US State Regulations

Massachusetts Right To Know

chromium	7440-47-3

Pennsylvania Right To Know

chromium	7440-47-3

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

LEAD METAL
SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identity: Lead Metal

Trade Names and Synonyms: Lead; Pb; Plumbum; Metallic Lead; Inorganic Lead; ASTM B29; TADANAC Lead, Low-Alpha Lead.

Manufacturer:
Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:
In U.S.:
Teck American Metal Sales Incorporated
501 North Riverpoint Blvd, Suite 300
Spokane, WA
USA, 99202

Other than U.S.:
Teck Metals Ltd.
#1700 – 11 King Street West
Toronto, Ontario
M5H 4C7

Preparer:
Teck Metals Ltd.
Suite 3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of Last Review: June 29, 2015.

Date of Last Edit: June 29, 2015.

Product Use: Used as a construction material for tank linings, piping, and equipment used in the manufacture of sulphuric acid and the refining and processing of petroleum; used in x-ray and atomic radiation shielding; used in the manufacture of paint pigments, organic and inorganic lead compounds, lead shot, lead wire for bullets, ballast, and lead solders; used as a bearing metal or alloy; used in the manufacture of storage batteries, ceramics, plastics, and electronic devices; used in the metallurgy of steel and other metals; and used in the form of lead oxide for batteries.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

Health		Physical	Environmental
Acute Toxicity (Oral, Inhalation)	– Does not meet criteria	Does not meet criteria for any Physical Hazard	**Aquatic Toxicity – Short Term (Acute) Category 3**
Skin Corrosion/Irritation	– Does not meet criteria		
Eye Damage/Eye Irritation	– Does not meet criteria		
Respiratory or Skin Sensitization	– Does not meet criteria		
Mutagenicity	– Does not meet criteria		
Carcinogenicity	**– Category 2**		
Reproductive Toxicity	**– Category 1A**		
Specific Target Organ Toxicity Chronic Exposure	**– Category 1**		

LABEL:

Symbols:

Signal Word:

DANGER

Hazard Statements	**Precautionary Statements:**
DANGER! Causes damage to kidneys, blood-forming systems, central nervous system and digestive tract through prolonged or repeated exposure. May damage the unborn child. May cause harm to breast-fed children. Suspected of damaging fertility. Suspected of causing cancer. Harmful to aquatic life.	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection. Do not breathe dust or fumes. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. If exposed or concerned or you feel unwell: Get medical advice/attention. Avoid release to the environment.

Emergency Overview: A bluish-white to silvery-grey, heavy, soft metal that does not burn in bulk. Finely-divided lead dust clouds are a moderate fire and explosion hazard, however. When heated strongly in air, highly toxic lead oxide fumes can be generated. Inhalation or ingestion of lead may produce both acute and chronic health effects. Possible cancer and reproductive hazard. SCBA and full protective clothing are required for fire emergency response personnel.

Potential Health Effects: Inhalation or ingestion of lead may result in headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm, and joint pain. Prolonged exposure may also cause central nervous system damage, hypertension, gastrointestinal disturbances, anemia, kidney dysfunction and possible reproductive effects. Pregnant women should be protected from excessive exposure in order to prevent lead crossing the placental barrier and causing infant neurological disorders. Lead and inorganic lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP lists lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU does not currently list lead as a human carcinogen (see Toxicological Information, Section 11).

Potential Environmental Effects: Lead metal has relatively low bioavailability; however, compounds which it forms with other elements can be toxic to both aquatic and terrestrial organisms at low concentrations. These compounds can be particularly toxic in the aquatic environment. Lead bioaccumulates in plants and animals in both aquatic and terrestrial environments (see Ecological Information, Section 12).

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENT	CAS Registry No.	CONCENTRATION (% wgt/wgt)
Lead	7439-92-1	99+%

Note: See Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Eye irritation, redness. Gently brush product off face if necessary. Do not rub eye(s). Let the eye(s) water naturally for a few minutes. Look right and left, then up and down. If particle/dust does not dislodge, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, get medical advice/attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: *Symptoms:* Skin soiling, mild irritation. Gently brush away excess dust. Wash gently and thoroughly with lukewarm, gently flowing water and non-abrasive soap for 5 minutes, or until product is removed. If skin irritation occurs or you feel unwell, get medical advice/attention. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: *Symptoms:* Respiratory irritation. Remove source of exposure or move person to fresh air and keep comfortable for breathing. Seek medical attention if you feel unwell.

Ingestion: *Symptoms:* Stomach upset. If you feel unwell or are concerned, get medical advice/attention.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not flammable or combustible. Finely-divided lead dust or powder is a moderate fire hazard and moderate explosion hazard when dispersed in the air at high concentrations and exposed to heat, flame, or other ignition sources. Explosions may also occur upon contact with certain incompatible materials (see Stability and Reactivity, Section 10).

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam.

Fire Fighting: Do not use direct water streams on fires where molten metal is present, due to the risk of a steam explosion that could potentially eject molten metal uncontrollably. Use a fine water mist on the front-running edge of the spill and on the top of the molten metal to cool and solidify it. If possible, move solid material from fire area or cool material exposed to flame to prevent melting of the metal ingots. Highly toxic lead oxide fumes may evolve in fires. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Restrict access to the area until completion of clean-up. Clean up spilled material immediately, observing precautions outlined below. Molten metal should be allowed to solidify before cleanup. If solid metal, wear gloves, pick up and return to process. If dust, wear recommended personal protective equipment (see below) and use methods which will minimize dust generation (e.g., vacuum solids). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labelled containers for later recovery or disposal. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

Personal Precautions: Persons responding to an accidental release should wear protective clothing, gloves and a respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust and fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash as well as a respirator to protect against inhalation of lead fume. Workers should wash and change clothing following cleanup of a lead spill to prevent personal contamination with lead dust.

Environmental Precautions: Lead metal has low bioavailability; however, compounds which it forms with other elements can be toxic to aquatic and terrestrial organisms. Releases of the product to water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store in a DRY, covered area, separate from strong acids, other incompatible materials, active metals and food or feedstuffs. Solid metal suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Otherwise, entrained moisture could expand explosively and spatter molten metal out of the bath. No special packaging materials are required. Lead metal, in contact with wood or other surfaces, may leave traces of lead particulate that can accumulate over time. Cleaning or disposal of these surfaces requires review to ensure that any effluent or solid waste disposal meets the requirements of regulations in the applicable jurisdiction.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines:

Component	ACGIH TLV	OSHA PEL	NIOSH REL
Lead	0.05 mg/m^3	0.05 mg/m^3	0.05 mg/m^3

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction.
ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentration of lead fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Local exhaust is recommended for melting, casting, welding, grinding, flame cutting or burning, and use of lead powders.

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when lead is processed. Appropriate eye protection should be worn where fume or dust is generated. Where hot or molten metal is handled, heat resistant gloves, goggles or face shield, and clothing to protect from radiant heat and hot metal splash should be worn. Safety type boots are recommended.

Respirators: Where lead dust or fumes are generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge). When exposure levels are obviously high but the actual concentration is unknown, a self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask should be worn.

General Hygiene Considerations: Do not eat, drink or smoke in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate, designated areas as well as at the end of the workday. A double locker-shower system with separate clean and dirty sides is usually required for lead handling operations to avoid cross-contamination of street clothes. Contaminated clothing should be changed frequently and laundered before each reuse. Inform laundry personnel of contaminants' hazards. Workers should not take dirty work clothes home and launder them with other personal clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Malleable, bluish-white to silvery-grey solid metal	**Odour:** None	**Odour Threshold:** Not Applicable	**pH:** Not Applicable
Vapour Pressure: (negligible @ 20°C)	**Vapour Density:** Not Applicable	**Melting Point/Range:** 328°C	**Boiling Point/Range:** 1,740°C
Relative Density (Water = 1)**:** 11.34	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Not Applicable	**Solubility:** Insoluble in water
Flash Point: None	**Flammable Limits (LEL/UEL):** Not Flammable	**Auto-ignition Temperature:** None	**Decomposition Temperature:** None

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur. Freshly cut or cast lead surfaces tarnish rapidly due to the formation of an insoluble protective layer of basic lead carbonate.

Incompatibilities: Lead reacts vigorously with strong acids (e.g., hot concentrated nitric acid, boiling concentrated hydrochloric acid, etc.), strong oxidizers such as peroxides, chlorates, nitrates and halogen or interhalogen compounds such as chlorine trifluoride. Powdered lead metal in contact with disodium acetylide, chlorine trifluoride, sodium carbide or fused ammonium nitrate poses a risk of explosion. Solutions of sodium azide in contact with lead metal can form lead azide, which is a detonating compound. Vigorous reactions can also occur between molten lead and active metals, such as sodium, potassium, lithium and calcium. A lead-zirconium alloy (10-70% Zr) will ignite when struck with a hammer.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting or burning, electric arc welding or overheating a molten bath will generate highly toxic lead oxide fume. Lead oxide is highly soluble in body fluids and the particle size of the metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Lead accumulates in bone and body organs once it enters the body. Elimination from the body is slow. Initial and periodic medical examinations are advised for persons repeatedly exposed to levels at or above the exposure limits of lead dust or fumes. Once lead enters the body, it can affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal system. The primary routes of exposure to lead are inhalation or ingestion of dust and fumes.

Acute:
Skin/Eye: Contact with dust or fume may cause local irritation but would not cause tissue damage.

Inhalation: Exposure to lead dust or fume may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An intense, short-term exposure to lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are unlikely in industry today. Kidney damage, as well as anemia, can occur from acute exposure.

Ingestion: Symptoms due to ingestion of lead dust or fume would be similar to those from inhalation. Other health effects such as metallic taste in the mouth and constipation or bloody diarrhea might also occur.

Chronic:
Prolonged exposure to lead dust and fume may produce many of the symptoms of short-term exposure and may also cause central nervous system damage, gastrointestinal disturbances, anemia, and, rarely, wrist drop. Reduced hemoglobin production has been associated with low lead exposures. Symptoms of central nervous system damage due to moderate lead exposure include fatigue, headaches, tremors and hypertension. Very high lead exposure can result in lead encephalopathy with symptoms of hallucinations, convulsions, and delirium. Kidney dysfunction and possible injury has also been associated with chronic lead poisoning. Chronic over-exposure to lead has been implicated as a causative agent for the impairment of male and female reproductive capacity. Pregnant women should be protected from excessive exposure as lead can cross the placental barrier and unborn children may suffer neurological damage or developmental problems due to excessive lead exposure. Teratogenic and mutagenic effects from exposure to lead have been reported in some studies but not in others. The literature is inconsistent and no firm conclusions can be drawn at this time. Lead and lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP lists lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen.

Animal Toxicity:

Hazardous Ingredient:	Acute Oral Toxicity:	Acute Dermal Toxicity:	Acute Inhalation Toxicity:
Lead	No Data	No Data	No Data

SECTION 12. ECOLOGICAL INFORMATION

While lead metal is relatively insoluble, its processing or extended exposure in aquatic and terrestrial environments may lead to the release of lead compounds in more bioavailable forms. While lead compounds are not particularly mobile in the aquatic environment, they can be toxic to aquatic organisms, especially fish, at low concentrations. Water hardness, pH and dissolved organic carbon content are three major factors which regulate the degree of lead toxicity. Lead in soil is generally neither very mobile nor bioavailable, as it can become strongly sorbed onto soil particles, increasingly so over time, to a degree related to physical properties of the soil. Lead bioaccumulates in plants and animals in both aquatic and terrestrial environments.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME ..... Not a regulated product in ingot form.
TRANSPORT CANADA AND U.S. DOT CLASSIFICATION ..... Not Applicable

TRANSPORT CANADA AND U.S. DOT PIN ..... Not Applicable
MARINE POLLUTANT..... No
IMO CLASSIFICATION ..... Not Regulated

SECTION 15. REGULATORY INFORMATION

U.S.
Ingredient Listed on TSCA Inventory..... Yes

Hazardous Under Hazard Communication Standard ..... Yes

CERCLA Section 103 Hazardous Substances..... ..... Lead ..... RQ: 10 lbs. (4.54 kg.)*
*reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA Section 302 Extremely Hazardous Substance..... No

EPCRA Section 311/312 Hazard Categories ..... Delayed (chronic) health hazard - Carcinogen
Delayed (chronic) health hazard – Reproductive toxin

EPCRA Section 313 Toxic Release Inventory..... Lead CAS No. 7439-92-1
Percent by Weight - At least 99%

SECTION 16. OTHER INFORMATION

Date of Original Issue: July 23, 1997 **Version:** 01 *(First edition)*

Date of Latest Revision: June 29, 2015 **Version:** 13

The information in this Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2015, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, Guide to Occupational Exposure Values – 2015.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urben, Ed), 1995.
- Canadian Centre for Occupational Health and Safety, Hamilton, ON, CHEMINFO Record No. 608 - Lead (Rev. 2009-05).
- European Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH).
- Health Canada, SOR/2015-17, Hazardous Products Regulations, 30 January 2015.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – present, (multi-volume work), World Health Organization, Geneva.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0052 - Lead.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank (online version).
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham, B. Cohrssen & C.H. Powell, Ed.
- U.S. Dept. of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 13th Report on Carcinogens, October 2014.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards, on-line edition.
- U.S. Dept. of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Lead, September 2005.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader
Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck American Metal Sales Incorporated and Teck Metals Ltd. extend no warranty and assume no responsibility for the accuracy of the content and expressly disclaim all liability for reliance thereon. This safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

SAFETY DATA SHEET

Version 6.2
Revision Date 04/17/2021
Print Date 06/18/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Magnesium

Product Number : 266302
Brand : Sigma-Aldrich
CAS-No. : 7439-95-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable solids (Category 1), H228
Self-heating chemicals (Category 1), H251
Chemicals which, in contact with water, emit flammable gases (Category 2), H261

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)
H228 Flammable solid.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

H251	Self-heating; may catch fire.
H261	In contact with water releases flammable gas.

Precautionary statement(s)

P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P223	Do not allow contact with water.
P231 + P232	Handle under inert gas. Protect from moisture.
P235 + P410	Keep cool. Protect from sunlight.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P280	Wear protective gloves/ eye protection/ face protection.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P402 + P404	Store in a dry place. Store in a closed container.
P403 + P235	Store in a well-ventilated place. Keep cool.
P407	Maintain air gap between stacks/ pallets.
P420	Store away from other materials.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Mg
Molecular weight	:	24.31 g/mol
CAS-No.	:	7439-95-4
EC-No.	:	231-104-6

No components need to be disclosed according to the applicable regulations.

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice

Consult a physician. Show this material safety data sheet to the doctor in attendance.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.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Dry powder Dry sand

Unsuitable extinguishing media
Do NOT use water jet.

5.2 Special hazards arising from the substance or mixture
Magnesium oxide

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. 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
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Avoid formation of dust and aerosols.**Advice on safe handling**
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.

Advice on protection against fire and explosion
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.
Storage class (TRGS 510): 4.2: Pyrophoric and self-heating hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Flame retardant antistatic protective clothing., 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.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: chips
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 648 °C (1198 °F) - lit.
f)	Initial boiling point and boiling range	1,090 °C 1,994 °F - lit.
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	May form combustible dust concentrations in air.
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	1 hPa at 621 °C (1150 °F)
l)	Vapor density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	The substance or mixture is classified as self heating with the category 1.
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Reacts violently with water.

10.4 Conditions to avoid
Heat, flames and sparks. Exposure to moisture.

10.5 Incompatible materials
Acids, Strong oxidizing agents, Acid chlorides, Halogens

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation

Respiratory or skin sensitization
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information
Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, chills, Fever, fatigue, muscle pain, joint pain, rash, Anorexia.
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence

Liver - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity
No data available

12.2 Persistence and degradability

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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.6 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging

Dispose of as unused product.

SECTION 14: Transport information

DOT (US)

UN number: 1869 Class: 4.1 Packing group: III
Proper shipping name: Magnesium
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG

UN number: 1869 Class: 4.1 Packing group: III EMS-No: F-G, S-G
Proper shipping name: MAGNESIUM

IATA

UN number: 1869 Class: 4.1 Packing group: III
Proper shipping name: Magnesium

SECTION 15: Regulatory information

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

Fire Hazard, Reactivity Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 16: Other information

Further information

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.2 Revision Date: 04/17/2021 Print Date: 06/18/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH)

Manganese ≥99,6 % , <100 mesh, powder

article number: **1HX8**
Version: **1.0 en**

date of compilation: 2021-04-15

SECTION 1: Identification of the substance/mixture and of the company/ undertaking

1.1 Product identifier

Identification of the substance	**Manganese** ≥99,6 % , <100 mesh, powder
Article number	1HX8
Registration number (REACH)	01-2119449803-34-xxxx
EC number	231-105-1
CAS number	7439-96-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses:	Laboratory chemical Laboratory and analytical use
Uses advised against:	Do not use for products which come into contact with foodstuffs. Do not use for private purposes (household).

1.3 Details of the supplier of the safety data sheet

Carl Roth GmbH + Co KG
Schoemperlenstr. 3-5
D-76185 Karlsruhe
Germany

Telephone:+49 (0) 721 - 56 06 0
Telefax: +49 (0) 721 - 56 06 149
e-mail: sicherheit@carlroth.de
Website: www.carlroth.de

Competent person responsible for the safety data sheet:	:Department Health, Safety and Environment
e-mail (competent person):	**sicherheit@carlroth.de**

1.4 Emergency telephone number

Name	Street	Postal code/city	Telephone	Website
National Poisons Information Centre Beaumont Hospital	Beaumont Road	Dublin 9	01 809 2166	https://www.poisons.ie/

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 (CLP)

Section	Hazard class	Cat-egory	Hazard class and category	Hazard statement
2.7	Flammable solid	2	Flam. Sol. 2	H228

For full text of abbreviations: see SECTION 16

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP)

Signal word **Warning**

Pictograms

GHS02

Hazard statements

H228 Flammable solid

Precautionary statements

Precautionary statements - prevention

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking

Labelling of packages where the contents do not exceed 125 ml

Signal word: **Warning**

Symbol(s)

2.3 Other hazards

Dust explosion hazards.

Results of PBT and vPvB assessment

According to the results of its assessment, this substance is not a PBT or a vPvB.

SECTION 3: Composition/information on ingredients

3.1 Substances

Name of substance	Manganese
Molecular formula	Mn
Molar mass	54,94 $^{g}/_{mol}$
REACH Reg. No	01-2119449803-34-xxxx
CAS No	7439-96-5
EC No	231-105-1

SECTION 4: First aid measures

4.1 Description of first aid measures

General notes

Take off contaminated clothing.

Following inhalation

Provide fresh air. In all cases of doubt, or when symptoms persist, seek medical advice.

Following skin contact

Rinse skin with water/shower.

Following eye contact

Rinse cautiously with water for several minutes. In all cases of doubt, or when symptoms persist, seek medical advice.

Following ingestion

Rinse mouth. Call a doctor if you feel unwell.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms and effects are not known to date.

4.3 Indication of any immediate medical attention and special treatment needed

none

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

co-ordinate firefighting measures to the fire surroundings
D-powder, sand

Unsuitable extinguishing media

water, foam, carbon dioxide (CO_2)

5.2 Special hazards arising from the substance or mixture

Combustible. Danger of dust explosion.

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Fight fire with normal precautions from a reasonable distance. Wear self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Avoid contact with skin, eyes and clothes. Do not breathe dust.

6.2 Environmental precautions

Keep away from drains, surface and ground water.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains. Take up mechanically.

Advice on how to clean up a spill

Take up mechanically. Control of dust.

Other information relating to spills and releases

Place in appropriate containers for disposal.

6.4 Reference to other sections

Hazardous combustion products: see section 5. Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Avoid dust formation.

Measures to prevent fire as well as aerosol and dust generation

Removal of dust deposits.

Advice on general occupational hygiene

Wash hands before breaks and after work. Keep away from food, drink and animal feedingstuffs. When using do not smoke.

7.2 Conditions for safe storage, including any incompatibilities

Store in a dry place. Keep container tightly closed.

Incompatible substances or mixtures

Observe hints for combined storage.

Protect against external exposure, such as

humidity, contact with air/oxygen

Consideration of other advice:

Ventilation requirements

Use local and general ventilation.

Specific designs for storage rooms or vessels

Recommended storage temperature: 15 – 25 °C

7.3 Specific end use(s)

No information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

National limit values

Occupational exposure limit values (Workplace Exposure Limits)

Country	Name of agent	CAS No	Identifier	TWA [mg/m³]	STEL [mg/m³]	Ceiling-C [mg/m³]	Notation	Source
EU	manganese	7439-96-5	IOELV	0,2			i	2017/164/EU
IE	dusts non-specific		OELV	10			i	S.I. No. 619 of 2001
IE	dusts non-specific		OELV	4			r	S.I. No. 619 of 2001
IE	manganese	7439-96-5	OELV	0,2	3		fume, i	S.I. No. 619 of 2001
IE	manganese	7439-96-5	OELV	0,02			fume, r	S.I. No. 619 of 2001
IE	manganese	7439-96-5	OELV	0,2			i	S.I. No. 619 of 2001
IE	manganese	7439-96-5	OELV	0,05			r	S.I. No. 619 of 2001

Notation

Ceiling-C	Ceiling value is a limit value above which exposure should not occur
fume	As fume
i	Inhalable fraction
r	Respirable fraction
STEL	Short-term exposure limit: a limit value above which exposure should not occur and which is related to a 15-minute period (unless otherwise specified)
TWA	Time-weighted average (long-term exposure limit): measured or calculated in relation to a reference period of 8 hours time-weighted average (unless otherwise specified)

8.2 Exposure controls

Individual protection measures (personal protective equipment)

Eye/face protection

Use safety goggle with side protection.

Skin protection

• hand protection

Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves. The times are approximate values from measurements at 22 ° C and permanent contact. Increased temperatures due to heated substances, body heat etc. and a reduction of the effective layer thickness by stretching can lead to a considerable reduction of the breakthrough time. If in doubt, contact manufacturer. At an approx. 1.5 times larger / smaller layer thickness, the respective breakthrough time is doubled / halved. The data apply only to the pure substance. When transferred to substance mixtures, they may only be considered as a guide.

• type of material

NBR (Nitrile rubber)

• material thickness

>0,11 mm

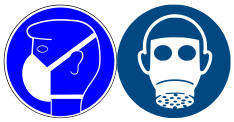
• breakthrough times of the glove material

>480 minutes (permeation: level 6)

• other protection measures

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended.

Respiratory protection



Respiratory protection necessary at: Dust formation. Particulate filter device (EN 143). P1 (filters at least 80 % of airborne particles, colour code: White).

Environmental exposure controls

Keep away from drains, surface and ground water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	solid
Form	powder
Colour	grey
Odour	odourless
Melting point/freezing point	1.246 °C (ECHA)
Boiling point or initial boiling point and boiling range	>1.900 °C
Flammability	flammable solid in accordance with GHS criteria
Lower and upper explosion limit	not determined
Flash point	not applicable
Auto-ignition temperature	>330 °C
Decomposition temperature	not relevant
pH (value)	not applicable

Kinematic viscosity	not relevant
Solubility(ies)	
Water solubility	0,001 $^{g}/_{l}$ at 20 °C (ECHA)
Partition coefficient	
Partition coefficient n-octanol/water (log value):	not relevant (inorganic)
Vapour pressure	not determined
Density	7,3 $^{g}/_{cm^3}$ at 20 °C
Particle characteristics	
Particle size	<150 µm
Other safety parameters	
Oxidising properties	none

9.2 Other information

Information with regard to physical hazard classes:	There is no additional information.
Other safety characteristics:	There is no additional information.

SECTION 10: Stability and reactivity

10.1 Reactivity

It's a reactive substance. Risk of ignition. Dust explosibility.

If heated

Risk of ignition.

10.2 Chemical stability

The material is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possibility of hazardous reactions

Violent reaction with: strong oxidiser, Acids

10.4 Conditions to avoid

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Protect from moisture.

10.5 Incompatible materials

There is no additional information.

Release of flammable materials with

Water, Acids => Hydrogen

10.6 Hazardous decomposition products

Hazardous combustion products: see section 5.

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Classification according to GHS (1272/2008/EC, CLP)

Acute toxicity

Shall not be classified as acutely toxic.

Acute toxicity					
Exposure route	**Endpoint**	**Value**	**Species**	**Method**	**Source**
oral	LD50	>2.000 $^{mg}/_{kg}$	rat		ECHA
inhalation: dust/ mist	LC50	>5,14 $^{mg}/_{l}$/4h	rat		ECHA

Skin corrosion/irritation

Shall not be classified as corrosive/irritant to skin.

Serious eye damage/eye irritation

Shall not be classified as seriously damaging to the eye or eye irritant.

Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

Symptoms related to the physical, chemical and toxicological characteristics

• If swallowed

Data are not available.

• If in eyes

causes slight to moderate irritation

• If inhaled

Inhalation of dust may cause irritation of the respiratory system, cough, Dyspnoea

• If on skin

Data are not available.

• Other information

none

11.2 Endocrine disrupting properties

Not listed.

11.3 Information on other hazards

There is no additional information.

SECTION 12: Ecological information

12.1 Toxicity

Shall not be classified as hazardous to the aquatic environment.

Aquatic toxicity (acute)

Endpoint	Value	Species	Exposure time
LC50	>3,6 $^{mg}/_{l}$	fish	96 h
EC50	>1,6 $^{mg}/_{l}$	aquatic invertebrates	48 h
ErC50	4,5 $^{mg}/_{l}$	algae	72 h

Aquatic toxicity (chronic)

Endpoint	Value	Species	Exposure time
EC50	19,5 $^{mg}/_{l}$	aquatic invertebrates	21 d

Biodegradation

The methods for determining the biological degradability are not applicable to inorganic substances.

12.2 Process of degradability

Data are not available.

12.3 Bioaccumulative potential

Does not significantly accumulate in organisms.

BCF	19 (ECHA)

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

Data are not available.

12.6 Endocrine disrupting properties

Not listed.

12.7 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

This material and its container must be disposed of as hazardous waste. Dispose of contents/container in accordance with local/regional/national/international regulations.

Recycling/reclamation of metals and metal compounds.

Sewage disposal-relevant information

Do not empty into drains.

Waste treatment of containers/packagings

It is a dangerous waste; only packagings which are approved (e.g. acc. to ADR) may be used.

13.2 Relevant provisions relating to waste

The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process. Waste catalogue ordinance (Germany).

13.3 Remarks

Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities. Please consider the relevant national or regional provisions.

SECTION 14: Transport information

14.1 UN number or ID number

ADR/RID/ADN	UN 3089
IMDG-Code	UN 3089
ICAO-TI	UN 3089

14.2 UN proper shipping name

ADR/RID/ADN	METAL POWDER, FLAMMABLE, N.O.S.
IMDG-Code	METAL POWDER, FLAMMABLE, N.O.S.
ICAO-TI	Metal powder, flammable, n.o.s.

14.3 Transport hazard class(es)

ADR/RID/ADN	4.1
IMDG-Code	4.1
ICAO-TI	4.1

14.4 Packing group

ADR/RID/ADN	III
IMDG-Code	III
ICAO-TI	III

14.5 Environmental hazards

non-environmentally hazardous acc. to the dangerous goods regulations

14.6 Special precautions for user

Provisions for dangerous goods (ADR) should be complied within the premises.

14.7 Maritime transport in bulk according to IMO instruments

The cargo is not intended to be carried in bulk.

14.8 Information for each of the UN Model Regulations

Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN) - Additional information

Classification code	F3
Danger label(s)	4.1

Special provisions (SP)	552
Excepted quantities (EQ)	E1
Limited quantities (LQ)	5 kg
Transport category (TC)	3
Tunnel restriction code (TRC)	E
Hazard identification No	40

International Maritime Dangerous Goods Code (IMDG) - Additional information

Marine pollutant	-
Danger label(s)	4.1

Special provisions (SP)	223
Excepted quantities (EQ)	E1
Limited quantities (LQ)	5 kg
EmS	F-G, S-G
Stowage category	A
Segregation group	7 - Heavy metals and their salts 15 - Powdered metals

International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information

Danger label(s)	4.1

Special provisions (SP)	A3
Excepted quantities (EQ)	E1
Limited quantities (LQ)	10 kg

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant provisions of the European Union (EU)

Restrictions according to REACH, Annex XVII

Dangerous substances with restrictions (REACH, Annex XVII)				
Name of substance	**Name acc. to inventory**	**CAS No**	**Restriction**	**No**
Manganese	flammable / pyrophoric		R40	40

Legend

R40 1. Shall not be used, as substance or as mixtures in aerosol dispensers where these aerosol dispensers are intended for supply to the general public for entertainment and decorative purposes such as the following:
- metallic glitter intended mainly for decoration,
- artificial snow and frost,
- 'whoopee' cushions,
- silly string aerosols,
- imitation excrement,
- horns for parties,
- decorative flakes and foams,
- artificial cobwebs,
- stink bombs.

2. Without prejudice to the application of other Community provisions on the classification, packaging and labelling of substances, suppliers shall ensure before the placing on the market that the packaging of aerosol dispensers referred to above is marked visibly, legibly and indelibly with:
'For professional users only'.
3. By way of derogation, paragraphs 1 and 2 shall not apply to the aerosol dispensers referred to Article 8 (1a) of Council Directive 75/324/EEC (2).
4. The aerosol dispensers referred to in paragraphs 1 and 2 shall not be placed on the market unless they conform to the requirements indicated.

List of substances subject to authorisation (REACH, Annex XIV)/SVHC - candidate list

Not listed.

Seveso Directive

2012/18/EU (Seveso III)			
No	**Dangerous substance/hazard categories**	**Qualifying quantity (tonnes) for the application of lower and upper-tier requirements**	**Notes**
	not assigned		

Deco-Paint Directive (2004/42/EC)

VOC content	0 % 0 $^{g}/_{l}$

Directive on industrial emissions (VOCs, 2010/75/EU)

VOC content	0 %
VOC content	0 $^{g}/_{l}$

Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) - Annex II

not listed

Regulation 166/2006/EC concerning the establishment of a European Pollutant Release and Transfer Register (PRTR)

not listed

Water Framework Directive (WFD)

List of pollutants (WFD)

Name of substance	Name acc. to inventory	CAS No	Listed in	Remarks
Manganese	Substances and preparations, or the breakdown products of such, which have been proved to possess carcinogenic or mutagenic properties or properties which may affect steroidogenic, thyroid, reproduction or other endocrine-related functions in or via the aquatic environment		A)	
Manganese	Metals and their compounds		A)	

Legend
A) Indicative list of the main pollutants

Regulation 98/2013/EU on the marketing and use of explosives precursors

not listed

Regulation 111/2005/EC laying down rules for the monitoring of trade between the Community and third countries in drug precursors

not listed

Regulation 1005/2009/EC on substances that deplete the ozone layer (ODS)

not listed

Regulation 649/2012/EU concerning the export and import of hazardous chemicals (PIC)

not listed

National inventories

Country	Inventory	Status
AU	AICS	substance is listed
CA	DSL	substance is listed
CN	IECSC	substance is listed
EU	ECSI	substance is listed
EU	REACH Reg.	substance is listed
KR	KECI	substance is listed
MX	INSQ	substance is listed
NZ	NZIoC	substance is listed
PH	PICCS	substance is listed
TR	CICR	substance is listed
TW	TCSI	substance is listed
US	TSCA	substance is listed

Legend
AICS Australian Inventory of Chemical Substances
CICR Chemical Inventory and Control Regulation
DSL Domestic Substances List (DSL)
ECSI EC Substance Inventory (EINECS, ELINCS, NLP)
IECSC Inventory of Existing Chemical Substances Produced or Imported in China
INSQ National Inventory of Chemical Substances
KECI Korea Existing Chemicals Inventory

Legend

NZIoC	New Zealand Inventory of Chemicals
PICCS	Philippine Inventory of Chemicals and Chemical Substances (PICCS)
REACH Reg.	REACH registered substances
TCSI	Taiwan Chemical Substance Inventory
TSCA	Toxic Substance Control Act

15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
2017/164/EU	Commission Directive establishing a fourth list of indicative occupational exposure limit values pursuant to Council Directive 98/24/EC, and amending Commission Directives 91/322/EEC, 2000/39/EC and 2009/161/EU
ADN	Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures (European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways)
ADR	Accord européen relatif au transport international des marchandises dangereuses par route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
ADR/RID/ADN	European Agreements concerning the International Carriage of Dangerous Goods by Road/Rail/Inland Waterways (ADR/RID/ADN)
BCF	Bioconcentration factor
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
Ceiling-C	Ceiling value
CLP	Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures
DGR	Dangerous Goods Regulations (see IATA/DGR)
EC50	Effective Concentration 50 %. The EC50 corresponds to the concentration of a tested substance causing 50 % changes in response (e.g. on growth) during a specified time interval
EC No	The EC Inventory (EINECS, ELINCS and the NLP-list) is the source for the seven-digit EC number, an identifier of substances commercially available within the EU (European Union)
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
EmS	Emergency Schedule
ErC50	≡ EC50: in this method, that concentration of test substance which results in a 50 % reduction in either growth (EbC50) or growth rate (ErC50) relative to the control
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
ICAO-TI	Technical instructions for the safe transport of dangerous goods by air
IMDG	International Maritime Dangerous Goods Code
IMDG-Code	International Maritime Dangerous Goods Code

Abbr.	Descriptions of used abbreviations
IOELV	Indicative occupational exposure limit value
LC50	Lethal Concentration 50%: the LC50 corresponds to the concentration of a tested substance causing 50 % lethality during a specified time interval
LD50	Lethal Dose 50 %: the LD50 corresponds to the dose of a tested substance causing 50 % lethality during a specified time interval
NLP	No-Longer Polymer
PBT	Persistent, Bioaccumulative and Toxic
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
S.I. No. 619 of 2001	Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001
STEL	Short-term exposure limit
SVHC	Substance of Very High Concern
TWA	Time-weighted average
VOC	Volatile Organic Compounds
vPvB	Very Persistent and very Bioaccumulative

Key literature references and sources for data

Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures. Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU.

Transport of dangerous goods by road, rail and inland waterway (ADR/RID/ADN). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

List of relevant phrases (code and full text as stated in chapter 2 and 3)

Code	Text
H228	Flammable solid.

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

SAFETY DATA SHEET

Version 6.3
Revision Date 08/31/2021
Print Date 06/18/2022

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Mercury

Product Number : 215457
Brand : SIGALD
Index-No. : 080-001-00-0
CAS-No. : 7439-97-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Inhalation (Category 2), H330
Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - repeated exposure (Category 1), H372
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Hazard statement(s)

H330	Fatal if inhaled.
H360	May damage fertility or the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Hg
Molecular weight	:	200.59 g/mol
CAS-No.	:	7439-97-6
EC-No.	:	231-106-7
Index-No.	:	080-001-00-0

Component	Classification	Concentration
mercury		
	Acute Tox. 2; Repr. 1B; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H330, H360, H372, H400, H410 M-Factor - Aquatic Acute: 1 - Aquatic Chronic: 100	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Consult a physician. Show this material safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Mercury/mercury oxides.
Not combustible.

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal. In some instances, a mercury spill kit may be used. Please consult with your site EHS representative to determine the most appropriate clean up method.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.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.

Hygiene measures

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

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 under inert gas.

Storage class

Storage class (TRGS 510): 6.1A: Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
mercury	7439-97-6	C	0.1 mg/m3	USA. NIOSH Recommended Exposure Limits
	Remarks	Potential for dermal absorption		
		CEIL	1.0mg/10m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	0.05 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		Skin notation		
		TWA	0.025 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		Kidney damage Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Not classifiable as a human carcinogen Danger of cutaneous absorption		
		TWA	0.05 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for dermal absorption		

8.2 Exposure controls

Appropriate engineering controls
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 EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, 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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Color: silver, white
b)	Odor	odorless
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -38.87 °C (-37.97 °F) - lit.
f)	Initial boiling point and boiling range	356.6 °C 673.9 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	< 0.01 hPa at 20 °C (68 °F) 1 hPa at 126 °C(259 °F)
l)	Vapor density	6.93 - (Air = 1.0)
m)	Density	13.55 g/cm3 at 25 °C (77 °F)
	Relative density	No data available
n)	Water solubility	0.00006 g/l at 25 °C (77 °F)
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapor density	6.93 - (Air = 1.0)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Ammonia, Azides, Nitrates, Chlorates, Copper

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Oral: No data available
LC50 Inhalation - Rat - male - 2 h - < 27 mg/m3
Dermal: No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
Presumed human reproductive toxicant

Specific target organ toxicity - single exposure
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.**Aspiration hazard**
No data available

11.2 Additional Information

RTECS: OV4550000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	mortality LC50 - Cyprinus carpio (Carp) - 0.160 mg/l - 96 h

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Bioaccumulation	Carassius auratus (goldfish) - 1,789 d - 0.25 µg/l(mercury) Bioconcentration factor (BCF): 155,986

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 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

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 14: Transport information

DOT (US)
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: Mercury
Reportable Quantity (RQ): 1 lbs
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 2809 Class: 8 (6.1) Packing group: III EMS-No: F-A, S-B
Proper shipping name: MERCURY
Marine pollutant : yes

IATA
UN number: 2809 Class: 8 (6.1) Packing group: III
Proper shipping name: Mercury

SECTION 15: Regulatory information

SARA 302 Components
This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
mercury	7439-97-6	2015-11-23

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

Reportable Quantity : D009 lbs

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.3 Revision Date: 08/31/2021 Print Date: 06/18/2022

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.8
Revision Date 09/07/2024
Print Date 09/08/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Nickel

Product Number : 268283
Brand : Aldrich
Index-No. : 028-002-01-4
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

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Skin sensitization (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), Lungs, H372

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Short-term (acute) aquatic hazard (Category 3), H402
Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word Danger

Hazard Statements

H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs (Lungs) through prolonged or repeated exposure if inhaled.
H412	Harmful to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P272	Contaminated work clothing must not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
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

SECTION 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.	:	028-002-01-4

Component	Classification	Concentration
nickel powder; [particle diameter < 1 mm]		
	Skin Sens. 1; Carc. 2;	<= 100 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; H317, H351, H372, H402, H412	

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Nickel/nickel oxides
Not combustible.
Ambient fire may liberate hazardous vapours.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Handle and store under inert gas.

Storage class
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
nickel powder; [particle diameter < 1 mm]	7440-02-0	TWA	1.5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not suspected as a human carcinogen		
		PEL	0.5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.015 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
nickel powder; [particle diameter < 1 mm]	7440-02-0	Nickel	5 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Nickel	30 µg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift at end of workweek			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Color: gray
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point: 1,455 °C (2,651 °F)
f)	Initial boiling point and boiling range	2,730 °C 4,946 °F
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	1 hPa at 1,810 °C (3,290 °F)
l)	Vapor density	No data available
m)	Density	8.9 g/cm3 at 25 °C (77 °F) - lit.
	Relative density	No data available
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
acids, Oxidizing agents, Sulfur compounds, Hydrogen gas, Oxygen, Methanol, organic solvents, Aluminum, Fluorine, Ammonia

10.6 Hazardous decomposition products
In the event of fire: see section 5

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - male and female - > 9,000 mg/kg
(OECD Test Guideline 401)
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation - 4 h
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available
Test Type: gene mutation test
Test system: Chinese hamster fibroblasts
Metabolic activation: without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Micronucleus test
Test system: Chinese hamster fibroblasts
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 487
Result: negative

Carcinogenicity
Suspected of causing cancer.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

1 - Group 1: Carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

2B - Group 2B: Possibly carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

IARC: 2B - Group 2B: Possibly carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

1 - Group 1: Carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

2B - Group 2B: Possibly carcinogenic to humans (nickel powder; [particle diameter < 1 mm])

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

NTP: RAHC - Reasonably anticipated to be a human carcinogen (nickel powder; [particle diameter < 1 mm])

RAHC - Reasonably anticipated to be a human carcinogen (nickel powder; [particle diameter < 1 mm])

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Inhalation - Causes damage to organs through prolonged or repeated exposure.
- Lungs

Aspiration hazard
No data available

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 728 d - NOAEL (No observed adverse effect level) - 2.2 mg/kg - LOAEL (Lowest observed adverse effect level) - 6.7 mg/kg

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Oncorhynchus mykiss (rainbow trout) - 15.3 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test LC50 - Ceriodaphnia dubia (water flea) - 0.074 mg/l - 48 h Remarks: (ECHA)
Toxicity to algae	static test EC50 - Pseudokirchneriella subcapitata (green algae) - > 81.5 - 148 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to daphnia and other aquatic	semi-static test EC10 - Ceriodaphnia dubia (water flea) - > 2.8 - 53.6 µg/l - 7 d

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

invertebrates(Chronic toxicity) (US-EPA)

12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (nickel powder; [particle diameter < 1 mm])
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG
Not dangerous goods

IATA
Not dangerous goods

Further information
Not classified as dangerous in the meaning of transport regulations.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

CERCLA Reportable Quantity

This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know

nickel powder; [particle diameter < 1 mm] 7440-02-0

Maine Chemicals of High Concern

nickel powder; [particle diameter < 1 mm] 7440-02-0

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including nickel powder; [particle diameter < 1 mm], which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The ingredients of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.8 Revision Date: 09/07/2024 Print Date: 09/08/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Revision Date 24-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Sodium Metal**

Cat No. : **S135-1LB; S206-1LB**

Synonyms Natrium.

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Substances/mixtures which, in contact with water, emit flammable gases	Category 1
Skin Corrosion/Irritation	Category 1 B
Serious Eye Damage/Eye Irritation	Category 1
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	

Label Elements

Signal Word
Danger

Hazard Statements
In contact with water releases flammable gases which may ignite spontaneously
Causes severe skin burns and eye damage
May cause respiratory irritation

Precautionary Statements
Prevention
Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Keep away from any possible contact with water, because of violent reaction and possible flash fire
Handle under inert gas. Protect from moisture
Response
Immediately call a POISON CENTER or doctor/physician
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
Wash contaminated clothing before reuse
Brush off loose particles from skin. Immerse in cool water/wrap with wet bandages
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
IF SWALLOWED: Rinse mouth. 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
Store in a dry place. Store in a closed container
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Reacts violently with water

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Sodium	7440-23-5	100

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required. Keep eye wide open while rinsing.

Skin Contact Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Call a physician immediately.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Call a physician or poison control center immediately. Do not use mouth-to-mouth method if victim ingested or inhaled

	the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Ingestion	Immediate medical attention is required. Do NOT induce vomiting. Drink plenty of water. Never give anything by mouth to an unconscious person.
Most important symptoms and effects	Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	CO_2, dry chemical, dry sand, alcohol-resistant foam. approved class D extinguishers.
Unsuitable Extinguishing Media	Water may be ineffective
Flash Point	Not applicable
Method -	No information available
Autoignition Temperature	115 °C / 239 °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
The product causes burns of eyes, skin and mucous membranes. Reacts violently with water.

Hazardous Combustion Products
Hydrogen.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	3	2	W

6. Accidental release measures

Personal Precautions	Use personal protective equipment as required. Evacuate personnel to safe areas. Avoid contact with skin, eyes or clothing. No special precautions required.
Environmental Precautions	Should not be released into the environment. Do not allow material to contaminate ground water system. See Section 12 for additional Ecological Information.
Methods for Containment and Clean Up	Sweep up and shovel into suitable containers for disposal. Avoid dust formation. Do not expose spill to water. Pick up and transfer to properly labelled containers.

7. Handling and storage

Handling	Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe dust. Do not ingest. If swallowed then seek immediate medical assistance. Do not allow contact with water.
Storage.	Corrosives area. Keep away from water or moist air. Keep in a dry place. Keep away from acids. Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures None under normal use conditions. 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 No special protective equipment required.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Light grey
Odor	Odorless
Odor Threshold	No information available
pH	
Melting Point/Range	98 °C / 208.4 °F
Boiling Point/Range	883 °C / 1621.4 °F
Flash Point	Not applicable
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1 mmHg @ 440 °C
Vapor Density	Not applicable
Specific Gravity	0.9684 @ 20°C
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	115 °C / 239 °F
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Na
Molecular Weight	22.99

10. Stability and reactivity

Reactive Hazard Yes

Stability Stable under normal conditions.

Conditions to Avoid Exposure to moist air or water. Exposure to moisture.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Hydrogen

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing. Reacts violently with water.

11. Toxicological information

Acute Toxicity

Product Information
Component Information
Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization 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
Sodium	7440-23-5	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Respiratory system
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

.

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	UN1428
Proper Shipping Name	SODIUM
Hazard Class	4.3
Packing Group	I

TDG Forbidden

IATA

UN-No	UN1428
Proper Shipping Name	SODIUM
Hazard Class	4.3
Packing Group	I

IMDG/IMO

UN-No	UN1428
Proper Shipping Name	SODIUM
Hazard Class	4.3
Packing Group	I

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Sodium	7440-23-5	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Sodium	7440-23-5	X	-	231-132-9	X	X	X	X	X	KE-31338

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Sodium	X	10 lb	-	-

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

Component	Hazardous Substances RQs	CERCLA EHS RQs
Sodium	10 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Sodium	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Sodium	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Sodium	7440-23-5	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Sodium	7440-23-5	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

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

Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Revision Date 26-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Selenium**

Cat No. : **AC419270000; AC419271000; AC419275000**

CAS No 7782-49-2
Synonyms None

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 3
Acute Inhalation Toxicity - Dusts and Mists	Category 3
Specific target organ toxicity - (repeated exposure)	Category 2

Label Elements

Signal Word
Danger

Hazard Statements
May cause damage to organs through prolonged or repeated exposure
Toxic if swallowed or if inhaled

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Response
Get medical attention/advice if you feel unwell
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
May cause long lasting harmful effects to aquatic life

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Selenium	7782-49-2	> 99.5

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects None reasonably foreseeable.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point No information available
Method - No information available

Autoignition Temperature Not applicable
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Dust can form an explosive mixture with air.

Hazardous Combustion Products
None known.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. Avoid dust formation. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.
Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Sweep up and shovel into suitable containers for disposal. Avoid dust formation.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Avoid dust formation. Use only under a chemical fume hood. Do not breathe (dust, vapor, mist, gas). Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Keep under nitrogen. Incompatible Materials. Acids. Strong oxidizing agents. Fluorine. oxygen. Metals.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Selenium	TWA: 0.2 mg/m³	(Vacated) TWA: 0.2 mg/m³	IDLH: 1 mg/m³ TWA: 0.2 mg/m³	TWA: 0.2 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection A NIOSH/MSHA approved air purifying dust or mist respirator or European Standard EN 149.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid Granules
Appearance	Dark grey
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	217 - 222 °C / 422.6 - 431.6 °F
Boiling Point/Range	685 °C / 1265 °F
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	1 mmHg @ 345 °C
Vapor Density	Not applicable
Specific Gravity	4.810
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Se
Molecular Weight	78.96

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Acids, Strong oxidizing agents, Fluorine, oxygen, Metals

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Selenium	LD50 = 6700 mg/kg (Rat)	Not listed	>5.67 mg/l (Rat) 4hr

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Selenium	7782-49-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Selenium	Not listed	LC50: > 100 mg/L, 96h semi-static (Oncorhynchus mykiss)	Not listed	Not listed

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	UN3283
Hazard Class	6.1
Packing Group	III

TDG

UN-No	UN3283
Hazard Class	6.1
Packing Group	III

IATA

UN-No	UN3283
Proper Shipping Name	SELENIUM COMPOUND, SOLID, N.O.S.
Hazard Class	6.1
Packing Group	III

IMDG/IMO

UN-No	UN3283
Proper Shipping Name	SELENIUM COMPOUND, SOLID, N.O.S.
Hazard Class	6.1
Packing Group	III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Selenium	7782-49-2	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Selenium	7782-49-2	X	-	231-957-4	X	X		X	X	KE-30924

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Selenium	7782-49-2	> 99.5	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Selenium	-	-	X	X

Clean Air Act

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Selenium	100 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Selenium	X	X	X	X	X

U.S. Department of Transportation
Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Selenium	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Selenium	7782-49-2	Not applicable	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Selenium	7782-49-2	Not applicable	Not applicable	Not applicable	Annex I - Y25

16. Other information

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

Revision Date 26-Dec-2021
Print Date 26-Dec-2021

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

ZINC METAL
SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identity: Zinc Metal

Trade Names and Synonyms: High Grade Zinc; Special High Grade Zinc; Zinc, Zn, CGG Alloy <1% Aluminum.

Manufacturer:
Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:
In U.S.:
Teck American Metal Sales Incorporated
501 North Riverpoint Blvd, Suite 300
Spokane, WA
USA, 99202

Other than U.S.:
Teck Metals Ltd.
#1700 – 11 King Street West
Toronto, Ontario
M5H 4C7

Preparer:
Teck Metals Ltd.
Suite 3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of Last Review: July 15, 2015.

Date of Last Edit: July 15, 2015.

Product Use: Zinc metal is used to coat steel for corrosion protection (galvanizing, electroplating, electrogalvanizing), as an alloying element in bronze, brass, aluminum and other metal alloys, for zinc die casting alloys, for zinc dry cell and zinc/air batteries, for the production of zinc sheet for architectural and coinage applications, as a reducing agent in organic chemistry and for other chemical applications.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

NOTE: In the form in which it is sold this product is not regulated as a Hazardous Product in the U.S. or Canada. This Safety Data Sheet is provided for information purposes only.

Health		Physical	Environmental
Acute Toxicity (Oral, Inhalation)	– Does not meet criteria	Does not meet criteria for any Physical Hazard	Aquatic Toxicity – (Short Term/Long Term) Does not meet any criteria
Skin Corrosion/Irritation	– Does not meet criteria		
Eye Damage/Eye Irritation	– Does not meet criteria		
Respiratory or Skin Sensitization	– Does not meet criteria		
Mutagenicity	– Does not meet criteria		
Carcinogenicity	– Does not meet criteria		
Reproductive Toxicity	– Does not meet criteria		
Specific Target Organ Toxicity:			
Acute Exposure	– Does not meet criteria		
Chronic Exposure	– Does not meet criteria		

LABEL:

Symbols: None required	**Signal Word:** None required
Hazard Statements	**Precautionary Statements:**
None required	None required

Emergency Overview: A lustrous bluish-silver metal that does not burn in bulk but may form explosive mixtures if dispersed in air as a fine powder. Zinc oxide fume is formed when zinc metal is heated to or near the boiling point, or is burned. Contact with acids or alkalis generates flammable hydrogen gas which can accumulate in poorly ventilated areas. Do NOT use water or foam on burning zinc metal. Apply dry chemical, sand or special powder extinguishing media. Zinc is relatively non-toxic and poses little immediate hazard to the health of emergency response personnel or to the environment in an emergency situation.

Potential Health Effects: Zinc is essentially non-toxic to humans. However, zinc oxide fumes may cause mild local irritation to eyes, nose, throat and upper airways. Acute over-exposure to zinc oxide fume may cause metal fume fever, characterized by flu-like symptoms such as chills, fever, nausea, and vomiting which may be delayed 3 – 10 hours in onset. In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. Zinc is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU (see Toxicological Information, Section 11).

Potential Environmental Effects: Zinc metal has relatively low bioavailability and poses no immediate ecological risks. Depending on physico-chemical characteristics (e.g., pH, water hardness), compounds of zinc metal can be toxic, particularly in the aquatic environment. Zinc also has the potential to bioaccumulate in plants and animals in both aquatic and terrestrial environments (see Ecological Information, Section 12).

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENTS	CAS Registry No.	CONCENTRATION (% wgt/wgt)
Zinc	7440-66-6	99+%

Note: See Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Mild eye irritation, redness. Do not rub eye(s). Let the eye(s) water naturally for a few minutes. Look right and left, then up and down. If particle/dust does not come out, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If eye irritation persists, get medical advice/attention. DO NOT attempt to manually remove anything from the eye.

Skin Contact: *Symptoms:* Soiling of skin. No health effects expected. If irritation does occur, rinse with lukewarm, gently flowing water for 5 minutes or until the product is removed. If skin irritation occurs or you feel unwell, get medical advice/attention. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: *Symptoms:* Coughing and irritation in heavy dust clouds. If symptoms are experienced remove source of contamination or move victim from exposure area to fresh air immediately and obtain medical advice. NOTE: Metal fume fever may develop 3-10 hours after exposure to zinc oxide fumes. If symptoms of metal fume fever (flu-like symptoms) develop, obtain medical attention.

Ingestion: *Symptoms:* Stomach upset, nausea, diarrhea. If swallowed, no specific intervention is indicated as this material is not likely to be hazardous by ingestion. However, if you are concerned or you feel unwell, obtain medical advice.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is difficult to ignite and is not considered a serious fire hazard. However, finely-divided metallic dust may form flammable or explosive dust clouds when dispersed in the air at high concentrations and exposed to heat, flame, or other ignition sources. Bulk dust in a damp state may heat spontaneously and ignite on exposure to air. Contact with acids and alkali hydroxides results in evolution of hydrogen gas which is potentially explosive. Mixtures with potassium chlorate or fused ammonium nitrate may explode on impact.

Extinguishing Media: Apply dry chemical, dry sand, or special powder extinguishing (Class D) media. Do NOT use water, carbon dioxide or foam on molten metals. Water may be ineffective for extinguishing a fire but should be used to keep fire-exposed billets, ingots and castings cool.

Fire Fighting: If possible, move material not yet involved in the fire from the fire area. If this is not possible, cool fire-exposed zinc by applying hose streams or fogs. Apply only dry chemical, sand, or special powder extinguishing media to any molten or burning zinc metal. Take extreme caution to prevent contact of water with molten or burning zinc. Zinc foil in particular may ignite in the presence of water. Zinc oxide fumes may evolve in fires. Fire fighters should be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of release if possible to do so safely. Clean up spilled material immediately observing precautions in Section 8, Personal Protection. Molten metal should be allowed to cool and harden before cleanup. Once solidified wear gloves, pick up and return to process. Powder or dust should be cleaned up by sweeping/shoveling, etc. Solid metal is recyclable. Return uncontaminated spilled material to the process if possible. Place contaminated material in clean, dry,

suitably labelled containers for later recovery or disposal. Treat or dispose of waste material in accordance with all local, state/provincial, and national requirements.

Personal Precautions: Protective clothing, gloves, and a respirator are recommended for persons responding to an accidental release (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with zinc dust and fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash.

Environmental Precautions: Zinc metal has relatively low bioavailability and poses no immediate ecological risks. Depending on physico-chemical characteristics (e.g., pH, water hardness), compounds of zinc metal can be toxic, particularly in the aquatic environment. Zinc also has the potential to bioaccumulate in plants and animals in both aquatic and terrestrial environments. Releases of the product to water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store zinc in a DRY covered area, separate from incompatible materials. Zinc ingots suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Ingots may contain cavities that collect moisture. Entrained moisture will expand explosively when immersed in a molten bath.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines: *(Time-Weighted Average (TWA) concentration over 8 hr unless otherwise indicated)*

Component	ACGIH TLV	OSHA PEL	NIOSH REL
Zinc	None established†	None established†	None established†

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction.

ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

† NOTE: While there is no established OEL for zinc as such, there are OELs for zinc oxide which may be formed during burning, welding or other fuming processes.

The OSHA PEL final rule limits for zinc oxide dust are 10 mg/m^3 (total) and 5 mg/m^3 (respirable); the OSHA PEL final rule limit for zinc oxide fume is 5 mg/m^3. Note that the OSHA PEL final rule limits are currently non-enforceable due to a court decision. The OSHA PEL transitional limits therefore remain in force at present. They are 15 mg/m^3 (total) and 5 mg/m^3 (respirable) while the transitional PEL for zinc oxide fume is 5 mg/m^3. The ACGIH TLV for zinc oxide is 2 mg/m^3 (respirable fraction) with a Short Term Exposure Limit (STEL) of 10 mg/m^3 (respirable fraction). The NIOSH REL for zinc oxide (dust or fume) is 5 mg/m^3 10 hr TWA with a 15 mg/m^3 ceiling limit (15 minute sample) for zinc oxide dust and a 10 mg/m^3 STEL for zinc oxide fume (15 minute sample).

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentration of zinc oxide fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Where metallic particles of zinc are being collected and transported by a ventilation system, use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Locate dust collectors and fans outdoors if possible and provide dust collectors with explosion vents or blow out panels. Refer to appropriate NFPA Standards 484, 654, and/or 68 for specific guidance.

Protective Clothing: Gloves and coveralls, shop coat or other work clothing are recommended to prevent prolonged or repeated direct skin contact when zinc is processed. Eye protection should be worn where fume or dust is generated. Respiratory protection may be required where zinc oxide fume is generated. Where hot or molten metal is handled, heat-resistant gloves, face shield, and clothing to protect from hot metal splash should be worn. Safety type boots are recommended.

Respirators: Where zinc oxide dust or fumes are generated and cannot be controlled to within acceptable levels, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-95 particulate filter cartridge).

General Hygiene Considerations: Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate designated areas. No special packaging materials are required.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Bluish-silver lustrous metal	**Odour:** None	**Odour Threshold:** None	**pH:** Not Applicable
Vapour Pressure: 1 mm at 487ºC Negligible at 20ºC	**Vapour Density:** Not Applicable	**Melting Point/Range:** 420º C	**Boiling Point/Range:** 908º C
Relative Density (Water = 1)**:** 7.1	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Log P (oct) = -0.47 (estimated)	**Solubility:** Insoluble in Water (0.2 mg/l @ pH 7)
Flash Point: Not Applicable.	**Flammable Limits (LEL/UEL):** LEL (Zinc Dust): 500 g/m^3; UEL Not Determined.	**Auto-ignition Temperature:** Approx 680ºC (dust cloud in air), Approx 460ºC (dust layer).	**Decomposition Temperature:** Oxidation starts approx 450°C

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur. Zinc metal slowly becomes covered with a white coating of a hydrated basic zinc carbonate on exposure to moist air. Fine, condensed zinc dust or powder may heat spontaneously and ignite on exposure to air when damp. Zinc metal will react with acids and strong alkalis to generate hydrogen gas. A violent, explosive reaction may occur when powdered zinc is heated with sulphur. Powdered zinc will become incandescent or ignite in the presence of fluorine, chlorine, bromine or interhalogens (e.g., chlorine trifluoride). Powdered zinc can also react explosively with halogenated hydrocarbons if heated. Mixtures with potassium chlorate or fused ammonium nitrate may explode on impact.

Incompatibilities: Contact with acids and alkalis will generate highly flammable hydrogen gas. Contact with acidic solutions of arsenic and antimony compounds may evolve highly toxic ARSINE or STIBINE gas. Incompatible with strong oxidizing agents such as chlorine, fluorine, bromine, sodium, potassium or barium peroxide, sodium or potassium chlorate, chromium trioxide and fused ammonium nitrate. Also incompatible with elemental sulphur dust, halogenated hydrocarbons or chlorinated solvents, chlorinated rubber, and ammonium sulphide or calcium disulphide.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting, electric arc welding or overheating a molten bath will generate zinc oxide fume which, on inhalation in sufficient quantity, can produce metal fume fever, a transient influenza-like illness.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Zinc, especially in the metal form, is relatively non-toxic. However, it can react with other materials, such as oxygen or acids, to form compounds that can be potentially toxic. The primary route of exposure would be through the generation and inhalation of zinc oxide fume.

Acute:
Skin/Eye: In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. Zinc metal is not chemically irritating to the eyes.

Inhalation: If excessive quantities of zinc oxide fume are inhaled, it can result in the condition called metal fume fever. The symptoms of metal fume fever will occur within 3 to 10 hours, and include immediate dryness and irritation of the throat, tightness of the chest and coughing, which may later be followed by flu-like symptoms of fever, malaise, perspiration, frontal headache, muscle cramps, low back pain, occasionally blurred vision, nausea, and vomiting. The symptoms are temporary and generally disappear, without medical intervention, within 24 to 48 hours of onset. There are no recognized complications, after affects, or chronic affects that result from this condition.

Ingestion: Zinc is not expected to be harmful if ingested. When ingested in excessive quantities, zinc can irritate the stomach resulting in nausea, vomiting, abdominal pain and diarrhea. Ingestion is not a typical route of occupational exposure.

Chronic:
There is no chronic form of metal fume fever but in rare instances an acute incident may be followed by complaints such as bronchitis or pneumonia. Some workers may develop a short-term immunity (resistance) so that repeated exposure to zinc oxide fumes does not cause metal fume fever. This immunity (resistance) however is quickly lost after short absences from work (weekends or vacations). Workers exposed to finely-divided metallic zinc for up to 35 years revealed no acute or chronic illnesses

attributable to zinc. Prolonged or repeated skin contact with zinc dust or powder may cause dryness, irritation and cracking (dermatitis) since zinc is astringent and may tend to draw moisture from the skin. Zinc is not listed as a human carcinogen by the Occupational Safety and Health Administration (OSHA), the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), the American Conference of Governmental Industrial Hygienists (ACGIH) or the European Union (EU).

Animal Toxicity:

Ingredient:	Acute Oral Toxicity:	Acute Dermal Toxicity:	Acute Inhalation Toxicity:
Zinc	>5,000 mg/kg†	No data	No data

† LD_{50}, Mouse, Oral,

SECTION 12. ECOLOGICAL INFORMATION

Zinc metal is relatively insoluble; however, processing of the product or extended exposure in aquatic and terrestrial environments may lead to the release of zinc compounds in bioavailable forms. Zinc is highly mobile, and can be toxic in the aquatic environment with water hardness, pH and dissolved organic carbon content being major regulating factors. Zinc also has the potential to bioaccumulate in plants and animals in both aquatic and terrestrial environments. In soils, zinc is moderately mobile in accordance with soil properties (e.g., cation exchange capacity, pH, redox potential, chemical species); these properties also influence its bioavailability to terrestrial plants.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME ..... Not applicable – not regulated.
U.S. DOT AND TRANSPORT CANADA HAZARD CLASSIFICATION .... Not applicable
U.S. DOT AND TRANSPORT CANADA PID ..... Not applicable
MARINE POLLUTANT..... No
IMO CLASSIFICATION ..... Not regulated

SECTION 15. REGULATORY INFORMATION

U.S.
INGREDIENTS LISTED ON TSCA INVENTORY..... Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD..... No

CERCLA SECTION 103 HAZARDOUS SUBSTANCES ..... Zinc.....Yes ..... RQ: 1,000 lb. (454 kg.)*
* reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE ..... No

EPCRA SECTION 311/312 HAZARD CATEGORIES ..... No Hazard Categories Apply

EPCRA SECTION 313 TOXIC RELEASE INVENTORY:..... This product does not contain any toxic chemicals subject to the Toxic Release reporting requirements. However, potential by-products from working with this product - "Zinc (Fume or Dust)" CAS 7440-66-6 are reportable.

SECTION 16. OTHER INFORMATION

Date of Original Issue: July 23, 1997 **Version:** 01 *(First edition)*

Date of Latest Revision: July 15, 2015 **Version:** 14

The information in this Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, 7th Edition plus updates.

- American Conference of Governmental Industrial Hygienists, 2015, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2015, Guide to Occupational Exposure Values.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition (P. G. Urben, Ed), 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) Hamilton, ON, CHEMINFO Record No. 239 – Zinc Metal.
- European Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH).
- Health Canada, SOR/2015-17, Hazardous Products Regulations, 30 January 2015.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – present, (multi-volume work), World Health Organization, Geneva.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, 13th Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank (on-line version).
- Oak Ridge National Laboratory, Oak Ridge, Tennessee – Toxicity Summary for Zinc and Zinc Compounds, April 1992.
- Patty's Toxicology, 5th Edition, 2001 E. Bingham, B. Cohrssen & CH Powell (Eds.).
- U.S. Dept. of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 13th Report on Carcinogens, October 2014.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards (on-line edition).
- U.S. Dept. of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Zinc - August 2005.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances (RTECS), CCOHS on-line version.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck American Metal Sales Incorporated and Teck Metals Ltd. extend no warranty and assume no responsibility for the accuracy of the content and expressly disclaim all liability for reliance thereon. This safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

1.1 Product identifier

Product name **POLYCHLORINATED BIPHENYLS (PCB)**
Synonym(s) CHLOREXTOL • CHLORINATED BIPHENYL • MONTAR • PCB • PHENOCHLOR

1.2 Uses and uses advised against

Use(s) INSULATION • PLASTICISER • TRANSFORMER LUBRICANT

1.3 Details of the supplier of the safety data sheet

Supplier name **GENERIC REPORT - FOR REFERENCE PURPOSES ONLY**
Address PO Box 21, West Perth, WA, Australia, 6872
Telephone (08) 9322 1711
Fax (08) 9322 1794
Email Not supplied
Website Not supplied

1.4 Emergency telephone number(s)

Emergency (08) 9322 1711

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA
GHS Classification(s) Specific Target Organ Systemic Toxicity (Repeated Exposure): Category 2
Aquatic Toxicity (Chronic): Category 1

2.2 Label elements

Signal word **WARNING**
Pictograms

Hazard statement(s)
H373 May cause damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.
Prevention statement(s)
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P273 Avoid release to the environment. This statement does not apply where this is the intended use.
Response statement(s)
P314 Get medical advice/attention if you feel unwell.
P391 Collect spillage.
Disposal statement(s)
P501 Dispose of contents/container in accordance with relevant regulations.

2.3 Other Hazards

No information provided.

3. COMPOSITION/ INFORMATION ON INGREDIENTS

3.1 Substances / Mixtures

Ingredient	CAS number	EC number	Content
POLYCHLORINATED BIPHENYLS (PCB)	1336-36-3	215-648-1	100%

4. FIRST AID MEASURES

Product name **POLYCHLORINATED BIPHENYLS (PCB)**

4.1 Description of first aid measures

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. To protect rescuer, use a Type A (Organic vapour) respirator or an Air-line respirator (in poorly ventilated areas). Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.
First aid facilities	No information provided.

4.2 Most important symptoms and effects, both acute and delayed

No information provided.

4.3 Immediate medical attention and special treatment needed

Treat symptomatically.

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Dry agent, carbon dioxide or foam. Prevent contamination of drains and waterways.

5.2 Special hazards arising from the substance or mixture

Combustible. May evolve toxic gases (carbon oxides, dibenzofurans, dioxins, hydrogen chloride, phenols, chlorides, hydrocarbons) when heated to decomposition.

5.3 Advice for firefighters

Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

5.4 Hazchem code

2X

2	Water Fog (or fine water spray if fog unavailable)
X	Full protective clothing including Self Contained Breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear Personal Protective Equipment (PPE) as detailed in section 8 of the SDS. Contact emergency services where appropriate.

6.2 Environmental precautions

Prevent product from entering drains and waterways.

6.3 Methods of cleaning up

Contain spillage, then cover / absorb spill with non-combustible absorbent material (vermiculite, sand, or similar), collect and place in suitable containers for disposal. Only trained personnel should undertake clean up.

6.4 Reference to other sections

See Sections 8 and 13 for exposure controls and disposal.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

7.2 Conditions for safe storage, including any incompatibilities

Store in segregated, locked and signposted compound with bunded floor. Drums may be plastic lined. Ensure area is cool, dry, well ventilated removed from direct sunlight, incompatible substances, heat or ignition sources and foodstuffs. Ensure each container is adequately labelled, protected from physical damage & sealed when not in use. Check regularly for leaks or spills.

Product name **POLYCHLORINATED BIPHENYLS (PCB)**

7.3 Specific end use(s)

No information provided.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

8.1 Control parameters

Exposure standards

Substance	Reference	TWA		STEL	
		ppm	mg/m³	ppm	mg/m³
PCBs (42% Chlorine)	SWA (AUS)	--	1	--	2
PCBs (54% Chlorine)	SWA (AUS)	--	0.5	--	1

Biological limits

No biological limit values have been entered for this product.

8.2 Exposure controls

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended. Maintain vapour levels below the recommended exposure standard.

PPE

Eye/Face Wear splash-proof goggles.

Hand Wear viton (R) or neoprene gloves.

Body Wear coveralls.

Respiratory Wear a Type A (Organic vapour) respirator. If using product in a confined area, wear an Air-line respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	VARY FROM OILY LIQUID TO WHITE CRYSTALLINE SOLID AND NON CRYSTALLINE RESIN
Odour	MILD AROMATIC ODOUR
Odour Threshold	NOT AVAILABLE
pH	NOT AVAILABLE
Melting Point	NOT AVAILABLE
Boiling Point	340°C to 375°C
Flash Point	NOT AVAILABLE
Evaporation Rate	NOT AVAILABLE
Flammability	COMBUSTIBLE
Upper Explosion Limit	NOT AVAILABLE
Lower Explosion Limit	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE
Vapour Density	NOT AVAILABLE
Solubility (water)	INSOLUBLE
Partition Coefficient	NOT AVAILABLE
Autoignition Temperature	NOT AVAILABLE
Decomposition Temperature	NOT AVAILABLE
Viscosity	NOT AVAILABLE
Explosive Properties	NOT AVAILABLE
Oxidising Properties	NOT AVAILABLE
Specific Gravity	1.44

9.2 Other information

% Volatiles	NOT AVAILABLE

10. STABILITY AND REACTIVITY

10.1 Reactivity

Carefully review all information in sections 10.2 to 10.6.

10.2 Chemical stability

No information provided.

10.3 Possibility of hazardous reactions

No information provided.

10.4 Conditions to avoid

No information provided.

10.5 Incompatible materials

Incompatible with oxidising agents (e.g. hypochlorites), acids (e.g. nitric acid), alkalis (e.g. sodium hydroxide), heat and ignition sources.

10.6 Hazardous decomposition products

May evolve toxic gases (carbon oxides, dibenzofurans, dioxins, hydrogen chloride, phenols, chlorides, hydrocarbons) when heated to decomposition.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Health hazard summary Toxic. This product has the potential to cause adverse health effects. Use safe work practices to avoid eye or skin contact and inhalation. PCBs are classified as probably carcinogenic to humans (IARC Group 2A). Chronic exposure may result in liver and skin damage. Chronic exposure may result in birth defects. Cumulative poison.

Eye Irritant. Contact may result in irritation, lacrimation, pain and redness.

Inhalation Toxic. Over exposure may result in irritation of the nose and throat, coughing, loss of appetite, nausea and vomiting. Chronic exposure may result in liver damage. PCBs are classified as probably carcinogenic to humans (IARC Group 2A).

Skin Toxic - irritant. Contact may result in irritation, redness, rash, brown-grey pigmentation and chloracne. May be absorbed through skin with harmful effects.

Ingestion Toxic. Ingestion may result in nausea, vomiting, abdominal pain, diarrhoea, dizziness and drowsiness. Chronic exposure may result in liver damage and skin pigmentation.

Toxicity data POLYCHLORINATED BIPHENYLS (PCB) (1336-36-3)
LD50 (Ingestion): 1900 mg/kg (mouse)
LDLo (Skin): 1148 mg/kg/38 days intermittently (rabbit)
TCLo (Inhalation): 0.93 mg/m³/8 hours/20 weeks intermittently (rat)
TDLo (Ingestion): 400 mg/kg (female rat)
TDLo (Intraperitoneal): 700 mg/kg (female rat)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

12.2 Persistence and degradability

No information provided.

12.3 Bioaccumulative potential

No information provided.

12.4 Mobility in soil

No information provided.

12.5 Results of PBT and vPvB assessment

No information provided.

12.6 Other adverse effects

Product name **POLYCHLORINATED BIPHENYLS (PCB)**

Current evidence suggests that the major source of Polychlorinated biphenyls (PCBs) released to the environment is an environmental cycling process of PCBs previously introduced into the environment. This cycling process involves volatilisation from ground surfaces (water, soil) into the atmosphere with subsequent removal from the atmosphere via wet/dry deposition and then revolatilisation. Monochlorinated biphenyls, dichlorinated biphenyls and trichlorinated biphenyls biodegrade relatively rapidly, tetrachlorinated biphenyls biodegrade slowly, & higher chlorinated biphenyls are resistant to biodegradation.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste disposal PCBs may only be disposed of by authorised methods or organisations. Contact your state EPA or the manufacturer for additional information.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

	Land Transport (ADG)	Sea Transport (IMDG/IMO)	Air Transport (IATA/ICAO)
14.1 UN number	2315	-	-
14.2 UN proper shipping name	POLYCHLORINATED BIPHENYLS	-	-
14.3 Transport hazard classes			
DG Class	9	-	-
Subsidiary risk(s)	None Allocated	-	-
14.4 Packing group	II	-	-
14.5 Environmental hazards		None Allocated	
14.6 Special precautions for user			
Hazchem Code	2X		

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Poison schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

Classifications N - Dangerous for the environment
Xn - Harmful

Risk phrases

R33:	Danger of cumulative effects.
R50/53:	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety phrases

S2:	Keep out of reach of children.
S35:	This material and its container must be disposed of in a safe way.
S60:	This material and its container must be disposed of as hazardous waste.
S61:	Avoid release to the environment. Refer to special instructions/safety data sheets.

Inventory listing(s) **AUSTRALIA: AICS (Australian Inventory of Chemical Substances)**
All components are listed on AICS, or are exempt.

15.2 Chemical safety assessment

No information provided.

Product name **POLYCHLORINATED BIPHENYLS (PCB)**

16. OTHER INFORMATION

Additional information

This ChemAlert report is for informational purposes in case of accidental exposure to Polychloinated Biphenyls (PCBs)

IARC - GROUP 2A - PROBABLE HUMAN CARCINOGEN. This product contains an ingredient which has demonstrated sufficient evidence to have been classified by the International Agency for Research into Cancer (IARC) as a probable human carcinogen and whose use should be strictly monitored and controlled.

POLYCHLORINATED BIPHENYLS: The use of PCBs has been banned in industry for some time, however problems may occur due to their use in the past. PCBs have been reported to be present within construction jointing sealants and capacitors. Special precautions are required when handling materials which may contain PCBs. Please consult Risk Management Technologies for further information.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a ChemAlert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

COLOUR RATING SYSTEM: RMT has assigned all ChemAlert reports a colour rating of Green, Amber or Red for the sole purpose of providing users with a quick and easy means of determining the hazardous nature of a product. Safe handling recommendations are provided in all ChemAlert reports so as to clearly identify how users can control the hazards and thereby reduce the risk (or likelihood) of adverse effects. As a general guideline, a Green colour rating indicates a low hazard, an Amber colour rating indicates a moderate hazard and a Red colour rating indicates a high hazard.

While all due care has been taken by RMT in the preparation of the Colour Rating System, it is intended as a guide only and RMT does not provide any warranty in relation to the accuracy of the Colour Rating System. As far as is lawfully possible, RMT accepts no liability or responsibility whatsoever for the actions or omissions of any person in reliance on the Colour Rating System.

Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	EC No - European Community Number
EMS	Emergency Schedules (Emergency Procedures for Ships Carrying Dangerous Goods)
GHS	Globally Harmonized System
GTEPG	Group Text Emergency Procedure Guide
IARC	International Agency for Research on Cancer
LC50	Lethal Concentration, 50% / Median Lethal Concentration
LD50	Lethal Dose, 50% / Median Lethal Dose
mg/m³	Milligrams per Cubic Metre
OEL	Occupational Exposure Limit
PEL	Permissible Exposure Limit
pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm	Parts Per Million
REACH	Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals
STEL	Short-Term Exposure Limit
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
SWA	Safe Work Australia
TLV	Threshold Limit Value

Product name **POLYCHLORINATED BIPHENYLS (PCB)**

TWA Time Weighted Average

Report Status This ChemAlert report has been independently compiled by RMT's scientific department utilising the original Safety Data Sheet ('SDS') for the product provided to RMT by the manufacturer. The information is based on the latest chemical and toxicological research and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. It is an independent collation by RMT of information obtained from the original SDS for this product. Its content has not been authorised or verified by the manufacturer / distributor of the chemical to which it relates.

This ChemAlert report does not constitute the manufacturer's original SDS and is not intended to be a replacement for same. It is provided to subscribers of ChemAlert as a reference tool only, is not all-inclusive and does not represent any guarantee as to the properties of the product. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this ChemAlert report, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this ChemAlert report.

Prepared By

Risk Management Technologies
5 Ventnor Ave, West Perth
Western Australia 6005
Phone: +61 8 9322 1711
Fax: +61 8 9322 1794
Email: info@rmt.com.au
Web: www.rmt.com.au

Last Reviewed: 05 Feb 2013
Date Printed: 27 Apr 2015
Based on SDS dated: 05 Feb 2013

End of Report

SAFETY DATA SHEET

Version 6.6
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 4,4'-DDE

Product Number : 35487
Brand : Sigma-Aldrich
CAS-No. : 72-55-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Oral (Category 1), H372
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word Danger

Hazard Statements

H301	Toxic if swallowed.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene

Formula : $C_{14}H_8Cl_4$
Molecular weight : 318.03 g/mol
CAS-No. : 72-55-9
EC-No. : 200-784-6

Component	Classification	Concentration
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene		
	Acute Tox. 3; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H301, H351, H372, H400,	<= 100 %

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	H410 M-Factor - Aquatic Acute: 100	

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 88.0 - 90.0 °C (190.4 - 194.0 °F)
f)	Initial boiling point and boiling range	No data available
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	< 0.000 hPa
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	log Pow: 6.51
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Strong oxidizing agents, Strong bases

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 87.0 mg/kg
Remarks: The value is given in analogy to the following substances: 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Remarks: No data available

Serious eye damage/eye irritation
Remarks: No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
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: 2A - Group 2A: Probably carcinogenic to humans (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Remarks: No data available
The value is given in analogy to the following substances: 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane
Ingestion - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

11.2 Additional Information

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 0.01 mg/l - 96 h Remarks: The value is given in analogy to the following substances: 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane LC50 - Lepomis macrochirus (Bluegill sunfish) - 0.01 mg/l - 96 h Remarks: The value is given in analogy to the following substances: 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane LC50 - Oncorhynchus mykiss (rainbow trout) - 0.003400 mg/l - 96 h Remarks: The value is given in analogy to the following substances: 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 0.00108 mg/l - 48 h Remarks: The value is given in analogy to the following substances: 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane
Toxicity to fish(Chronic toxicity)	NOEC - Oncorhynchus mykiss (rainbow trout) - 113 mg/l - 3.0 d Remarks: The value is given in analogy to the following substances: 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane

12.2 Persistence and degradability
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.3 Bioaccumulative potential

Bioaccumulation Gambusia affinis (Mosquito fish) - 33 d
- 3.84 µg/l(2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)

Bioconcentration factor (BCF): 12,037

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)

UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: yes Poison Inhalation Hazard: No

IMDG

UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)
Marine pollutant : yes

IATA

UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene)

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene	72-55-9	1	1

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

Components	CAS-No.	Component TPQ (lbs)

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

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Massachusetts Right To Know

No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know

2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene 72-55-9

Pennsylvania Right To Know

2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene 72-55-9

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

New Jersey Right To Know

2,2-bis(p-Chlorophenyl)-1,1-dichloroethylene 72-55-9

The ingredients of this product are reported in the following inventories:

TSCA : Product contains substance(s) not listed on TSCA inventory.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.6 Revision Date: 09/06/2024 Print Date: 09/07/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.10
Revision Date 09/06/2024
Print Date 09/07/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 4,4'-DDT

Product Number : 31041
Brand : Sigma-Aldrich
Index-No. : 602-045-00-7
CAS-No. : 50-29-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Acute toxicity, Dermal (Category 3), H311
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Oral (Category 1), H372

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word Danger

Hazard Statements

H301 + H311	Toxic if swallowed or in contact with skin.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P302 + P352 + P312	IF ON SKIN: Wash with plenty of water.Call a POISON CENTER/ doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane 1,1-Bis(4-chlorophenyl)-2,2,2-trichloroethane
Formula	:	$C_{14}H_9Cl_5$
Molecular weight	:	354.49 g/mol
CAS-No.	:	50-29-3
EC-No.	:	200-024-3
Index-No.	:	602-045-00-7

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Component	Classification	Concentration
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane		
	Acute Tox. 3; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H301, H311, H351, H372, H400, H410 M-Factor - Aquatic Acute: 100 - Aquatic Chronic: 100	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Hydrogen chloride gas
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Storage class
Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans		
		TWA	0.5 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen		
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		PEL	1 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/ range: 107 - 110 °C (225 - 230 °F) - lit.
f)	Initial boiling point and boiling range	260.0 °C 500.0 °F
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

	flammability or explosive limits	
k)	Vapor pressure	0.000002 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	No data available
m)	Density	0.99 g/cm3
	Relative density	No data available
n)	Water solubility	slightly soluble
o)	Partition coefficient: n-octanol/water	log Pow: 6.91 - Potential bioaccumulation
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Oxidizing agents
iron/iron-containing compounds

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 87.0 mg/kg
Remarks: (RTECS)
Inhalation: No data available
LD50 Dermal - Rabbit - 300.0 mg/kg
Remarks: Behavioral:Tremor.
Behavioral:Muscle weakness.
Behavioral:Ataxia.
(RTECS)

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
Suspected of causing cancer.

IARC:	2A - Group 2A: Probably carcinogenic to humans (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
NTP:	RAHC - Reasonably anticipated to be a human carcinogen (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Ingestion - Causes damage to organs through prolonged or repeated exposure.
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Aspiration hazard
No data available

11.2 Additional Information

RTECS: KJ3325000
CNS stimulation., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Pancreas. -

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 0.003400 mg/l - 96.0 h Remarks: (ECOTOX Database) (Regulation (EC) No 1272/2008, Annex VI)
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 0.00108 mg/l - 48 h Remarks: (ECOTOX Database) (Regulation (EC) No 1272/2008, Annex VI)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

Bioaccumulation	Oncorhynchus mykiss (rainbow trout) - 20 d - 0.001 mg/l(1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane) Bioconcentration factor (BCF): 46,670

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 14: Transport information

DOT (US)
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solids, organic, n.o.s. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: yes Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: III EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)
Marine pollutant : yes

IATA
UN number: 2811 Class: 6.1 Packing group: III
Proper shipping name: Toxic solid, organic, n.o.s. (1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane)

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	1	1

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

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

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane 50-29-3

Pennsylvania Right To Know
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane 50-29-3

Maine Chemicals of High Concern

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including 1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

International Regulations

Rotterdam Convention (Prior Informed Consent)	:	1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane
Stockholm Convention (Persistent Organic Pollutants)	:	1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane

The ingredients of this product are reported in the following inventories:

TSCA	:	All substances listed as active on the TSCA inventory

TSCA list

The following substance(s) is/are subject to a Significant New Use Rule:

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3	See 40 CFR § 721.2287; Final Rule

The following substance(s) is/are subject to TSCA 12(b) export notification requirements:

1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	50-29-3

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.10 Revision Date: 09/06/2024 Print Date: 09/07/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.9
Revision Date 09/08/2024
Print Date 09/09/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Dieldrin

Product Number : 33491
Brand : Sigma-Aldrich
Index-No. : 602-049-00-9
CAS-No. : 60-57-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 2), H300
Acute toxicity, Dermal (Category 1), H310
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Oral (Category 1), H372

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word Danger

Hazard Statements

H300 + H310	Fatal if swallowed or in contact with skin.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if swallowed.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust.
P262	Do not get in eyes, on skin, or on clothing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P302 + P350 + P310	IF ON SKIN: Gently wash with plenty of soap and water. Immediately call a POISON CENTER or doctor/ physician.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	1,2,3,4,10,10-Hexachloro-1,4,4a,5,6,7,8,8a-octahydro-6,7-epoxy-1,4:5,8-dimethanonaphthalene
Formula	:	$C_{12}H_8Cl_6O$
Molecular weight	:	380.91 g/mol
CAS-No.	:	60-57-1
EC-No.	:	200-484-5

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Index-No. : 602-049-00-9

Component	Classification	Concentration
Dieldrin		
	Acute Tox. 2; Acute Tox. 1; Carc. 2; STOT RE 1; Aquatic Acute 1; Aquatic Chronic 1; H300, H310, H351, H372, H400, H410 M-Factor - Aquatic Acute: 100 M-Factor - Aquatic Chronic: 10	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Call a physician immediately.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible.

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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Carbon oxides
Hydrogen chloride gas
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1A: Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Dieldrin	60-57-1	TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption		
		TWA	0.25 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen Potential for dermal absorption		
		TWA	0.25 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		PEL	0.25 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
protective clothing

Respiratory protection
Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

e)	Melting point/freezing point	Melting point/ range: 143 - 144 °C (289 - 291 °F) - lit.
f)	Initial boiling point and boiling range	No data available
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	slightly soluble
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Violent reactions possible with:
Strong oxidizing agents

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 38.3 mg/kg
Remarks: (RTECS)
Inhalation: No data available
Acute toxicity estimate Dermal - 5.1 mg/kg
(Expert judgment)
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
Suspected of causing cancer.

IARC:	2A - Group 2A: Probably carcinogenic to humans (Dieldrin)
NTP:	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Ingestion - Causes damage to organs through prolonged or repeated exposure.
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Aspiration hazard
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

11.2 Additional Information

RTECS: IO1750000
Discomfort, Headache, Nausea, Vomiting, Dizziness, Tremors, tonic convulsions, clonic spasms, Coma., respiratory failure
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Blood - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test LC50 - Lepomis cyanellus - 0.011 mg/l - 96 h Remarks: (ECOTOX Database)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 14: Transport information

DOT (US)
UN number: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solids, organic, n.o.s. (Dieldrin)
Reportable Quantity (RQ): 1 lbs
Marine pollutant: yes Poison Inhalation Hazard: No

IMDG
UN number: 2811 Class: 6.1 Packing group: I EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, ORGANIC, N.O.S. (Dieldrin)
Marine pollutant : yes

IATA
UN number: 2811 Class: 6.1 Packing group: I
Proper shipping name: Toxic solid, organic, n.o.s. (Dieldrin)
IATA Passenger: Not permitted for transport

SECTION 15: Regulatory information

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Dieldrin	60-57-1	1	1

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

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

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Massachusetts Right To Know
Dieldrin 60-57-1

Pennsylvania Right To Know
Dieldrin 60-57-1

Maine Chemicals of High Concern
Product does not contain any listed chemicals

Vermont Chemicals of High Concern
Product does not contain any listed chemicals

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including Dieldrin, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

International Regulations

Rotterdam Convention (Prior Informed Consent)	:	Dieldrin
Stockholm Convention (Persistent Organic Pollutants)	:	Dieldrin

The ingredients of this product are reported in the following inventories:

TSCA	:	Product contains substance(s) not listed on TSCA inventory.

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16: Other information

Further information

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.

The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.

Version: 6.9 Revision Date: 09/08/2024 Print Date: 09/09/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Creation Date 06-Mar-2007 **Revision Date** 12-Sep-2023 **Revision Number** 7

1. Identification

Product Name **Perfluoroheptanoic acid**

Cat No. : **AC277270000; AC277270050; AC277270100**

CAS No 375-85-9
Synonyms 2,2,3,3,4,4,5,5,6,6,7,7,7,-Tridecafluoroheptanoic acid

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-227-6701 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No. **US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 4
Skin Corrosion/Irritation	Category 1 B
Serious Eye Damage/Eye Irritation	Category 1
Reproductive Toxicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Respiratory system.	
Specific target organ toxicity - (repeated exposure)	Category 1

Label Elements

Signal Word
Danger

Hazard Statements
Harmful if swallowed
Causes severe skin burns and eye damage
May cause respiratory irritation
May damage the unborn child
Causes damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Response
Immediately call a POISON CENTER or doctor/physician
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
Wash contaminated clothing before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
Ingestion
Rinse mouth
Do NOT induce vomiting
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)
None identified
Other hazards
Contains a known or suspected endocrine disruptor.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Heptanoic acid, tridecafluoro-	375-85-9	<=100

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

	Immediate medical attention is required. Keep eye wide open while rinsing.
Skin Contact	Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Call a physician immediately.
Inhalation	Remove to fresh air. If not breathing, give artificial respiration. Call a physician or poison control center immediately. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Ingestion	Immediate medical attention is required. Do NOT induce vomiting. Drink plenty of water. Never give anything by mouth to an unconscious person.
Most important symptoms and effects	Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Carbon dioxide (CO_2). Dry chemical. Chemical foam. CO_2, dry chemical, dry sand, alcohol-resistant foam.
Unsuitable Extinguishing Media	No information available
Flash Point	> 110 °C / > 230 °F
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
The product causes burns of eyes, skin and mucous membranes.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2). Gaseous hydrogen fluoride (HF).
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
3	1	0	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment as required. Evacuate personnel to safe areas. Avoid contact with skin, eyes or clothing.
Environmental Precautions	Should not be released into the environment. Do not allow material to contaminate ground water system.
Methods for Containment and Clean Up	Sweep up and shovel into suitable containers for disposal. Avoid dust formation.

7. Handling and storage

Handling Do not get in eyes, on skin, or on clothing. Wear personal protective equipment/face protection. Use only under a chemical fume hood. Do not breathe dust. Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep in a dry, cool and well-ventilated place. Keep container tightly closed. Corrosives area. Incompatible Materials. Strong oxidizing agents. Acids.

8. Exposure controls / personal protection

Exposure Guidelines This product does not contain any hazardous materials with occupational exposure limitsestablished by the region specific regulatory bodies.

Engineering Measures 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.

Recommended Filter type: Particulates filter conforming to EN 143.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Light yellow
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	30 °C / 86 °F
Boiling Point/Range	175 °C / 347 °F @ 760 mmHg
Flash Point	> 110 °C / > 230 °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	No information available
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	C7 H F13 O2
Molecular Weight	364.05

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, Acids

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2), Gaseous hydrogen fluoride (HF)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Causes burns by all exposure routes

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
Heptanoic acid, tridecafluoro-	375-85-9	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 Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Endocrine Disruptor Information

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Do not empty into drains.

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN3261
Proper Shipping Name Corrosive solid, acidic, organic, n.o.s.
Technical Name Heptanoic acid, tridecafluoro-
Hazard Class 8
Packing Group II

TDG

UN-No UN3261
Proper Shipping Name Corrosive solid, acidic, organic, n.o.s.
Hazard Class 8
Packing Group II

IATA

UN-No UN3261
Proper Shipping Name Corrosive solid, acidic, organic, n.o.s.
Hazard Class 8
Packing Group II

IMDG/IMO

UN-No UN3261
Proper Shipping Name Corrosive solid, acidic, organic, n.o.s.
Hazard Class 8
Packing Group II

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Heptanoic acid, tridecafluoro-	375-85-9	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Heptanoic acid, tridecafluoro-	375-85-9	-	X	206-798-9	-	X	X	X	-	KE-28149

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313 Not applicable

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA - Occupational Safety and Health Administration Not applicable

CERCLA Not applicable

California Proposition 65 This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations Not applicable

U.S. Department of Transportation
Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Heptanoic acid, tridecafluoro-	375-85-9	-	-	SVHC Candidate list - Toxic for reproduction (Article 57c); Persistent, bioaccumulative and toxic (Article 57d); Very persistent and very bioaccumulative (Article 57e); Equivalent level of concern having probable serious effects to human health (Article 57f - human health); Equivalent level of concern having probable serious effects to the environment (Article 57f - environment)

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

https://echa.europa.eu/candidate-list-table
https://echa.europa.eu/authorisation-list

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Heptanoic acid, tridecafluoro-	375-85-9	Not applicable	Not applicable	Not applicable	Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
See table for values

Component	OECD PFAS	US (EPA) PFAS	EU (ECHA) PFAS	UK (HSE) PFAS	Chemsec PFAS (Sin List)
Heptanoic acid, tridecafluoro- (CAS #: 375-85-9)	Listed	Listed	Listed	Listed	-

PFAS Legend
Listed = Meets the PFAS definition of the named authority

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Heptanoic acid, tridecafluoro-	375-85-9	Not applicable	Not applicable	Not applicable	Not applicable

16. Other information

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

Creation Date 06-Mar-2007
Revision Date 12-Sep-2023
Print Date 12-Sep-2023
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Version 6.9
Revision Date 03/02/2024
Print Date 07/13/2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Tridecafluorohexane-1-sulfonic acid potassium salt

Product Number : 50929
Brand : Aldrich
CAS-No. : 3871-99-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

Uses advised against : The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 SPRUCE ST
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 4), H332
Carcinogenicity (Category 2), H351

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Reproductive toxicity (Category 1B), H360
Effects on or via lactation, H362
Specific target organ toxicity - repeated exposure (Category 1), H372
Long-term (chronic) aquatic hazard (Category 2), H411

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word	Danger
Hazard Statements	
H302 + H332	Harmful if swallowed or if inhaled.
H351	Suspected of causing cancer.
H360	May damage fertility or the unborn child.
H362	May cause harm to breast-fed children.
H372	Causes damage to organs through prolonged or repeated exposure.
H411	Toxic to aquatic life with long lasting effects.
Precautionary Statements	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P263	Avoid contact during pregnancy/ while nursing.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P391	Collect spillage.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Potassium tridecafluoro-1-hexanesulfonate
Perfluorohexanesulfonic acidpotassium salt

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Formula	:	C6HF13O3S.K
Molecular weight	:	438.20 g/mol
CAS-No.	:	3871-99-6
EC-No.	:	223-393-2

Component	Classification	Concentration
Potassium perfluorohexane-1-sulphonate		
	Acute Tox. 4; Carc. 2; Repr. 1B; Lact. ; STOT RE 1; Aquatic Chronic 2; H302, H332, H351, H360, H362, H372, H411	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Call in physician.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

5.2 Special hazards arising from the substance or mixture

Nature of decomposition products not known.
Combustible.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Suppress (knock down) gases/vapors/mists with a water spray jet. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

hygroscopic Store under inert gas. Moisture sensitive.

Storage class

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Storage class (TRGS 510): 6.1C: Combustible, acute toxic Cat.3 / toxic compounds or compounds which causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection

Handle with impervious gloves.

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection

protective clothing

Respiratory protection

Recommended Filter type: Filter type P3
The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.
required when dusts are generated.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: crystalline Color: beige
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	No data available
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
no information available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 500.1 mg/kg
(Expert judgment)
Acute toxicity estimate Inhalation - 4 h - 11.1 mg/l - vapor

(Expert judgment)
Dermal: No data available

Skin corrosion/irritation
Remarks: No data available

Serious eye damage/eye irritation
Remarks: Causes serious eye damage.

Respiratory or skin sensitization
No data available

Germ cell mutagenicity
No data available
No data available
No data available

Carcinogenicity
Suspected of causing cancer.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
May damage the unborn child.
Studies indicating a hazard to babies during the lactation period

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

11.2 Additional Information

Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1 Toxicity

No data available

Toxicity to daphnia and other aquatic invertebrates	Remarks: No data available (Potassium perfluorohexane-1-sulphonate)
Toxicity to algae	Remarks: No data available (Potassium perfluorohexane-1-sulphonate)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	Remarks: No data available (Potassium perfluorohexane-1-sulphonate)

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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

Discharge into the environment must be avoided.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)

Not dangerous goods

IMDG

UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Potassium perfluorohexane-1-sulphonate)
Marine pollutant : yes
Marine pollutant : no

IATA

UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Potassium perfluorohexane-1-sulphonate)

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.Packages smaller than or equal to 5 kg / L , not dangerous goods of Class 9

SECTION 15: Regulatory information

SARA 302 Components

This material does not contain any components with a section 302 EHS TPQ.

SARA 313 Components

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Potassium perfluorohexane-1-sulphonate	3871-99-6	2021-01-12

SARA 311/312 Hazards
Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

SECTION 16: Other information

Further information
The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.
Copyright 2020 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The branding on the header and/or footer of this document may temporarily not visually match the product purchased as we transition our branding. However, all of the information in the document regarding the product remains unchanged and matches the product ordered. For further information please contact mlsbranding@sial.com.
Version: 6.9 Revision Date: 03/02/2024 Print Date: 07/13/2024

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/23/2019 Version Number 2 Reviewed on 03/23/2019

*
1 Identification

· **Product identifier**

· **Trade name: Perfluorooctanoic Acid (PFOA)**

· **Part number:** N-1588
· **CAS Number:**
335-67-1
· **EC number:**
206-397-9
· **Index number:**
607-704-00-2
· **Application of the substance / the mixture** Reagents and Standards for Analytical Chemical Laboratory Use

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Agilent Technologies, Inc.
5301 Stevens Creek Blvd.
Santa Clara, CA 95051 USA

· **Information department:**
Telephone: 800-227-9770
e-mail: pdl-msds_author@agilent.com
· **Emergency telephone number:** CHEMTREC®: 1-800-424-9300

*
2 Hazard(s) identification

· **Classification of the substance or mixture**

GHS08 Health hazard

Carc. 2 H351 Suspected of causing cancer.
Repr. 1B H360 May damage fertility or the unborn child.
STOT RE 1 H372 Causes damage to the liver through prolonged or repeated exposure.

GHS05 Corrosion

Eye Dam. 1 H318 Causes serious eye damage.

GHS07

Acute Tox. 4 H302 Harmful if swallowed.
Acute Tox. 4 H332 Harmful if inhaled.

· **Label elements**
· **GHS label elements** The substance is classified and labeled according to the Globally Harmonized System (GHS).

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/23/2019 Version Number 2 Reviewed on 03/23/2019

Trade name: Perfluorooctanoic Acid (PFOA)

(Contd. of page 1)

· **Hazard pictograms**

GHS05 GHS07 GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
perfluorooctanoic acid (PFOA)
· **Hazard statements**
Harmful if swallowed or if inhaled.
Causes serious eye damage.
Suspected of causing cancer.
May damage fertility or the unborn child.
Causes damage to the liver through prolonged or repeated exposure.
· **Precautionary statements**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust/fume/gas/mist/vapors/spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.
If swallowed: Call a poison center/doctor if you feel unwell.
Rinse mouth.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.
Continue rinsing.
Immediately call a poison center/doctor.
IF exposed or concerned: Get medical advice/attention.
Get medical advice/attention if you feel unwell.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.
· **Classification system:**
· **NFPA ratings (scale 0 - 4)**

Health = 3
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = *3
Fire = 0
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.

(Contd. on page 3)

Safety Data Sheet
acc. to OSHA HCS

Trade name: Perfluorooctanoic Acid (PFOA)

(Contd. of page 2)

· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Substances**
· **CAS No. Description**
335-67-1 perfluorooctanoic acid (PFOA)
· **Identification number(s)**
· **EC number:** 206-397-9
· **Index number:** 607-704-00-2

4 First-aid measures

· **Description of first aid measures**
· **General information:**
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
· **After inhalation:**
Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist.
In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Generally the product does not irritate the skin.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** Immediately call a doctor.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:** Use fire fighting measures that suit the environment.
· **Special hazards arising from the substance or mixture**
During heating or in case of fire poisonous gases are produced.
· **Advice for firefighters**
· **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
Mount respiratory protective device.
Wear protective equipment. Keep unprotected persons away.
· **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Use neutralizing agent.
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.

(Contd. on page 4)

(Contd. of page 3)

· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**
1.1 mg/m³

· **PAC-2:**
12 mg/m³

· **PAC-3:**
75 mg/m³

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Thorough dedusting.
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
· **Information about protection against explosions and fires:** Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Keep receptacle tightly sealed.
· **Specific end use(s)** No further relevant information available.

*
8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**
· **Components with limit values that require monitoring at the workplace:** Not required.
· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes.
Avoid contact with the eyes and skin.
· **Breathing equipment:**
When used as intended with Agilent instruments, the use of the product under normal laboratory conditions and with standard practices does not result in significant airborne exposures and therefore respiratory protection is not needed.
Under an emergency condition where a respirator is deemed necessary, use a NIOSH or equivalent approved device/equipment with appropriate organic or acid gas cartridge.

(Contd. on page 5)

(Contd. of page 4)

· **Protection of hands:**
Although not recommended for constant contact with the chemicals or for clean-up, nitrile gloves 11-13 mil thickness are recommended for normal use. The breakthrough time is 1 hr. For cleaning a spill where there is direct contact of the chemical, butyl rubber gloves are recommended 12-15 mil thickness with breakthrough times exceeding 4 hrs. Supplier recommendations should be followed.
· **Material of gloves**
For normal use: nitrile rubber, 11-13 mil thickness
For direct contact with the chemical: butyl rubber, 12-15 mil thickness
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· **Penetration time of glove material**
For normal use: nitrile rubber: 1 hour
For direct contact with the chemical: butyl rubber: >4 hours
· **Eye protection:**

Tightly sealed goggles

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Solid
Color:	Not determined.
· **Odor:**	Characteristic
· **Odor threshold:**	Not determined.
· **pH-value:**	Not applicable.
· **Change in condition**	
Melting point/Melting range:	55-56 °C (131-132.8 °F)
Boiling point/Boiling range:	190 °C (374 °F)
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Product is not flammable.
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Not determined.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapor pressure at 20 °C (68 °F):**	0.69 hPa (0.5 mm Hg)
· **Density at 20 °C (68 °F):**	0.9 g/cm³ (7.5105 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not applicable.

(Contd. on page 6)

(Contd. of page 5)

· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with Water at 20 °C (68 °F):**	3.4 g/l
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
VOC content:	0.00 % 0.0 g/l / 0.00 lb/gal
Solids content:	100.0 %
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

ATE (Acute Toxicity Estimate)

Oral	LD50	500 mg/kg
Inhalative	LC50/4 h	1.5 mg/L

· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** Strong irritant with the danger of severe eye injury.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

2B

· **NTP (National Toxicology Program)**

Substance is not listed.

(Contd. on page 7)

Safety Data Sheet
acc. to OSHA HCS

Trade name: Perfluorooctanoic Acid (PFOA)

(Contd. of page 6)

· **OSHA-Ca (Occupational Safety & Health Administration)**

Substance is not listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 2 (Assessment by list): hazardous for water
Do not allow product to reach ground water, water course or sewage system.
Must not reach bodies of water or drainage ditch undiluted or unneutralized.
Danger to drinking water if even small quantities leak into the ground.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· **UN-Number**	
· **DOT, IMDG, IATA**	UN3261
· **UN proper shipping name**	
· **DOT**	Corrosive solid, acidic, organic, n.o.s. (perfluorooctanoic acid (PFOA))
· **IMDG, IATA**	CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (perfluorooctanoic acid (PFOA))

(Contd. on page 8)

(Contd. of page 7)

· **Transport hazard class(es)**

· **IATA**

· **Class**	8 Corrosive substances
· **Label**	8
· **Environmental hazards:**	Not applicable.
· **Special precautions for user**	Warning: Corrosive substances
· **Danger code (Kemler):**	80
· **EMS Number:**	F-A,S-B
· **Segregation groups**	Acids
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	
· **DOT**	
· **Quantity limitations**	On passenger aircraft/rail: 25 kg On cargo aircraft only: 100 kg
· **IMDG**	
· **Limited quantities (LQ)**	5 kg
· **Excepted quantities (EQ)**	Code: E1 Maximum net quantity per inner packaging: 30 g Maximum net quantity per outer packaging: 1000 g
· **UN "Model Regulation":**	UN 3261 CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. (PERFLUOROOCTANOIC ACID (PFOA)), 8, III

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**

· **Sara**

· **Section 355 (extremely hazardous substances):**

Substance is not listed.

· **Section 313 (Specific toxic chemical listings):**

Substance is not listed.

· **TSCA (Toxic Substances Control Act):**

Substance is listed.

· **Proposition 65**

· **Chemicals known to cause cancer:**

Substance is not listed.

· **Chemicals known to cause reproductive toxicity for females:**

Substance is not listed.

(Contd. on page 9)

Safety Data Sheet
acc. to OSHA HCS

Trade name: Perfluorooctanoic Acid (PFOA)

(Contd. of page 8)

· **Chemicals known to cause reproductive toxicity for males:**
Substance is not listed.

· **Chemicals known to cause developmental toxicity:**
Substance is listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**
Substance is not listed.

· **TLV (Threshold Limit Value established by ACGIH)**
Substance is not listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
Substance is not listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

*
16 Other information

The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

· **Date of preparation / last revision** 03/23/2019 / 1

· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
Acute Tox. 4: Acute toxicity – Category 4
Eye Dam. 1: Serious eye damage/eye irritation – Category 1
Carc. 2: Carcinogenicity – Category 2
Repr. 1B: Reproductive toxicity – Category 1B
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1

· *** Data compared to the previous version altered.**

Perfluorooctanesulfonic acid

Safety Data Sheet 6164308

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 12/10/2015 Version: 1.0

SECTION 1: Identification

1.1. Identification

Product form	:	Substance
Substance name	:	Perfluorooctanesulfonic acid
CAS No	:	1763-23-1
Product code	:	6164-3-08
Formula	:	C8HF17O3S
Synonyms	:	1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-Heptadecafluorooctane-1-sulfonic acid
Other means of identification	:	MFCD00042454

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	:	Laboratory chemicals Manufacture of substances Scientific research and development

1.3. Details of the supplier of the safety data sheet

SynQuest Laboratories, Inc.
P.O. Box 309
Alachua, FL 32615 - United States of America
T (386) 462-0788 - F (386) 462-7097
info@synquestlabs.com - www.synquestlabs.com

1.4. Emergency telephone number

Emergency number	:	(844) 523-4086 (3E Company - Account 10069)

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

Classification (GHS-US)

Acute Tox. 4 (Oral)	H302 -	Harmful if swallowed
Skin Corr. 1B	H314 -	Causes severe skin burns and eye damage
Eye Dam. 1	H318 -	Causes serious eye damage
STOT SE 3	H335 -	May cause respiratory irritation

Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :

GHS05 GHS07

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) :
H302 - Harmful if swallowed
H314 - Causes severe skin burns and eye damage
H335 - May cause respiratory irritation

Precautionary statements (GHS-US) :
P260 - Do not breathe dust, mist, spray
P264 - Wash skin thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P301+P312 - If swallowed: Call a POISON CENTER or doctor/ physician if you feel unwell
P301+P330+P331 - If swallowed: rinse mouth. Do NOT induce vomiting
P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/ physician
P321 - Specific treatment (see supplemental first aid instructions on this label)
P330 - Rinse mouth

P363 - Wash contaminated clothing before reuse
P403+P233 - Store in a well-ventilated place. Keep container tightly closed
P405 - Store locked up
P501 - Dispose of contents/container to an approved waste disposal plant

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Substance type : Mono-constituent

Name	Product identifier	%	Classification (GHS-US)
Perfluorooctanesulfonic acid (Main constituent)	(CAS No) 1763-23-1	<= 100	Acute Tox. 4 (Oral), H302 Skin Corr. 1B, H314 Eye Dam. 1, H318 STOT SE 3, H335

Full text of H-phrases: see section 16

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Move the affected personnel away from the contaminated area.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration. Get immediate medical advice/attention.

First-aid measures after skin contact : Wash with plenty of soap and water. Remove contaminated clothing and shoes. Get immediate medical advice/attention.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

First-aid measures after ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth out with water. Get immediate medical advice/attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11.

Symptoms/injuries after inhalation : Material is destructive to tissue of the mucuous membranes and upper respiratory tract. Cough, shortness of breath, headache, nausea.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Alcohol resistant foam. Carbon dioxide. Dry powder. Water spray. Use extinguishing media appropriate for surrounding fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Thermal decomposition generates: Carbon oxides. Hydrogen fluoride. Sulfur oxides.

5.3. Advice for firefighters

Firefighting instructions : In case of fire: Evacuate area.

Protection during firefighting : Wear gas tight chemically protective clothing in combination with self contained breathing apparatus. For further information refer to section 8: "Exposure controls/personal protection".

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Evacuate unnecessary personnel. Ensure adequate air ventilation. Do not breathe dust.

6.1.1. For non-emergency personnel

Emergency procedures : Only qualified personnel equipped with suitable protective equipment may intervene.

6.1.2. For emergency responders

Protective equipment	:	Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

Avoid release to the environment. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

For containment	:	Stop leak if safe to do so.
Methods for cleaning up	:	Sweep or shovel spills into appropriate container for disposal. Minimize generation of dust.
Other information	:	For disposal of solid materials or residues refer to section 13 : "Disposal considerations".

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	:	Do not handle until all safety precautions have been read and understood. Ensure good ventilation of the work station. Do not breathe dust, mist, spray. Wear personal protective equipment. Avoid contact with skin and eyes.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety procedures. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures	:	Comply with applicable regulations.
Storage conditions	:	Keep container closed when not in use. Hygroscopic. Keep contents under inert gas.
Incompatible materials	:	Refer to Section 10 on Incompatible Materials.
Storage area	:	Store in dry, cool, well-ventilated area.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No additional information available

8.2. Exposure controls

Appropriate engineering controls	:	Ensure good ventilation of the work station. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
Hand protection	:	Protective gloves. 29 CFR 1910.138: Hand Protection.
Eye protection	:	Chemical goggles or safety glasses. Face shield. 29 CFR 1910.133: Eye and Face Protection.
Skin and body protection	:	Wear suitable protective clothing.
Respiratory protection	:	In case of inadequate ventilation wear respiratory protection. 29 CFR 1910.134: Respiratory Protection.
Other information	:	Safety shoes. 29 CFR 1910.136: Foot Protection.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Solid
Color	:	No data available
Odor	:	No data available
Odor threshold	:	No data available
pH	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	145 °C (@ 10 mm Hg)
Flash point	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Flammability (solid, gas)	:	No data available
Explosion limits	:	No data available
Explosive properties	:	No data available

Oxidizing properties	:	No data available
Vapor pressure	:	No data available
Relative density	:	1.25 (@ 25 °C)
Relative vapor density at 20 °C	:	No data available
Molecular mass	:	500.13 g/mol
Solubility	:	No data available
Log Pow	:	No data available
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

The product is stable at normal handling and storage conditions.

10.3. Possibility of hazardous reactions

No additional information available

10.4. Conditions to avoid

Keep away from heat, sparks and flame.

10.5. Incompatible materials

Strong bases. Strong oxidizing agents.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. Hazardous decomposition products in case of fire, see Section 5.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	:	Oral: Harmful if swallowed.
Skin corrosion/irritation	:	Causes severe skin burns and eye damage.
Serious eye damage/irritation	:	Causes serious eye damage.
Respiratory or skin sensitization	:	Not classified
Germ cell mutagenicity	:	Not classified
Carcinogenicity	:	Not classified
Reproductive toxicity	:	Not classified
Specific target organ toxicity (single exposure)	:	May cause respiratory irritation.
Specific target organ toxicity (repeated exposure)	:	Not classified
Aspiration hazard	:	Not classified
Symptoms/injuries after inhalation	:	Material is destructive to tissue of the mucuous membranes and upper respiratory tract. Cough, shortness of breath, headache, nausea.

SECTION 12: Ecological information

12.1. Toxicity

No additional information available

12.2. Persistence and degradability

No additional information available

12.3. Bioaccumulative potential

No additional information available

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods : Remove to an authorized incinerator equipped with an afterburner and a flue gas scrubber.

Waste disposal recommendations : Dispose of contents/container in accordance with licensed collector's sorting instructions.

Additional information : Recycle the material as far as possible.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Transport document description : UN3261 Corrosive solid, acidic, organic, n.o.s., 8, II

UN-No.(DOT) : UN3261

Proper Shipping Name (DOT) : Corrosive solid, acidic, organic, n.o.s.

Transport hazard class(es) (DOT) : 8 - Class 8 - Corrosive material 49 CFR 173.136

Hazard labels (DOT) : 8 - Corrosive

Packing group (DOT) : II - Medium Danger

DOT Packaging Non Bulk (49 CFR 173.xxx) : 212

DOT Packaging Bulk (49 CFR 173.xxx) : 240

DOT Symbols : G - Identifies PSN requiring a technical name

DOT Special Provisions (49 CFR 172.102) : IB8 - Authorized IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2); Fiberboard (11G); Wooden (11C, 11D and 11F); Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2).
IP2 - When IBCs other than metal or rigid plastics IBCs are used, they must be offered for transportation in a closed freight container or a closed transport vehicle.
IP4 - Flexible, fiberboard or wooden IBCs must be sift-proof and water-resistant or be fitted with a sift-proof and water-resistant liner.
T3 - 2.65 178.274(d)(2) Normal..... 178.275(d)(2)
TP33 - The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. Solid substances transported or offered for transport above their melting point are authorized for transportation in portable tanks conforming to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II, unless a tank with more stringent requirements for minimum shell thickness, maximum allowable working pressure, pressure-relief devices or bottom outlets are assigned in which case the more stringent tank instruction and special provisions shall apply. Filling limits must be in accordance with portable tank special provision TP3. Solids meeting the definition of an elevated temperature material must be transported in accordance with the applicable requirements of this subchapter.

DOT Packaging Exceptions (49 CFR 173.xxx) : 154

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 15 kg

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 50 kg

DOT Vessel Stowage Location	:	B - (i) The material may be stowed ''on deck'' or ''under deck'' on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) ''On deck only'' on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.
Other information	:	No supplementary information available.

TDG

No additional information available

Transport by sea

UN-No. (IMDG)	:	3261
Proper Shipping Name (IMDG)	:	CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S.
Class (IMDG)	:	8 - Corrosive substances
Packing group (IMDG)	:	II - substances presenting medium danger

Air transport

UN-No. (IATA)	:	3261
Proper Shipping Name (IATA)	:	Corrosive solid, acidic, organic, n.o.s.
Class (IATA)	:	8 - Corrosives
Packing group (IATA)	:	II - Medium Danger

SECTION 15: Regulatory information

15.1. US Federal regulations

Perfluorooctanesulfonic acid (1763-23-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
EPA TSCA Regulatory Flag	S - S - indicates a substance that is identified in a proposed or final Significant New Uses Rule.

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

This product or mixture does not contain a toxic chemical or chemicals in excess of the applicable de minimis concentration as specified in 40 CFR §372.38(a) subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

15.2. International regulations

CANADA

Perfluorooctanesulfonic acid (1763-23-1)
Listed on the Canadian NDSL (Non-Domestic Substances List)

EU-Regulations

No additional information available

National regulations

Perfluorooctanesulfonic acid (1763-23-1)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Japanese Pollutant Release and Transfer Register Law (PRTR Law) Listed on INSQ (Mexican national Inventory of Chemical Substances)

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer and/or reproductive harm

SECTION 16: Other information

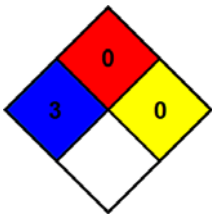
Full text of H-phrases:

Acute Tox. 4 (Oral)	Acute toxicity (oral) Category 4
Eye Dam. 1	Serious eye damage/eye irritation Category 1
Skin Corr. 1B	Skin corrosion/irritation Category 1B
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H302	Harmful if swallowed
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage
H335	May cause respiratory irritation

NFPA health hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.

NFPA fire hazard : 0 - Materials that will not burn.

NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given

Flammability : 0 Minimal Hazard - Materials that will not burn

Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.

SDS US (GHS HazCom 2012)

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is offered solely for your consideration, investigation, and verification. It does not represent any guarantee of the properties of the product nor that the hazard precautions or procedures described are the only ones which exist. SynQuest shall not be held liable or any damage resulting from handling or from contact with the above product.

ATTACHMENT – E-2
HEALTH AND SAFETY BRIEFING

Health and Safety Briefing/Site Orientation Record/Hazard Communication

This is to verify that I, the undersigned, have been provided with a site (orientation) briefing, including hazard communication, regarding the safety and health considerations at the 19-27 and 29 Clay Street and 60-62 Commercial Street, Brooklyn, New York (Site). I agree to abide by my employer's Site-specific safety and health plan and other safety or health requirements applicable to the Site.

Name (Print)	Signature	Company	Date

Site (orientation) briefing conducted by: _____

Date:_____

Health and Safety Briefing/Site Orientation Record

ATTACHMENT – E-3
ROUTE TO HOSPITAL

Google Maps 19 Clay St, Brooklyn, NY 11222 to NYU Langone Health Drive 3.4 miles, 16 min

19 Clay St
Brooklyn, NY 11222

⚠ This route has tolls.

Take Manhattan Ave to McGuinness Blvd

3 min (0.4 mi)

1. Head east on Clay St toward Manhattan Ave

0.1 mi

2. Turn right at the 1st cross street onto Manhattan Ave

0.2 mi

3. Turn left onto Green St

0.1 mi

Take Pulaski Brg, Queens–Midtown Tunl and 2nd Ave to 1st Ave. in Manhattan

10 min (3.0 mi)

4. Turn left at the 1st cross street onto McGuinness Blvd

348 ft

5. Use the right lane to continue on Pulaski Brg

0.6 mi

6. Slight right toward 49th Ave

95 ft

7. Turn right onto 49th Ave

203 ft

8. Turn right onto 11th Pl

259 ft

9. Turn right onto 50th Ave

46 ft

10. Turn left toward I-495 W

⚠ Toll road

456 ft

11. Merge onto I-495 W

⚠ Toll road

0.1 mi

12. Continue onto Queens–Midtown Tunl

⚠ Toll road

1.2 mi

13. Continue onto I-495 W/Queens–Midtown Tunl

⚠ Toll road

338 ft

14. Take the exit toward Uptown/3 Ave/38 St/41 St

⚠ Toll road

0.1 mi

15. Take the ramp to 39th St

⚠ Toll road

16 ft

16. Turn right onto E 37th St

433 ft

17. Turn right onto 2nd Ave

0.3 mi

18. Turn left onto E 30th St

0.1 mi

19. Use the left 2 lanes to turn left onto 1st Ave.

367 ft

NYU Langone Health
550 1st Ave., New York, NY 10016

ATTACHMENT – E-4
ACCIDENT AND INJURY REPORT FORM

SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

Injured Employee _____ Job Title _____

Home Office _____ Division/Department _____

Date/Time of Accident _____

Location of Accident _____

Witnesses to the Accident _____

Injury Incurred? _____ Nature of Injury _____

_____

Engaged in What Task When Injured? _____

_____

Will Lost Time Occur? ____ How Long? _____ Date Lost Time Began _____

Were Other Persons Involved/Injured? _____

_____

How Did the Accident Occur? _____

_____

_____

_____

_____

What Could Be Done to Prevent Recurrence of the Accident? _____

_____

_____

What Actions Have You Taken Thus Far to Prevent Recurrence? _____

_____

_____

Supervisor's Signature _____ Title _____ Date _____

Reviewer's Signature _____ Title _____ Date _____

Note: If the space provided on this form is insufficient, provide additional information on a separate page and attach. The completed accident investigation report must be submitted to the Health and Safety Manager within two days of the occurrence of the accident.

GZA GeoEnvironmental of New York.

APPENDIX F

MATERIALS MANAGEMENT PLAN

Known for excellence.
Built on trust.

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

GZA GeoEnvironmental of NY
104 West 29th Street
10th Floor
New York, NY 10001
T: 212.594.8140
F: 212.279.8180
www.gza.com

MATERIALS MANAGEMENT PLAN – INTERIM REMEDIAL MEASURE WORK PLAN

19-27 Clay Street, 29 Clay Street, and 60-62 Commercial Street
Brooklyn, NY 11222
Block 2482, Lots 9, 10, and 53
BCP Site No. C224390

January 2025
File No. 41.0163279.00

PREPARED FOR:
Clay Properties, LLC
124 North 4th Street, 2nd Floor
Brooklyn, NY 11249

PREPARED BY:
GZA GeoEnvironmental of New York
104 West 29th Street | 10th Floor | New York, NY 10001
212-594-8140

www.gza.com

Copyright© 2025 GZA GeoEnvironmental of New York.

1.0 SOIL SCREENING METHODS 1

2.0 INVESTIGATION DERIVED WASTE STORAGE 1

3.0 CHARACTERIZATION OF IDW 1

4.0 MATERIALS EXCAVATION, LOAD-OUT, AND DEPARTURE 2

5.0 OFF-SITE MATERIALS TRANSPORT 2

6.0 MATERIALS DISPOSAL OFF-SITE 3

7.0 FLUIDS MANAGEMENT 3

8.0 CONTINGENCY PLAN FOR UNKNOWN CONTAMINATION SOURCES 4

9.0 ODOR, DUST, AND NUISANCE CONTROL 4

1.0 SOIL SCREENING METHODS

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional (QEP) and will be reported in the Construction Completion Report (CCR) following completion of the work outlined in the Interim Remedial Measure Work Plan (IRMWP). Soil screening will be performed during invasive work as part of the remedy and development phases prior to issuance of the Certificate of Completion (COC).

2.0 INVESTIGATION DERIVED WASTE STORAGE

Investigation Derived Waste (IDW) generated during the IRM, including soil, groundwater, solid waste, and Dense Non-Aqueous Phase Liquids (DNAPL) will be stored in properly labeled DOT approved 55-gallon drums on spill pallets, or equivalent, in preparation for off-Site disposal. The 55-gallon drums and secondary containment will be periodically inspected for leaks or damage. Larger capacity storage containers such as totes or double walled tanks may be utilized during vacuum enhanced fluid recovery (VEFR) events to lessen the chance of spilling material when transferring from the vacuum truck to the storage containers.

All boreholes which require drill cuttings disposal will be backfilled with cement grout. Disposable sampling equipment including spoons, gloves, bags, paper towels, etc. that come in contact with environmental media will be double bagged and disposed as municipal trash dumpster as non-hazardous trash, unless it the sampling equipment comes in contact with DNAPL or soil with heavy odors. Sampling equipment that comes into contact with DNAPL or soil with heavy odors will be stored in 55-gallon drums for off-Site disposal of hazardous solid waste.

Soil stockpiling will not occur during the IRM work.

3.0 CHARACTERIZATION OF IDW

Soil/fill and groundwater has been extensively analyzed across the Site during the Remedial Investigation (RI), conducted in August-September 2024. Existing analytical data of soil and groundwater will be used for characterization. If additional characterization is required by the disposal facility, the media to be transported off-Site will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations.

The Site has a current United States Environmental Protection Agency (USEPA) Identification Number, NY0000374314, which will remain and used for disposal of media through the IRM work.

4.0 MATERIALS EXCAVATION, LOAD-OUT, AND DEPARTURE

The PE/QEP overseeing the IRM will:

- Oversee remedial work and the excavation and load-out of excavated material;
- Ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- Ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this Interim Remedial Measure Work Plan;
- Ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- Ensure that all outbound trucks are inspected and cleaned (if necessary) before leaving the Site;
- Ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

5.0 OFF-SITE MATERIALS TRANSPORT

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364.

Northbound outgoing trucks will use Manhattan Avenue, Green Street, and McGuiness Boulevard to access the Long Island Expressway. Southbound outgoing trucks will use Manhattan Avenue, Green Street, and McGuiness Boulevard access the Brooklyn Queens Expressway. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

6.0 MATERIALS DISPOSAL OFF-SITE

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in New York City under a the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is permitted and approved to accept the material. These documents will be included in the CCR.

The CCR will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the CCR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the final remedial report. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

7.0 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including DNAPL, will be handled, transported, and disposed in accordance with applicable laws and regulations. All fluids stored on-Site for disposal will be stored in properly labeled DOT-approved 55-gallon drums contained on spill pallets, or an equivalent containment system. During purging of water or transfer of fluids from vacuum trucks into 55-gallon drums, additional secondary containment will be implemented to prevent spills and fluid runoff. The additional secondary containment may include poly sheeting and containment berms. If the additional secondary containment comes in contact with hazardous materials, it will be handled in accordance with local laws and regulations for hazardous waste.

8.0 CONTINGENCY PLAN FOR UNKNOWN CONTAMINATION SOURCES

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to NYSDEC's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during IRM work, sampling will be performed on contaminated source material and surrounding soils and reported to NYSDEC. Chemical analytical testing will be performed for target analyte list (TAL) metals, target compound list (TCL) volatiles and semi-volatiles, TCL pesticides and polychlorinated biphenyls (PCBs), as appropriate.

9.0 ODOR AND NUISANCE CONTROL

Odor Control

This odor control plan is capable of controlling emissions of nuisance odors off-Site (we note that there will not be residents or tenants on the property during the IRM). Odor controls will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of odor suppressants to cover exposed odorous soils. If nuisance odors develop and cannot otherwise be controlled, additional means to eliminate them will include: (d) use of chemical odorant suppressants in spray or misting systems. The proposed odor suppressant for this Site is BioSolve® Pinkwater (or equivalent). The contractor who uses BioSolve® Pinkwater (or equivalent) for odor suppression will fully understand the manufacturer's specifications prior to usage.

If nuisance odors are identified, 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 all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of the Volunteer's Remedial Engineer, who is responsible for certifying the Final Engineering Report.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

Dust Control

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Exercise extra care during dry and high-wind periods.

- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted, and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. NYSDEC will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying this remedial plan.

GZA GeoEnvironmental of New York.

APPENDIX G

GSR CLIMATE SCREEN CHECKLIST AND ENVIRONMENTAL FOOTPRINT ANALYSIS

Known for excellence.
Built on trust.

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

GZA GeoEnvironmental of New York
104 West 29th Street
10th Floor
New York, NY 10001
T: 212.594.8140
F: 212.279.8180
www.gza.com

October 22, 2024
41.0163279.00 & 41.0163305.00

Clay Properties LLC
134 North 4th Street
Brooklyn, New York 11249

Green and Sustainable Remediation Evaluation
19-27 Clay Street & 60-62 Commercial Street & 29 Clay Street
Brooklyn, NY 11222
NYSDEC BCP Site Numbers – C224390 & C224408

Sites remediated under the oversight of the New York State Department of Environmental Conservation (NYSDEC) are required to incorporate the concepts of green remediation into all phases of the cleanup process in accordance with DER-31. Green remediation is defined as "*the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprint of cleanup actions*." GZA GeoEnvironmental of New York (GZA) has completed the following evaluation of the remedial activities associated with the *Interim Remedial Measures Work Plan* (IRMWP) for the site located at 19-27 Clay Street, 60-62 Commercial Street, and 29 Clay Street, Brooklyn, New York utilizing the SiteWise™ tool for green and sustainable remediation tracking and information provided by the site owner, Clay Properties LLC, and its subcontractors.

BACKGROUND

The site is located at Block 2482, Lots 9, 10, and 53 in Kings County New York and identified as 19-27 Clay Street, 60-62 Commercial Street, and 29 Clay Street, Brooklyn, New York. Clay Properties LLC entered into the Brownfield Cleanup Program (BCP) with the NYSDEC to investigate and remediate the site for the development of a two-story recreational facility on Lot 9, a new residential tower on Lot 53, and a new 20,000 square foot mixed-use building on Lot 10. The site is approximately 0.53 acres and is situated in the Greenpoint neighborhood of Brooklyn and surrounded by residential, commercial, and industrial properties. The site has undergone two remedial investigations in February 2023 under the New York City Mayor's Office of Environmental Remediation (NYCOER) and in August and September 2024 under the NYSDEC for the BCP. Due to the contamination observed during the 2024 remedial investigation, GZA has prepared the IRMWP to begin remediation of the Site and limit potential exposure to hazardous materials during the initial construction phase.

The IRMs under the *IRMWP* include a pre-demolition survey and building demolition, dense non-aqueous phase liquid (DNAPL) recovery and delineation, groundwater injections, a temporary soil vapor extraction (SVE) system, and contained-in determination sampling of soils. Descriptions of the general activities performed under these actions as well as the parameters used for the SiteWise™ evaluation are presented in the following sections.

FOOTPRINT ANALYSIS

PRE-DEMOLITION SURVEY AND DEMOLITION

The two-story warehouse building that comprises the entirety of the property at Block 2482 Lot 9 will be demolished for redevelopment purposes. Prior to the demolition, a survey of the building materials will be completed for analysis of lead-based paint, asbestos, and polychlorinated biphenyls (PCB) containing materials. For the footprint analysis, it is assumed that a total of 10 paint samples will be analyzed for lead, 15 samples will be collected for asbestos analysis, and 15 samples will be collected for PCB analysis. These samples will be collected utilizing non-powered hand tools for minimizing dust generation.

The assumptions utilized in the analysis of the demolition process include the following:

- A mini excavator (150 horsepower) and a large excavator (400 horsepower) will be used.
- 1,000 square feet of plastic sheeting will be used for dust containment.
- A crew of 3 laborers will complete the pre-demolition survey in 2 working days and a crew 5 laborers and operators will complete the building demolition over 10 working days.
- Construction and demolition (C&D) debris will be removed from the Site on 10 truckloads with 20 cubic yard containers.
- One blower for ventilation and two community air monitoring stations (CAMP) will operate during all working hours for demolition.
- 100 gallons of water per day will be utilized for dust suppression measures during demolition.
- All heavy equipment will be transported to the site from within 50 miles of the Site.
- All C&D debris will be transported to a transfer station within 50 miles of the Site.
- All labor for the survey and demolition activities will be traveling from within 10 miles of the Site.

DNAPL RECOVERY AND DELINEATION

DNAPL was encountered as free product in 5 soil borings and 2 monitoring wells during the 2024 remedial investigation. To recover the DNAPL, 4 recovery wells will be installed to just above the clay layer at approximately 25 feet below ground surface. DNAPL recovery will be performed with a vacuum truck applying suction to each of the wells and extracting groundwater and free product for offsite disposal.

Prior to the installation of the recovery wells, two soil borings will be drilled to either 25 feet below ground surface or the clay layer, whichever is shallower. Each boring will be sampled at three intervals for volatile organic compound (VOC) analysis. The borings will be used to delineate the eastern extent of the DNAPL area and evaluate the locations of the proposed recovery wells.

The assumptions utilized in the analysis of the DNAPL recovery and delineation process include the following:

- DNAPL delineation samples will be collected in a single field day by a GZA field staff.
- Delineation borings will be installed with direct-push technology drill rig with a two-man crew.

- DNAPL recovery wells will be installed over two days with GZA oversight.
- DNAPL recovery wells will be installed with a sonic drill rig with a two-man crew.
- Recovery wells will be constructed of schedule 40 PVC with sand filter pack and stick-up construction.
- All drill cuttings will be drummed for offsite disposal.
- DNAPL recovery events will be single day events with 1 GZA field staff for oversight.
- 3 DNAPL recovery events will be completed.
- DNAPL recovery will be completed with a vacuum truck with 10,000-gallon capacity by two technicians.
- GZA staff will commute to and from the site utilizing the local subway.
- Drilling and vacuum extraction subcontractors will commute utilizing trucks from a maximum distance of 50 miles.
- All groundwater and soil disposal will be to offsite facilities within 50 miles.

GROUNDWATER INJECTIONS

Petroleum related and chlorinated VOCs were found in exceedance of applicable criteria across the site with petroleum related VOCs primarily found in the source area near MW-10 and MW-11 and downgradient. In order to address the VOC groundwater contamination, 3 groundwater injection events are planned during the IRMs. Phase 1 of the injections will include the use of emulsified zero valent iron (EZVI) in-situ chemical reduction (ISCR) injections during two events; a primary injection event and a polishing injection event. Phase 2 of the injections will use Provectus-IR® ISCR Reagent in a single injection event.

The assumptions utilized in the analysis of the groundwater injection activities include the following:

- Each injection event will be implemented over 10 working days with one GZA field staff providing oversight and two drillers.
- Injections will be completed utilizing a DPT drill rig.
- The first round of Phase 1 injections will include 22,225 gallons of EZVI across 31 injection points.
- The second round of Phase 1 injections will include 2,800 gallons of EZVI across 11 injection points.
- The Phase 2 injections will include 144,000 pounds of Provect-IR mixed with 69,120 gallons of water across 60 injection points.
- A full round of groundwater sampling for VOCs across all 32 monitoring wells is included once for each phase.
- Groundwater from purging of monitoring wells will be drummed for offsite disposal.
- GZA staff will commute to and from the site utilizing the local subway.
- Drilling subcontractors will commute to and from the site utilizing a truck from a maximum distance of 50 miles.
- All offsite disposal will be a facility within 50 miles of the Site.

TEMPORARY SOIL VAPOR EXTRACTION SYSTEM

In order to prevent the offsite migration of soil vapors, a SVE system will be installed along the northern and eastern boarders of Lot 53. A pilot study will also be conducted as a part of the SVE system design process. The pilot test will include installing test vapor extraction points and applying a temporary vacuum determine the radius of influence imposed in the testing area. Based on the results of pilot study the full scall temporary SVE system will be designed and installed. The system is anticipated to include 4 extraction wells above the water table connected to a dedicated remediation trailer housing the blower, a granular activated carbon (GAC) vessel, and a discharge stack. The temporary SVE system is only anticipated to be operated prior to the start of the construction phase; however, the SVE system will be designed to be capable of remaining in place during the construction phase if sampling indicates the potential for vapor migration still poses as a potential hazard.

The assumptions utilized in the analysis of the temporary SVE system activities include the following:

- The pilot study will be completed over a two-day period with one GZA field staff and two drillers.
- The pilot study will install 4 borings to just above the groundwater table utilizing a DPT rig.
- The pilot study will utilize a blower for approximately 2 hours per test location and effluent will be directed through a GAC treatment vessel prior to emitting to atmosphere.
- Pilot study wells will be sampled for VOCs utilizing Method TO-15.
- The temporary SVE system will include 4 SVE wells installed with a DPT drill rig and set with 4-inch PVC screens and risers with sand filter pack and a bentonite seal.
- The temporary SVE system will operate continuously for 3 months upon start up and an assumed shutdown at the start of the construction phase.
- The temporary SVE system will include startup sampling of each well, the blower influent, and the GAC effluent followed by monthly sampling of the blower influent and GAC effluent.
- All soil cuttings from installation of pilot study and temporary SVE system wells will be drummed for offsite disposal.
- GZA staff will commute to and from the site utilizing the local subway.
- Drilling subcontractors will commute to and from the site utilizing a truck from a maximum distance of 50 miles.
- All offsite disposal will be a facility within 50 miles of the Site.

CONTAINED-IN DETERMINATION SAMPLING

Contain-in sampling will be completed in the areas of the proposed footings and utilities for the future development to potentially allow for the management of excavated soils as a non-listed hazardous waste. A Contained-In Determination Workplan will be submitted to NYSDEC detailing the sampling locations and methodology for approval prior to the work.

The assumptions utilized in the analysis of the temporary SVE system activities include the following:

- Contained-in determination sampling will be completed over two days with one GZA field staff and two drillers.
- 5 samples will be collected and analyzed for full toxicity characteristics leachate procedure suite, total petroleum hydrocarbons, extractable petroleum hydrocarbons, VOCs, semi-volatile organic compounds, and metals.
- 20 borings will be installed utilizing a DPT drill rig to a depth above the water table.
- All soil cuttings from drilling will be drummed for offsite disposal.
- GZA staff will commute to and from the site utilizing the local subway.
- Drilling subcontractors will commute to and from the site utilizing a truck from a maximum distance of 50 miles.
- All offsite disposal will be a facility within 50 miles of the Site.

EVALUATION RESULTS SUMMARY

SiteWise™ breaks down the impacts of project into the following categories:

- Greenhouse gas emissions (metric tons)
- Total energy used (million british thermal units)
- Water consumption (gallons)
- Electricity Usage (megawatt hours)
- Onsite nitrous oxide emissions (metric tons)
- Onsite sulfur oxide emissions (metric tons)
- Onsite particulate matter less than 10 microns (PM10) emissions (metric tons)
- Total nitrous oxide emissions (metric tons)
- Total sulfur oxide emissions (metric tons)
- Total PM10 emissions (metric tons)
- Accident fatality risk
- Accident injury risk

The project impacts for these categories are provided for project wide evaluation as well as individual components of the project. The detailed summary of the evaluation, including the breakdown of overall project and individual component environmental footprints, is provided in **Attachment 1**. A climate screening checklist of the remedy is also provided as **Attachment 2**.

Overall, the project related impacts included a total of 51,461.64 metric tons of greenhouse gas emissions, 354,000 million British thermal units of energy consumed, 127,000 gallons of water consumed, and 3.46 megawatt hours of electricity used. An estimated 19.4 percent of the electricity consumed onsite was from a renewable source, such as solar or wind.

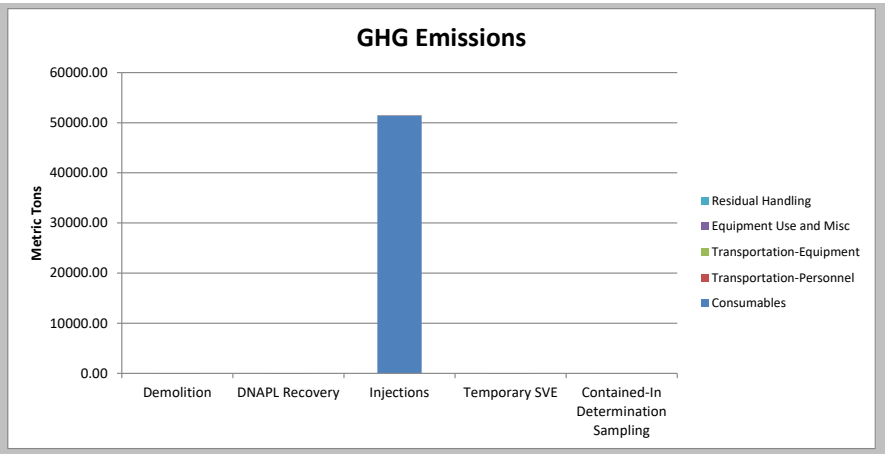
Attachment 1 – SiteWise™ Footprint Analysis

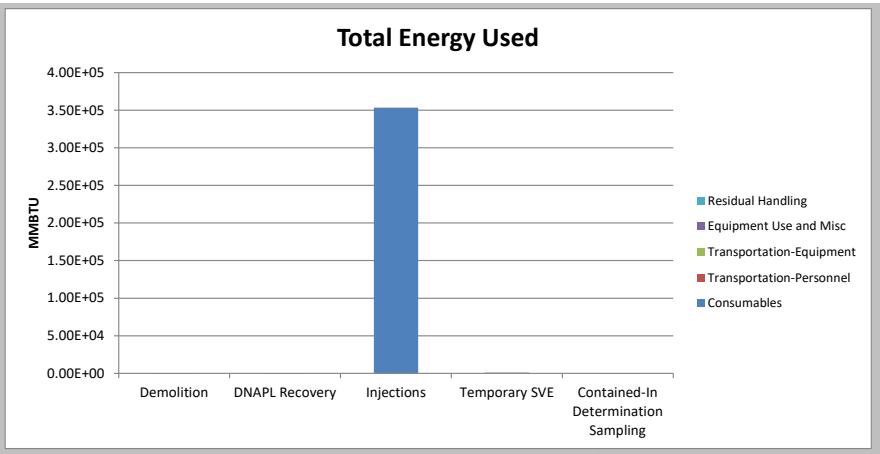
Overall Project Summary

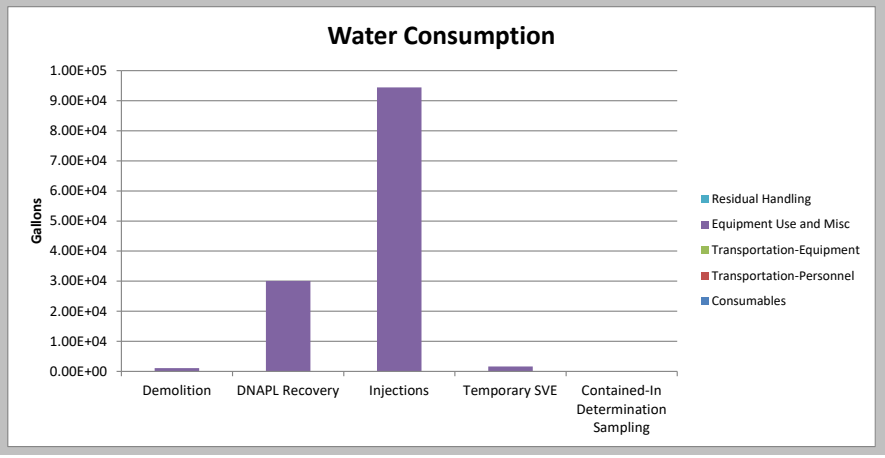
Sustainable Remediation - Environmental Footprint Summary
Clay Street IRMs 2

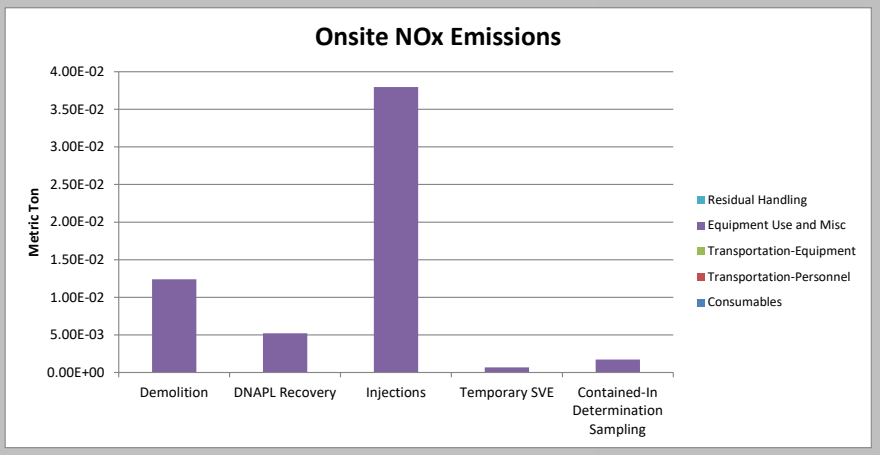
Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx Emissions	Total SOx Emissions	Total PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton		
Demolition	Consumables	0.14	4.5E+00	NA	NA	NA	NA	NA	2.8E-04	5.0E-04	7.3E-05	NA	NA
	Transportation-Personnel	0.24	3.1E+00	NA	NA	NA	NA	NA	1.0E-04	3.2E-06	1.4E-05	8.7E-06	7.0E-04
	Transportation-Equipment	0.47	6.1E+00	NA	NA	NA	NA	NA	1.5E-04	2.6E-06	1.3E-05	1.6E-06	1.3E-04
	Equipment Use and Misc	3.85	7.5E+01	1.1E+03	3.0E-02	1.2E-02	3.1E-03	1.6E-03	2.2E-02	1.0E-02	2.6E-03	4.8E-05	1.2E-02
	Residual Handling	0.74	9.7E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	2.3E-04	4.1E-06	2.1E-05	3.9E-06	3.1E-04
	Sub-Total	5.44	9.79E+01	1.07E+03	2.98E-02	1.24E-02	3.06E-03	1.57E-03	2.31E-02	1.05E-02	2.69E-03	6.20E-05	1.32E-02
DNAPL Recovery	Consumables	1.11	9.2E+01	NA	NA	NA	NA	NA	7.0E-04	1.1E-03	1.6E-04	NA	NA
	Transportation-Personnel	0.15	1.9E+00	NA	NA	NA	NA	NA	5.9E-05	2.2E-05	8.4E-06	3.9E-06	3.2E-04
	Transportation-Equipment	0.17	2.2E+00	NA	NA	NA	NA	NA	5.2E-05	9.3E-07	4.7E-06	7.8E-07	6.3E-05
	Equipment Use and Misc	1.04	1.4E+01	3.0E+04	1.8E-01	5.2E-03	5.3E-04	4.7E-04	7.6E-03	2.3E-03	7.3E-04	8.3E-06	2.7E-03
	Residual Handling	0.56	7.6E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	4.3E-04	1.5E-04	7.7E-04	1.6E-06	1.3E-04
	Sub-Total	3.04	1.17E+02	3.01E+04	1.85E-01	5.21E-03	5.32E-04	4.68E-04	8.82E-03	3.58E-03	1.67E-03	1.46E-05	3.26E-03
Injections	Consumables	51,430.54	3.5E+05	NA	NA	NA	NA	NA	1.0E+02	2.1E+02	4.1E+01	NA	NA
	Transportation-Personnel	1.57	2.0E+01	NA	NA	NA	NA	NA	6.3E-04	1.2E-04	8.9E-05	4.2E-05	3.4E-03
	Transportation-Equipment	0.22	3.0E+00	NA	NA	NA	NA	NA	7.1E-05	2.9E-06	5.8E-06	1.2E-06	9.4E-05
	Equipment Use and Misc	9.64	1.3E+02	9.4E+04	1.1E-02	3.8E-02	4.0E-03	3.6E-03	6.1E-02	2.0E-02	6.3E-03	6.4E-05	2.2E-02
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	51,441.97	3.53E+05	9.45E+04	1.12E-02	3.80E-02	3.99E-03	3.57E-03	1.03E+02	2.06E+02	4.12E+01	1.08E-04	2.53E-02
Temporary SVE	Consumables	3.31	4.4E+02	NA	NA	NA	NA	NA	1.3E-03	2.1E-03	3.1E-04	NA	NA
	Transportation-Personnel	0.18	2.2E+00	NA	NA	NA	NA	NA	7.0E-05	1.9E-05	1.0E-05	4.7E-06	3.8E-04
	Transportation-Equipment	0.15	2.0E+00	NA	NA	NA	NA	NA	4.7E-05	1.9E-06	3.8E-06	7.8E-07	6.3E-05
	Equipment Use and Misc	2.91	5.1E+01	1.6E+03	3.2E+00	6.9E-04	7.0E-05	6.2E-05	1.0E-02	7.9E-03	1.5E-03	5.2E-06	2.2E-03
	Residual Handling	0.08	1.1E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	6.0E-05	2.1E-05	1.1E-04	3.9E-07	3.1E-05
	Sub-Total	6.63	4.94E+02	1.65E+03	3.23E+00	6.88E-04	7.03E-05	6.19E-05	1.19E-02	1.01E-02	1.97E-03	1.11E-05	2.72E-03
Contained-In Determination Sampling	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.06	7.6E-01	NA	NA	NA	NA	NA	2.3E-05	7.5E-06	3.3E-06	1.6E-06	1.3E-04
	Transportation-Equipment	0.07	1.0E+00	NA	NA	NA	NA	NA	2.4E-05	9.6E-07	1.9E-06	3.9E-07	3.1E-05
	Equipment Use and Misc	4.35	6.2E+01	5.0E+00	0.0E+00	1.7E-03	1.8E-04	1.5E-04	2.2E-02	1.5E-02	1.8E-03	3.6E-06	1.3E-03
	Residual Handling	0.08	1.1E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	6.0E-05	2.1E-05	1.1E-04	3.9E-07	3.1E-05
	Sub-Total	4.56	6.46E+01	5.00E+00	0.00E+00	1.72E-03	1.76E-04	1.55E-04	2.19E-02	1.53E-02	1.95E-03	5.97E-06	1.47E-03
Total		**5.1E+04**	**3.5E+05**	**1.3E+05**	**3.5E+00**	**5.8E-02**	**7.8E-03**	**5.8E-03**	**1.0E+02**	**2.1E+02**	**4.1E+01**	**2.0E-04**	**4.6E-02**

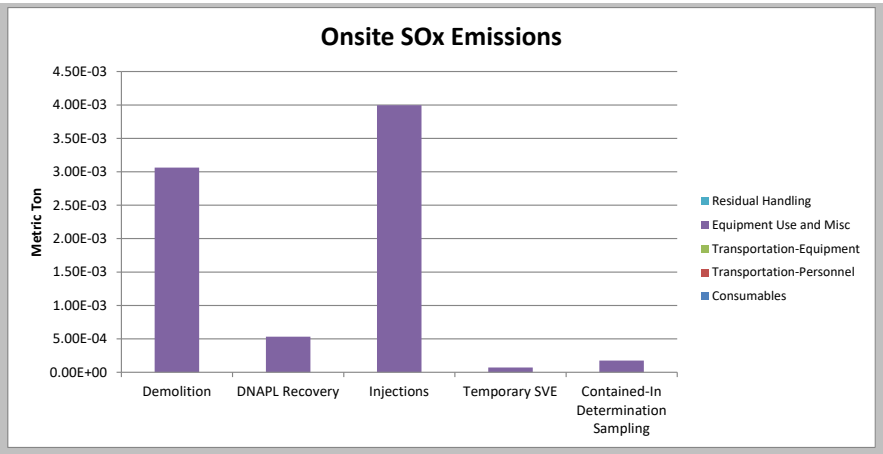
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Percent electricity from renewable sources	Total Cost with Footprint Reduction
	tons	tons	cubic yards	$		%	
Demolition	0.0E+00	0.0E+00	0.0E+00	0	1.1E-01	24.2%	$0
DNAPL Recovery	0.0E+00	3.8E+00	0.0E+00	0	2.6E-02	24.2%	
Injections	0.0E+00	0.0E+00	0.0E+00	0	2.0E-01	24.2%	
Temporary SVE	6.0E-01	0.0E+00	0.0E+00	0	2.2E-02	24.2%	
Contained-In Determination Sampling	6.0E-01	0.0E+00	0.0E+00	0	1.2E-02	0.0%	
Total	1.2E+00	3.8E+00	0.0E+00	0.0E+00	3.7E-01	9.7E-01	

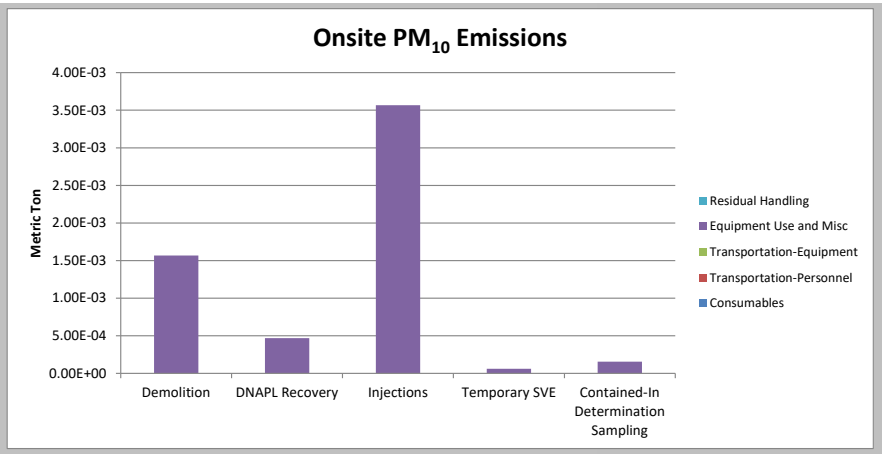

GHG Emissions
Metric Tons
60000.00
50000.00
40000.00
30000.00
20000.00
10000.00
0.00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

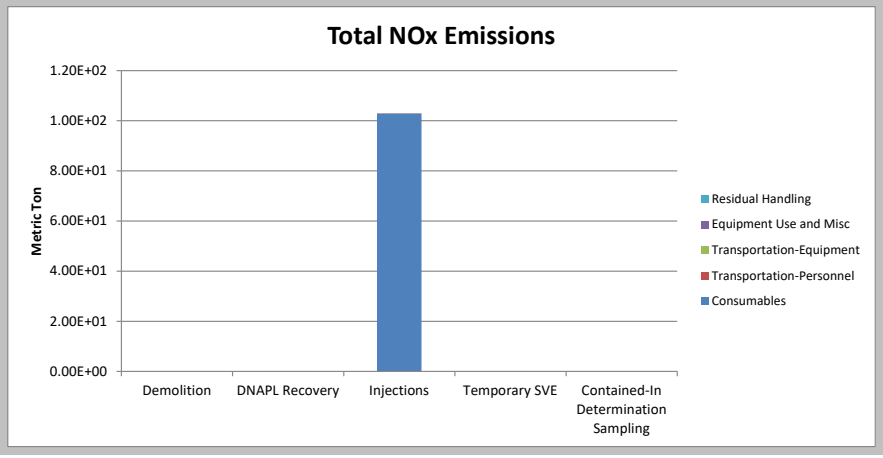

Total Energy Used
MMBTU
4.00E+05
3.50E+05
3.00E+05
2.50E+05
2.00E+05
1.50E+05
1.00E+05
5.00E+04
0.00E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

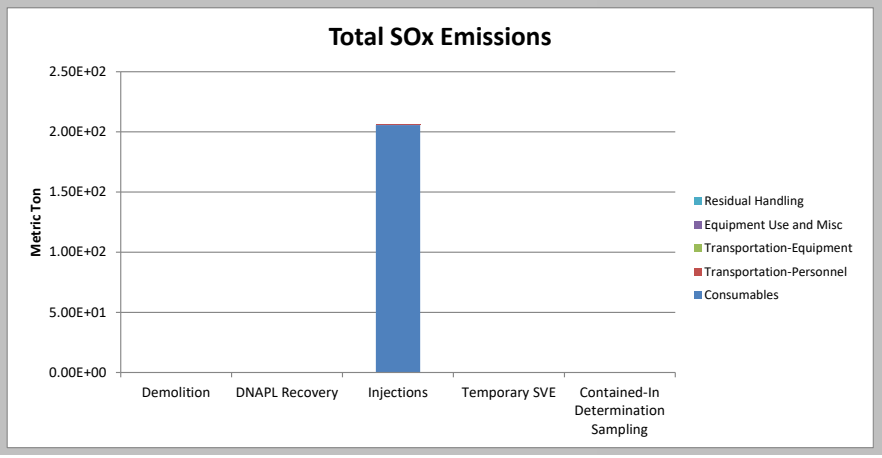

Water Consumption
Gallons
1.00E+05
9.00E+04
8.00E+04
7.00E+04
6.00E+04
5.00E+04
4.00E+04
3.00E+04
2.00E+04
1.00E+04
0.00E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

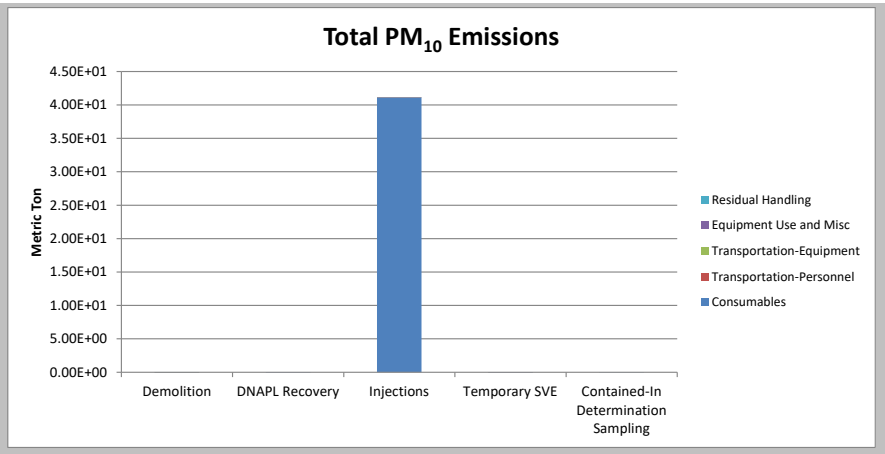

Onsite NOx Emissions
Metric Ton
4.00E-02
3.50E-02
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

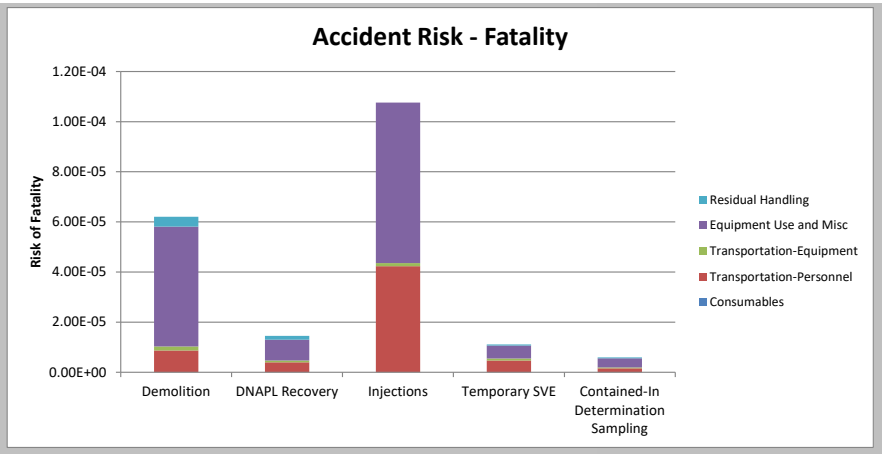

Onsite SOx Emissions
Metric Ton
4.50E-03
4.00E-03
3.50E-03
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

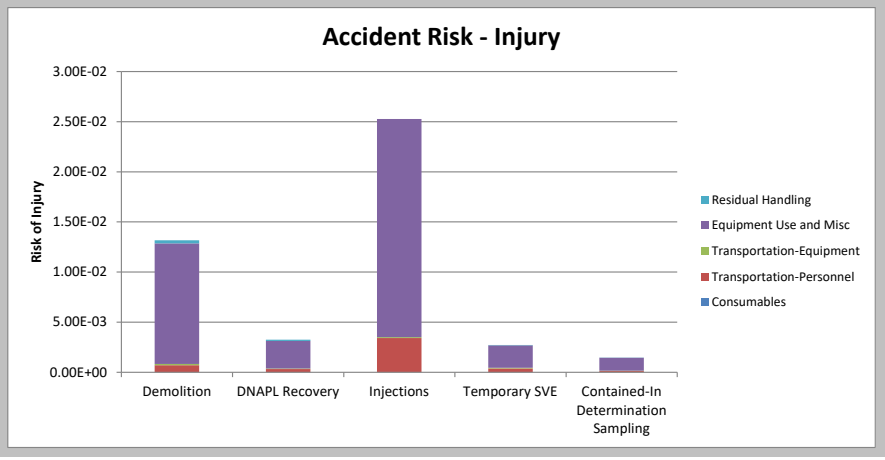

Onsite PM10 Emissions
Metric Ton
4.00E-03
3.50E-03
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

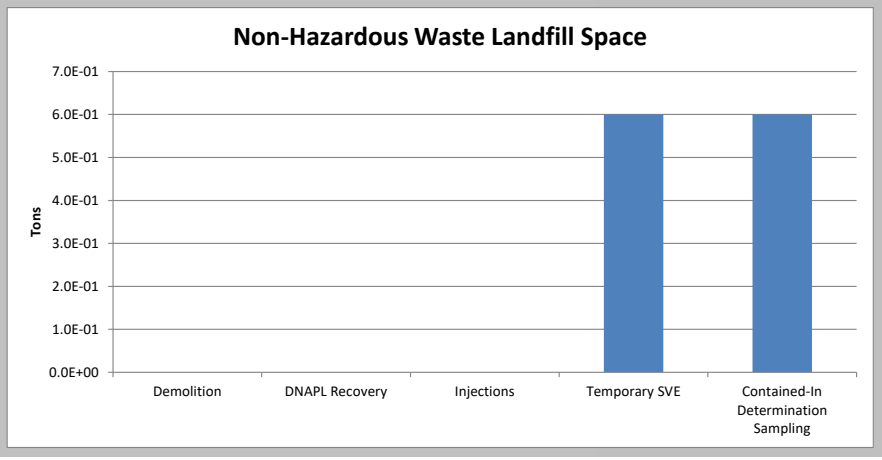

Total NOx Emissions
Metric Ton
1.20E+02
1.00E+02
8.00E+01
6.00E+01
4.00E+01
2.00E+01
0.00E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

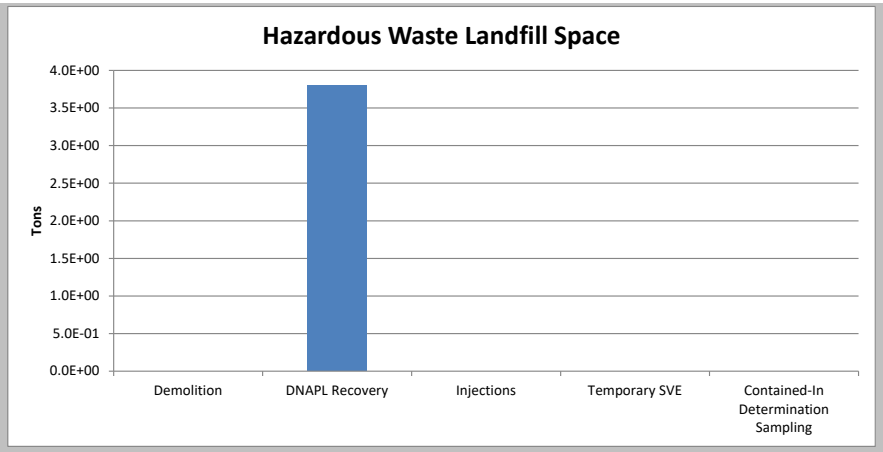

Total SOx Emissions
Metric Ton
2.50E+02
2.00E+02
1.50E+02
1.00E+02
5.00E+01
0.00E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

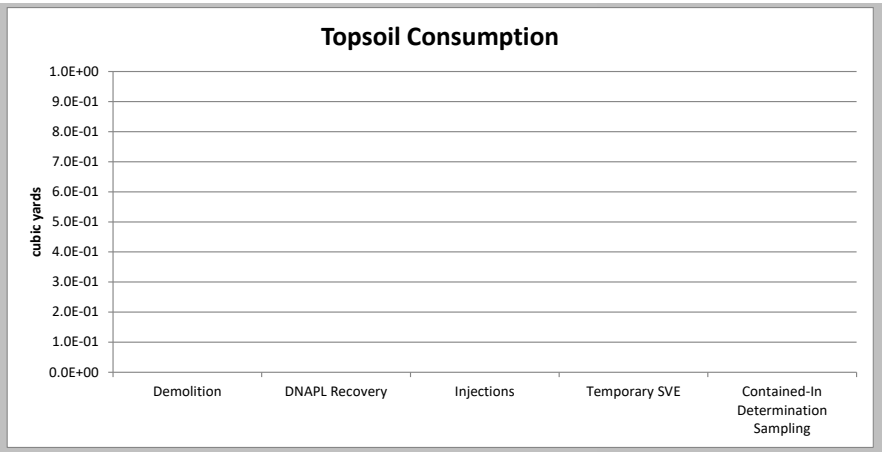

Total PM10 Emissions
Metric Ton
4.50E+01
4.00E+01
3.50E+01
3.00E+01
2.50E+01
2.00E+01
1.50E+01
1.00E+01
5.00E+00
0.00E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

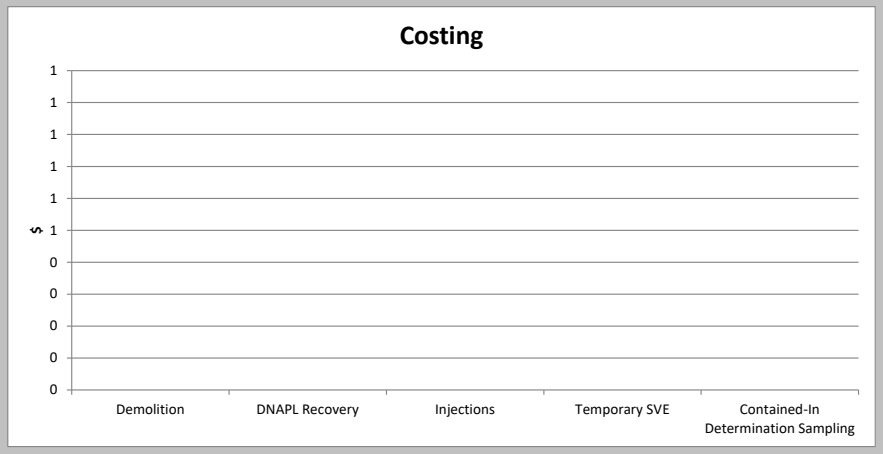

Accident Risk - Fatality
Risk of Fatality
1.20E-04
1.00E-04
8.00E-05
6.00E-05
4.00E-05
2.00E-05
0.00E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

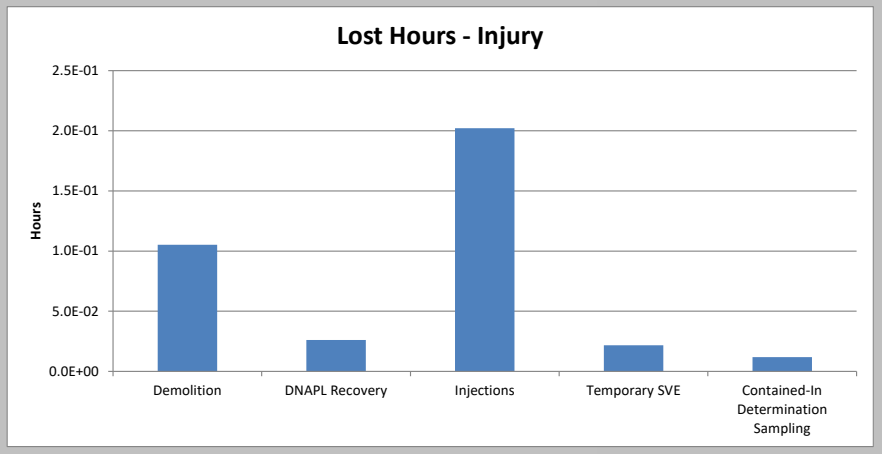

Accident Risk - Injury
Risk of Injury
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Non-Hazardous Waste Landfill Space
Tons
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling


Hazardous Waste Landfill Space
Tons
4.0E+00
3.5E+00
3.0E+00
2.5E+00
2.0E+00
1.5E+00
1.0E+00
5.0E-01
0.0E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling


Topsoil Consumption
cubic yards
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling


Costing
$
1
1
1
1
1
1
0
0
0
0
0
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling


Lost Hours - Injury
Hours
2.5E-01
2.0E-01
1.5E-01
1.0E-01
5.0E-02
0.0E+00
Demolition
DNAPL Recovery
Injections
Temporary SVE
Contained-In Determination Sampling

Component 1 – Demolition

Sustainable Remediation Summary - Demolition

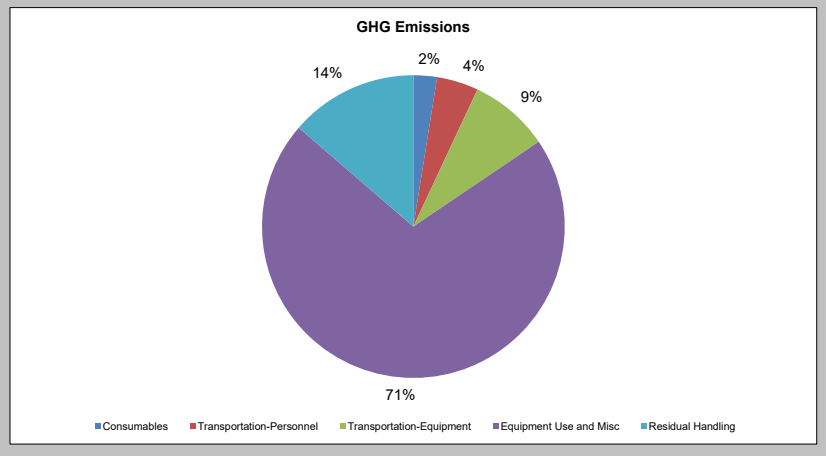
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	0.14	2.5	4.5E+00	4.6	NA	NA	NA	NA	NA	-	NA	-	NA	-	2.8E-04	1.2	5.0E-04	4.8	7.3E-05	2.7	NA	NA	NA	NA
Transportation-Personnel	0.24	4.5	3.1E+00	3.1	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.0E-04	0.4	3.2E-06	0.0	1.4E-05	0.5	8.7E-06	14.1	7.0E-04	5.3
Transportation-Equipment	0.47	8.6	6.1E+00	6.2	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.5E-04	0.6	2.6E-06	0.0	1.3E-05	0.5	1.6E-06	2.5	1.3E-04	1.0
Equipment Use and Misc	3.85	70.8	7.5E+01	76.2	1.1E+03	100.0	3.0E-02	100.0	1.2E-02	100.0	3.1E-03	100.0	1.6E-03	100.0	2.2E-02	96.7	1.0E-02	95.1	2.6E-03	95.5	4.8E-05	77.1	1.2E-02	91.3
Residual Handling	0.74	13.7	9.7E+00	9.9	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	2.3E-04	1.0	4.1E-06	0.0	2.1E-05	0.8	3.9E-06	6.3	3.1E-04	2.4
Total	5.44	100.0	9.79E+01	100.0	1.07E+03	100.0	2.98E-02	100.0	1.24E-02	100.0	3.06E-03	100.0	1.57E-03	100.0	2.31E-02	100.0	1.05E-02	100.0	2.69E-03	100.0	6.20E-05	100.0	1.32E-02	100.0

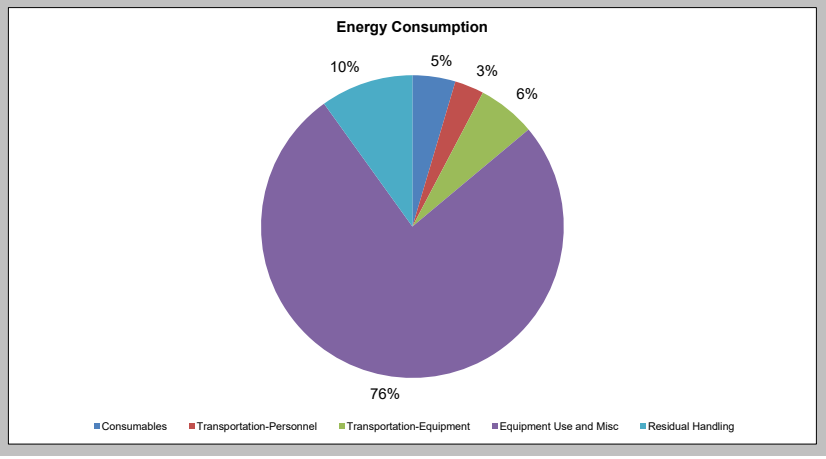
Additional Sustainability Metrics

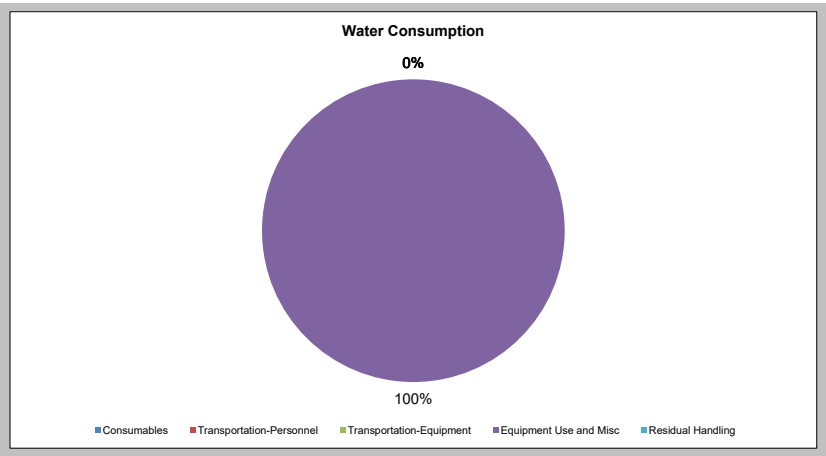
Non-Hazardous Waste Landfill Space (tons)	0.0
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd^3)	0.0
Cost of Phase ($)	0.0
Lost Hours - Injury	0.1

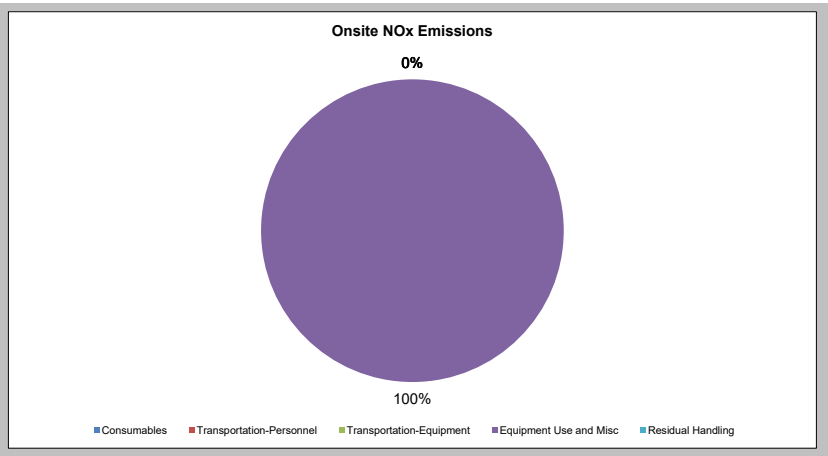
Footprint Reduction

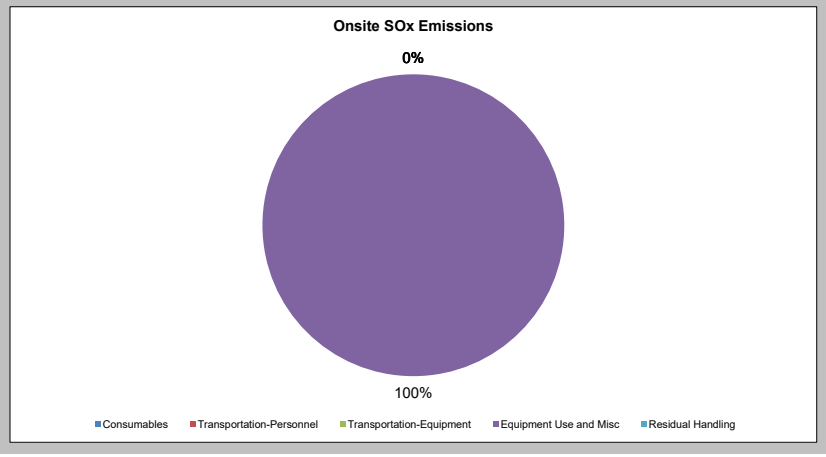
Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	24.2%
Landfill gas reduction (metric ton CO_2 e)	0.00E+00
GHG emissions (metric ton CO2 e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00

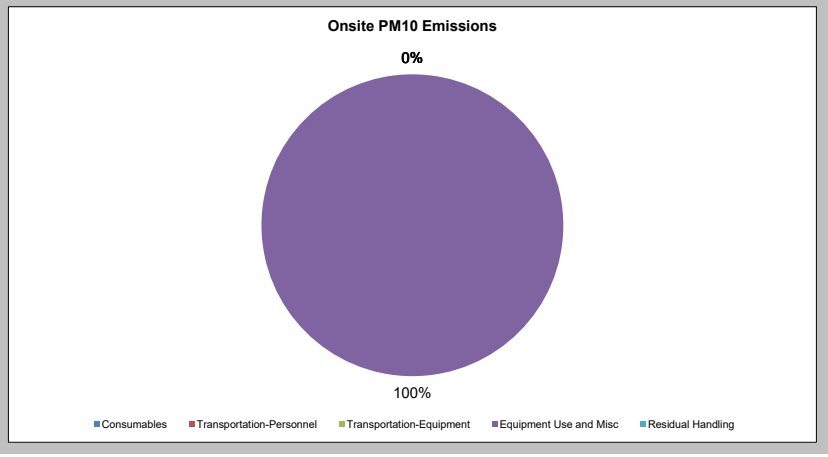


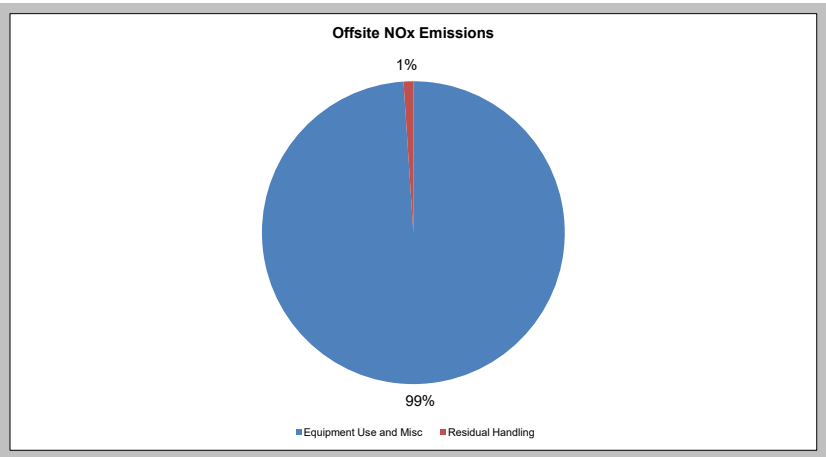


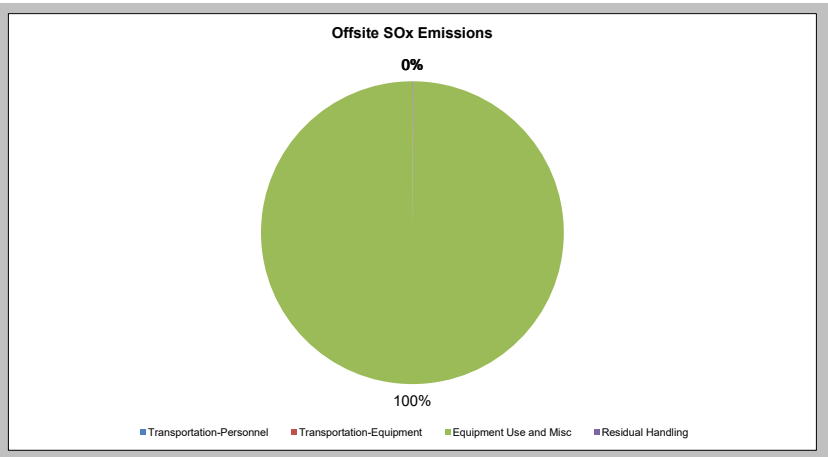

Water Consumption
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

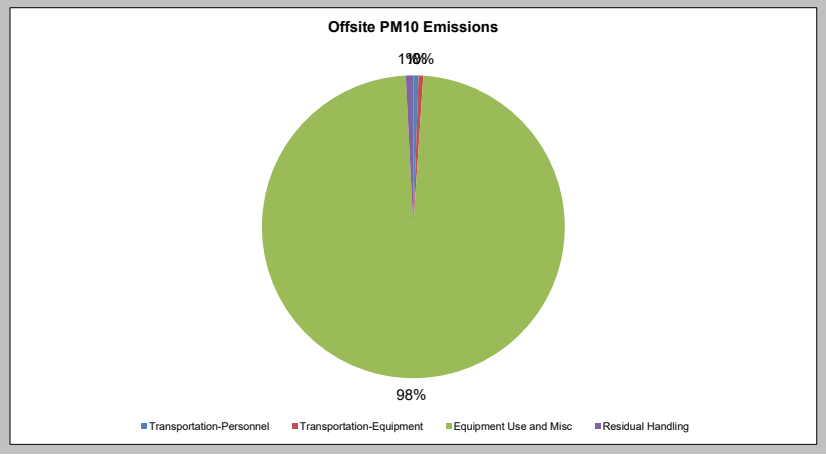

Onsite NOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

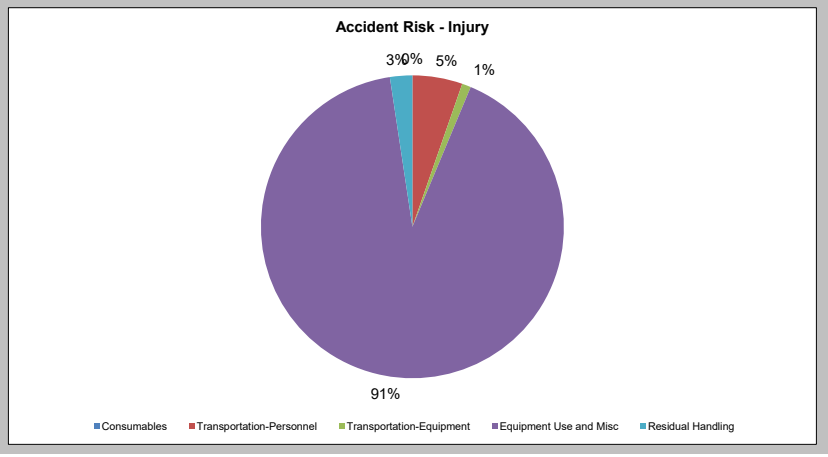

Onsite SOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

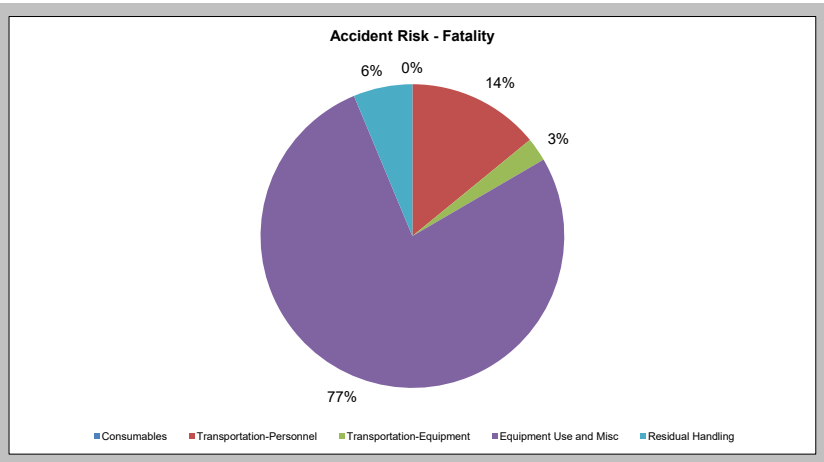

Onsite PM10 Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite NOx Emissions
1%
99%
Equipment Use and Misc
Residual Handling


Offsite SOx Emissions
0%
100%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite PM10 Emissions
98%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Injury
3%
0%
5%
1%
91%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Fatality
6%
0%
14%
3%
77%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

Component 2 – DNAPL Recovery

Sustainable Remediation Summary - DNAPL Recovery

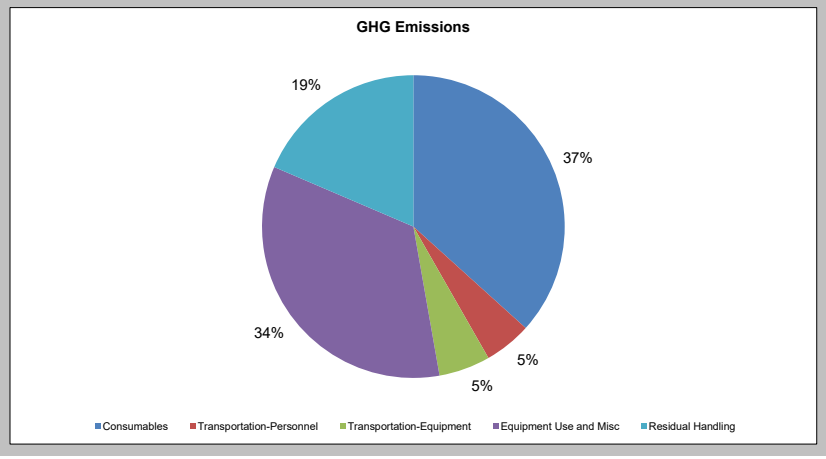
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	1.11	36.7	9.2E+01	78.3	NA	NA	NA	NA	NA	-	NA	-	NA	-	7.0E-04	7.9	1.1E-03	30.6	1.6E-04	9.3	NA	NA	NA	NA
Transportation-Personnel	0.15	5.0	1.9E+00	1.6	NA	NA	NA	NA	NA	-	NA	-	NA	-	5.9E-05	0.7	2.2E-05	0.6	8.4E-06	0.5	3.9E-06	27.1	3.2E-04	9.8
Transportation-Equipment	0.17	5.5	2.2E+00	1.9	NA	NA	NA	NA	NA	-	NA	-	NA	-	5.2E-05	0.6	9.3E-07	0.0	4.7E-06	0.3	7.8E-07	5.4	6.3E-05	1.9
Equipment Use and Misc	1.04	34.2	1.4E+01	11.7	3.0E+04	100.0	1.8E-01	100.0	5.2E-03	100.0	5.3E-04	100.0	4.7E-04	100.0	7.6E-03	86.0	2.3E-03	64.7	7.3E-04	43.6	8.3E-06	56.8	2.7E-03	84.4
Residual Handling	0.56	18.6	7.6E+00	6.5	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	4.3E-04	4.9	1.5E-04	4.0	7.7E-04	46.3	1.6E-06	10.7	1.3E-04	3.9
Total	3.04	100.0	1.17E+02	100.0	3.01E+04	100.0	1.85E-01	100.0	5.21E-03	100.0	5.32E-04	100.0	4.68E-04	100.0	8.82E-03	100.0	3.58E-03	100.0	1.67E-03	100.0	1.46E-05	100.0	3.26E-03	100.0

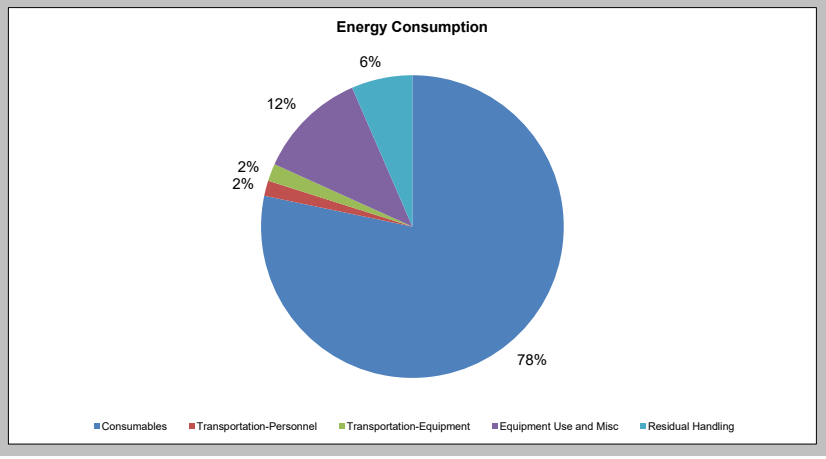
Additional Sustainability Metrics

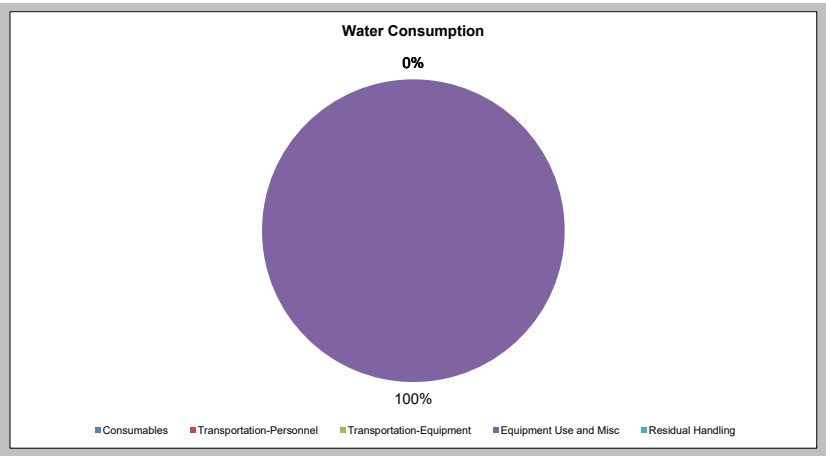
Non-Hazardous Waste Landfill Space (tons)	0.0
Hazardous Waste Landfill Space (tons)	3.8
Topsoil Consumption (yd^3)	0.0
Cost of Phase ($)	0.0
Lost Hours - Injury	0.0

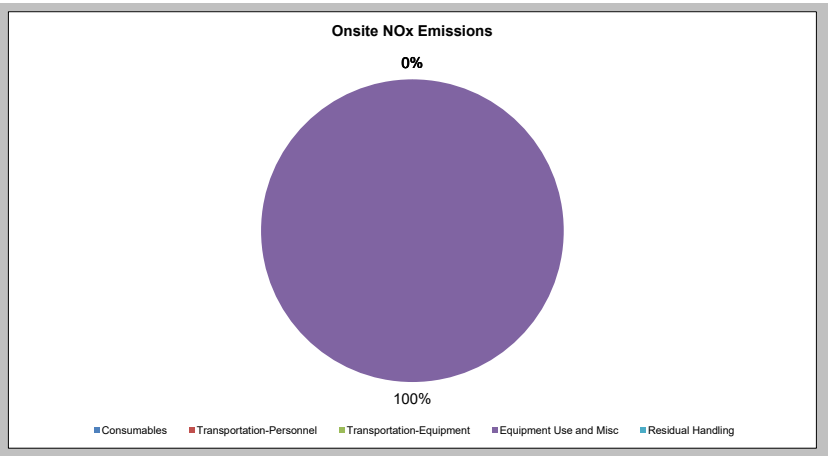
Footprint Reduction

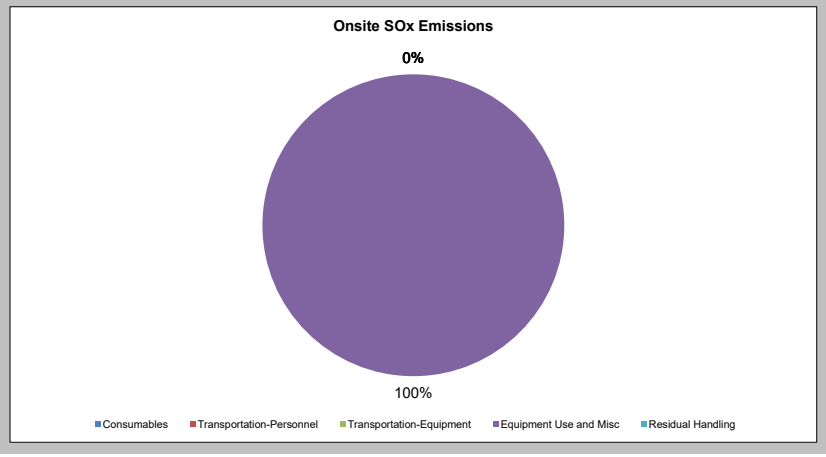
Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	24.2%
Landfill gas reduction (metric ton CO_2 e)	0.00E+00
GHG emissions (metric ton CO2 e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00

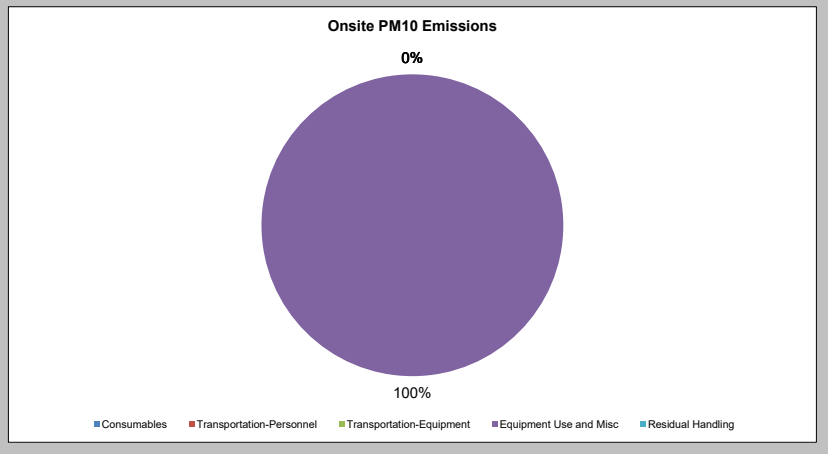


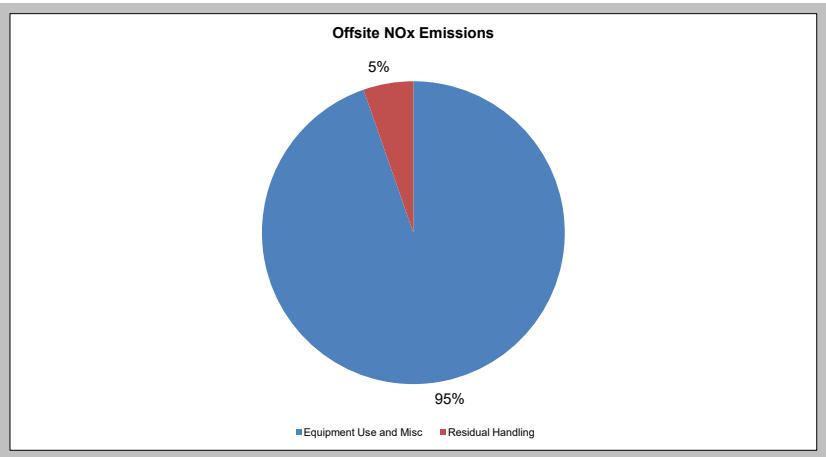


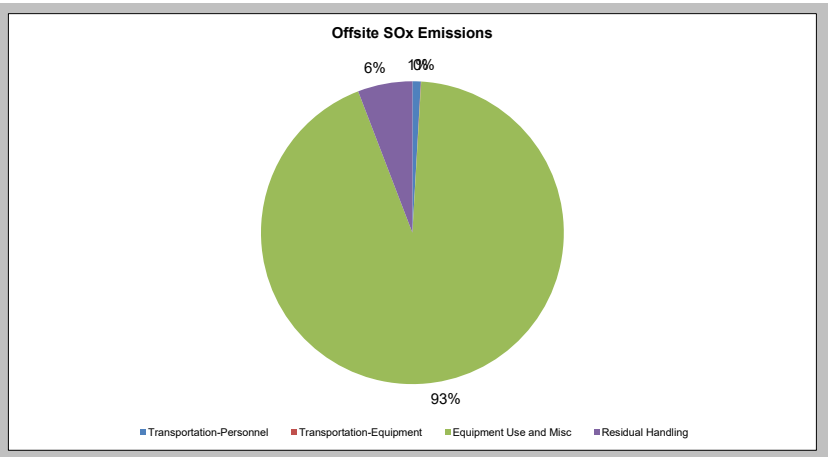

Water Consumption
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

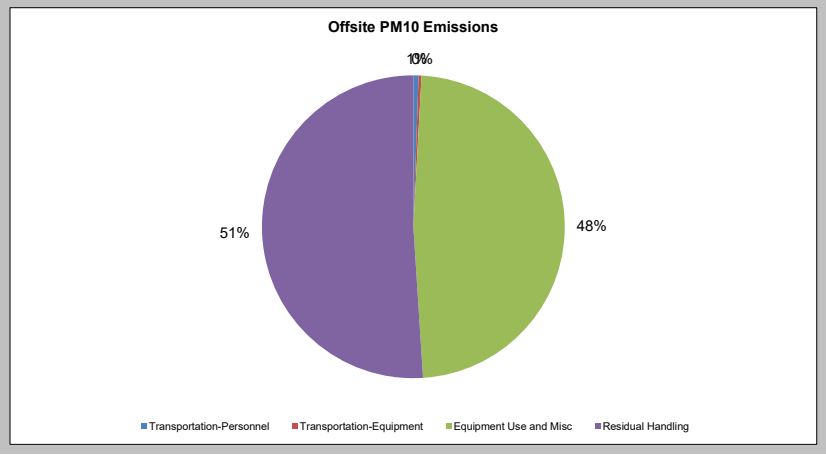

Onsite NOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

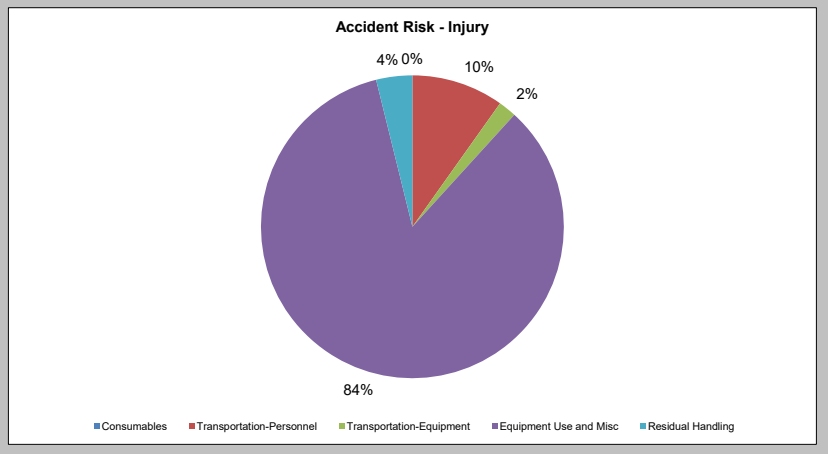

Onsite SOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

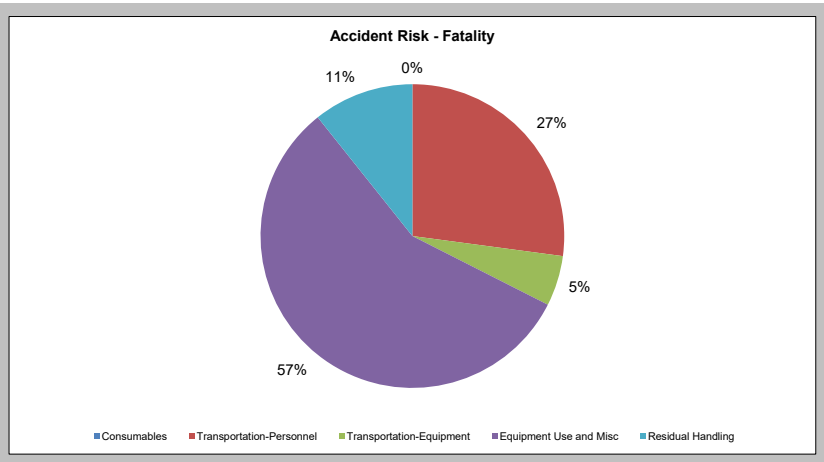

Onsite PM10 Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite NOx Emissions
5%
95%
Equipment Use and Misc
Residual Handling


Offsite SOx Emissions
6%
93%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite PM10 Emissions
51%
48%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Injury
4%
0%
10%
2%
84%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Fatality
0%
27%
5%
57%
11%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

Component 3 – Injections

Sustainable Remediation Summary - Injections

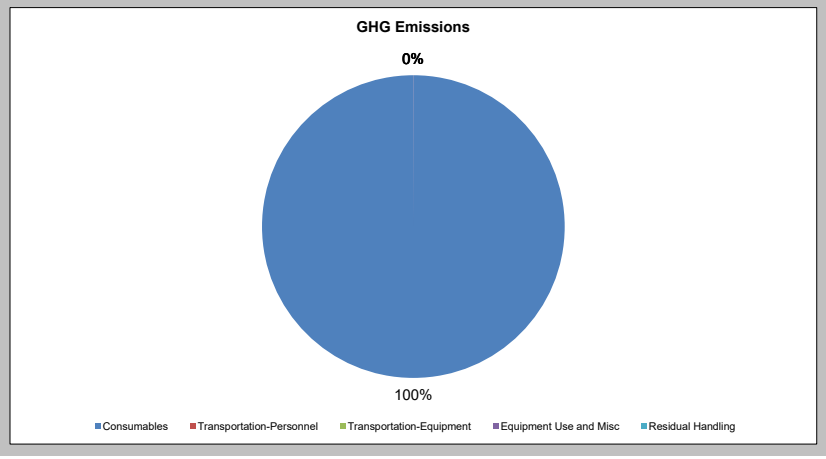
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	51,430.54	100.0	3.5E+05	100.0	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.0E+02	99.9	2.1E+02	100.0	4.1E+01	100.0	NA	NA	NA	NA
Transportation-Personnel	1.57	0.0	2.0E+01	0.0	NA	NA	NA	NA	NA	-	NA	-	NA	-	6.3E-04	0.0	1.2E-04	0.0	8.9E-05	0.0	4.2E-05	39.4	3.4E-03	13.5
Transportation-Equipment	0.22	0.0	3.0E+00	0.0	NA	NA	NA	NA	NA	-	NA	-	NA	-	7.1E-05	0.0	2.9E-06	0.0	5.8E-06	0.0	1.2E-06	1.1	9.4E-05	0.4
Equipment Use and Misc	9.64	0.0	1.3E+02	0.0	9.4E+04	100.0	1.1E-02	100.0	3.8E-02	100.0	4.0E-03	100.0	3.6E-03	100.0	6.1E-02	0.1	2.0E-02	0.0	6.3E-03	0.0	6.4E-05	59.6	2.2E-02	86.1
Residual Handling	0.00	-	0.0E+00	-	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	0.0E+00	-
Total	51,441.97	100.0	3.53E+05	100.0	9.45E+04	100.0	1.12E-02	100.0	3.80E-02	100.0	3.99E-03	100.0	3.57E-03	100.0	1.03E+02	100.0	2.06E+02	100.0	4.12E+01	100.0	1.08E-04	100.0	2.53E-02	100.0

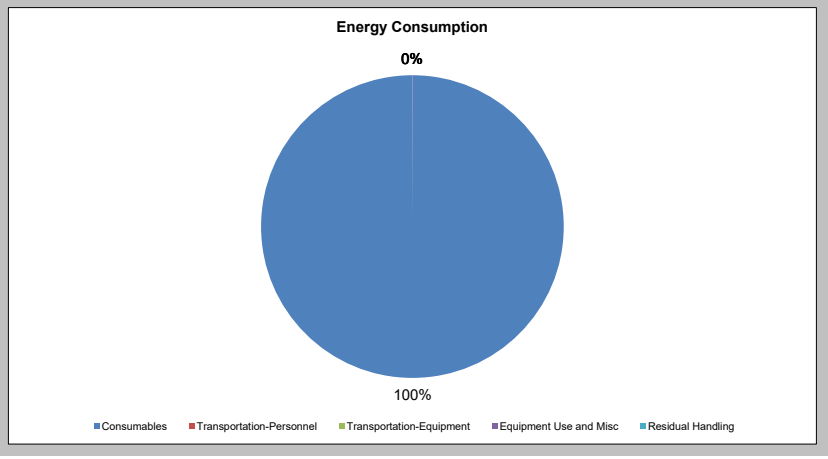
Additional Sustainability Metrics

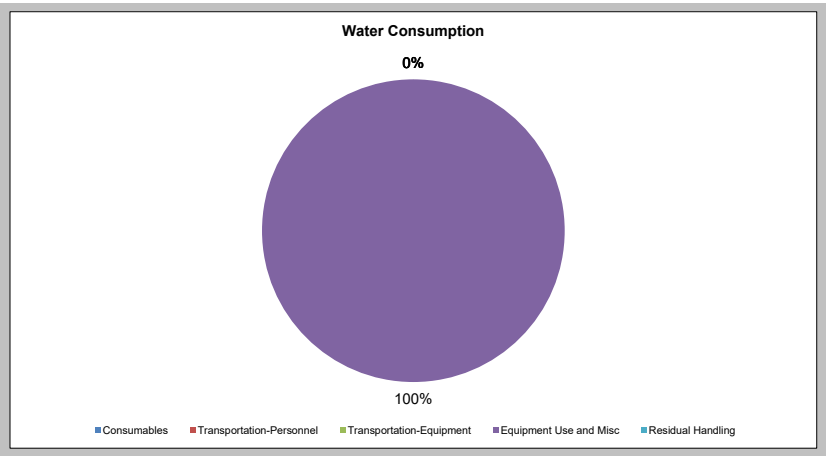
Non-Hazardous Waste Landfill Space (tons)	0.0
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd^3)	0.0
Cost of Phase ($)	0.0
Lost Hours - Injury	0.2

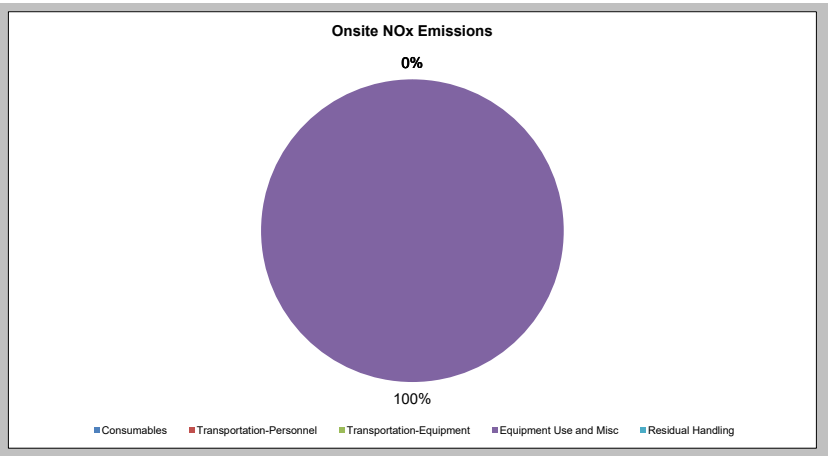
Footprint Reduction

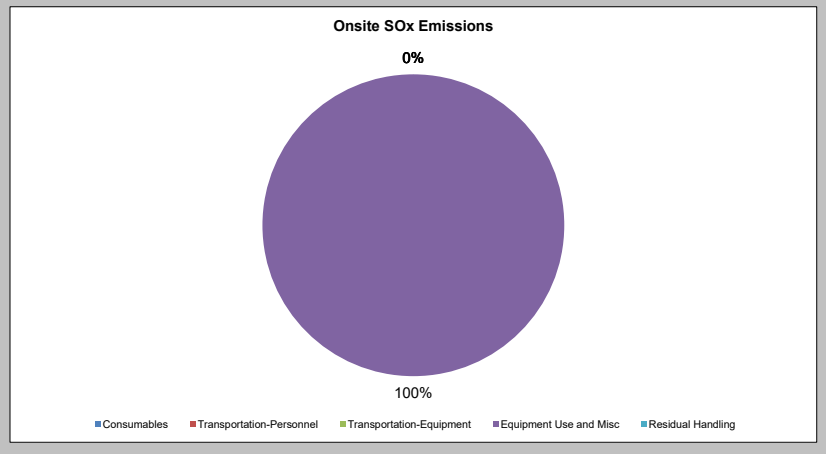
Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	24.2%
Landfill gas reduction (metric ton CO_2 e)	0.00E+00
GHG emissions (metric ton CO2 e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00

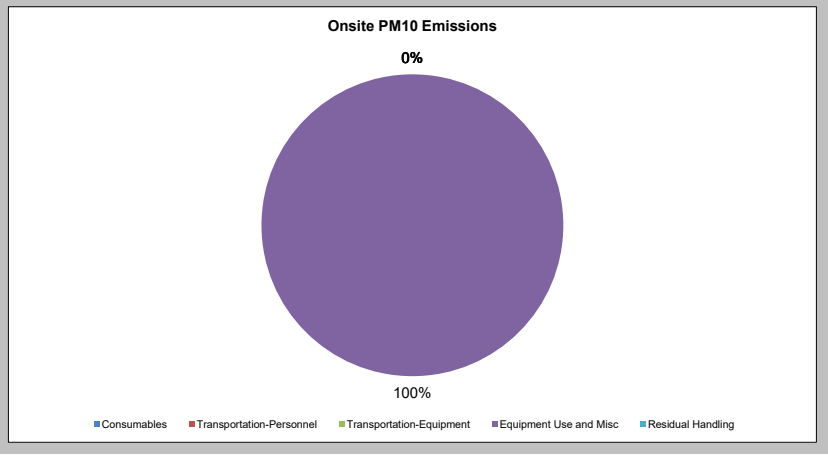


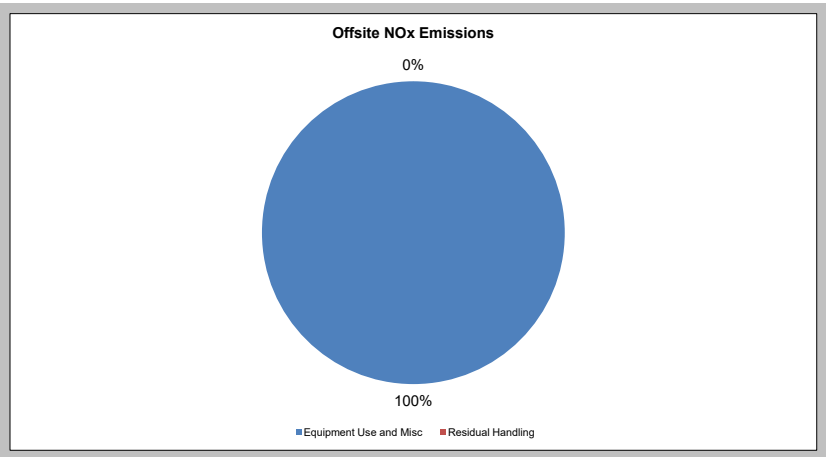


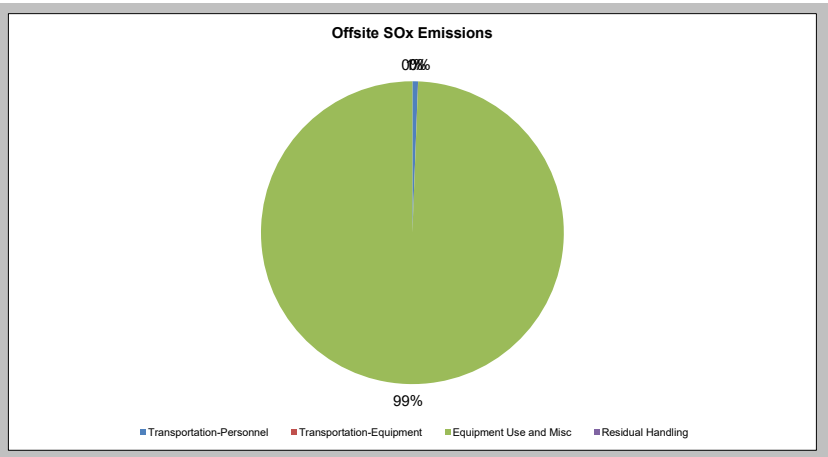

Water Consumption
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

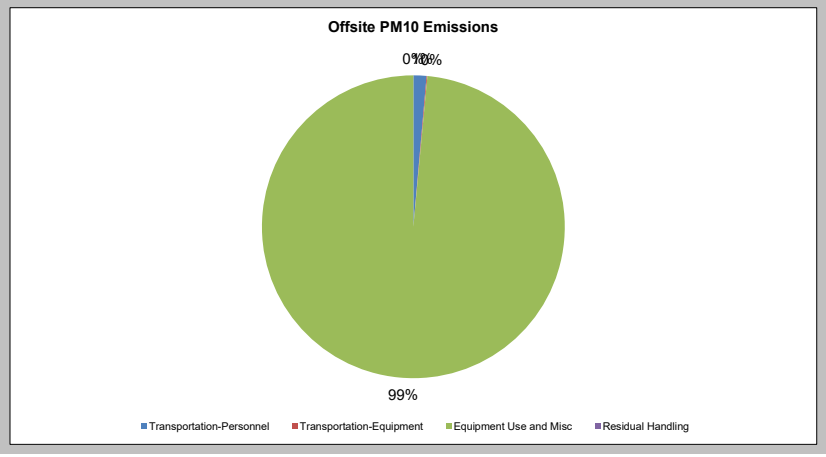

Onsite NOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

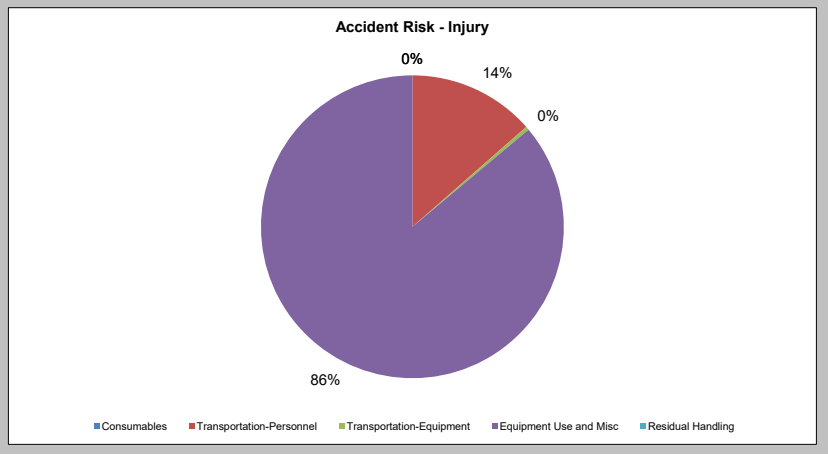

Onsite SOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

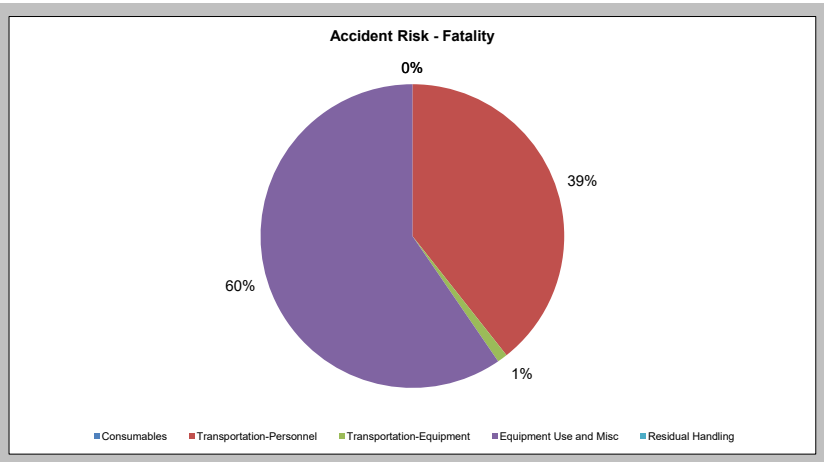

Onsite PM10 Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite NOx Emissions
0%
100%
Equipment Use and Misc
Residual Handling


Offsite SOx Emissions
99%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite PM10 Emissions
99%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Injury
0%
14%
0%
86%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Fatality
0%
39%
60%
1%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

Component 4 – Temporary SVE

Sustainable Remediation Summary - Temporary SVE

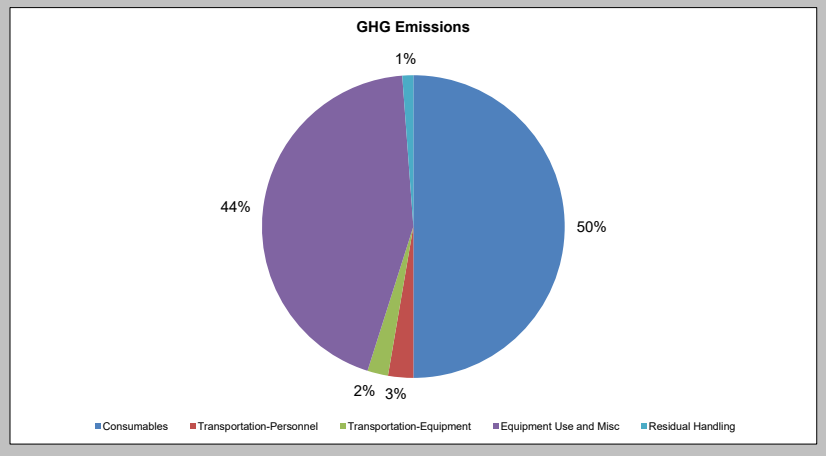
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	3.31	50.0	4.4E+02	88.7	NA	NA	NA	NA	NA	-	NA	-	NA	-	1.3E-03	11.2	2.1E-03	20.9	3.1E-04	15.6	NA	NA	NA	NA
Transportation-Personnel	0.18	2.7	2.2E+00	0.5	NA	NA	NA	NA	NA	-	NA	-	NA	-	7.0E-05	0.6	1.9E-05	0.2	1.0E-05	0.5	4.7E-06	42.6	3.8E-04	14.0
Transportation-Equipment	0.15	2.2	2.0E+00	0.4	NA	NA	NA	NA	NA	-	NA	-	NA	-	4.7E-05	0.4	1.9E-06	0.0	3.8E-06	0.2	7.8E-07	7.0	6.3E-05	2.3
Equipment Use and Misc	2.91	43.9	5.1E+01	10.2	1.6E+03	100.0	3.2E+00	100.0	6.9E-04	100.0	7.0E-05	100.0	6.2E-05	100.0	1.0E-02	87.3	7.9E-03	78.7	1.5E-03	78.1	5.2E-06	46.9	2.2E-03	82.5
Residual Handling	0.08	1.2	1.1E+00	0.2	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	6.0E-05	0.5	2.1E-05	0.2	1.1E-04	5.6	3.9E-07	3.5	3.1E-05	1.2
Total	6.63	100.0	4.94E+02	100.0	1.65E+03	100.0	3.23E+00	100.0	6.88E-04	100.0	7.03E-05	100.0	6.19E-05	100.0	1.19E-02	100.0	1.01E-02	100.0	1.97E-03	100.0	1.11E-05	100.0	2.72E-03	100.0

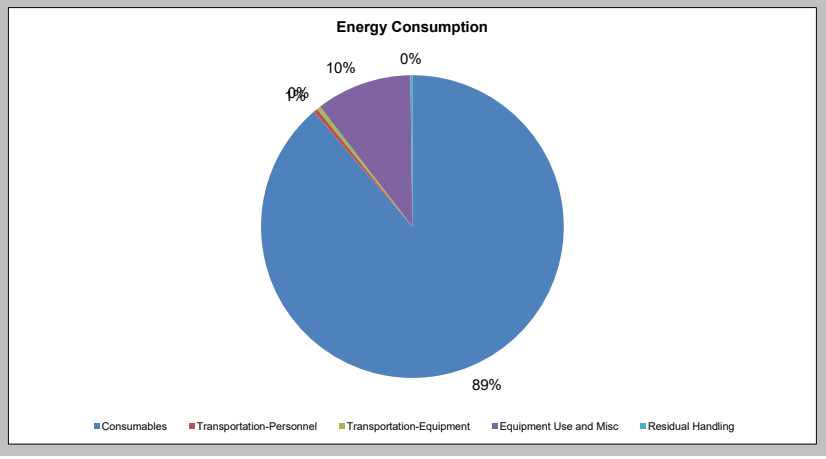
Additional Sustainability Metrics

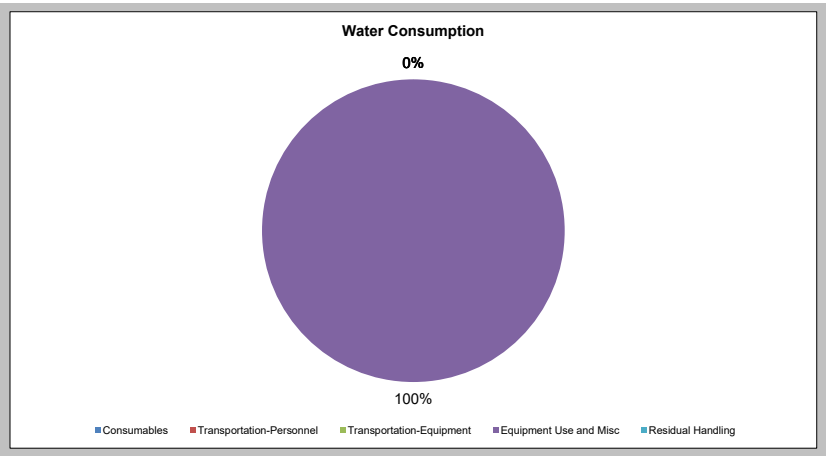
Non-Hazardous Waste Landfill Space (tons)	0.6
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd^3)	0.0
Cost of Phase ($)	0.0
Lost Hours - Injury	0.0

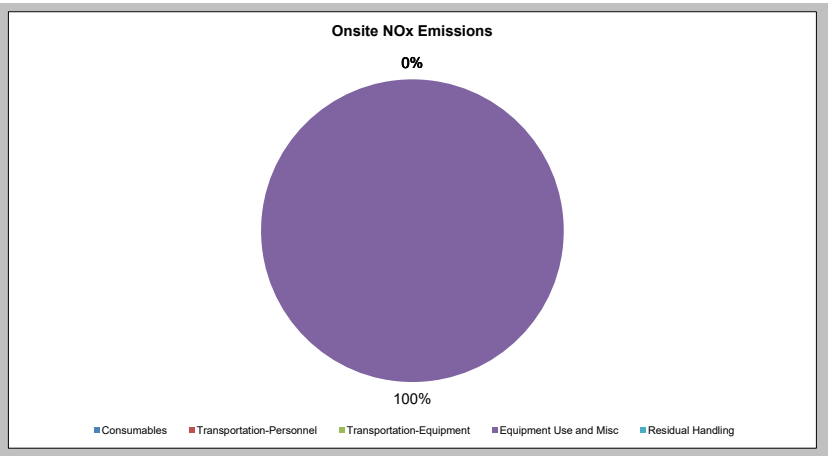
Footprint Reduction

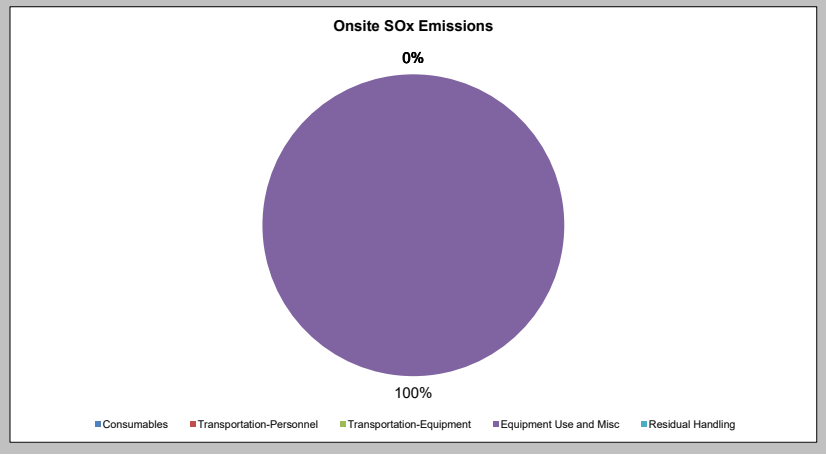
Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	24.2%
Landfill gas reduction (metric ton CO_2 e)	0.00E+00
GHG emissions (metric ton CO2 e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00

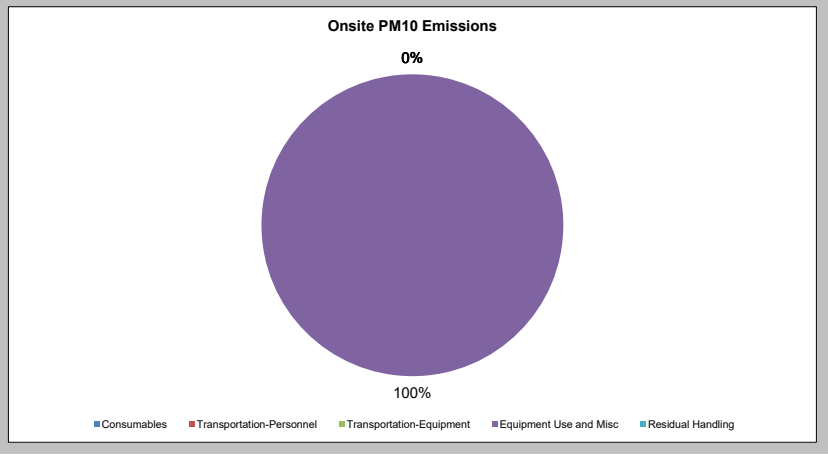


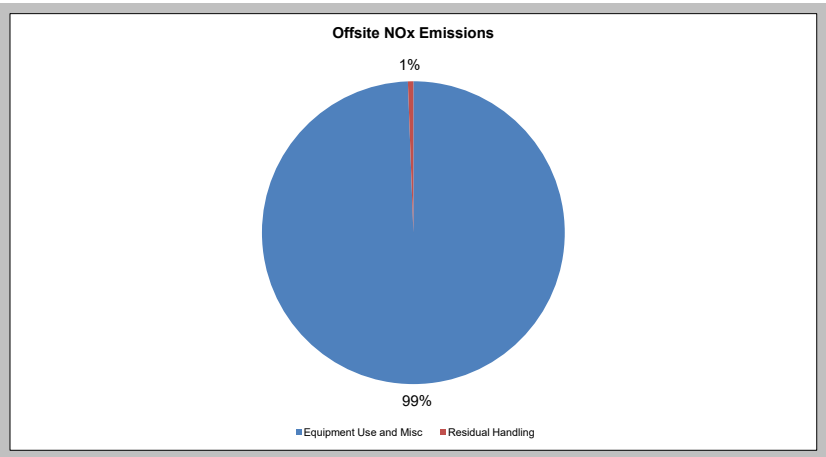


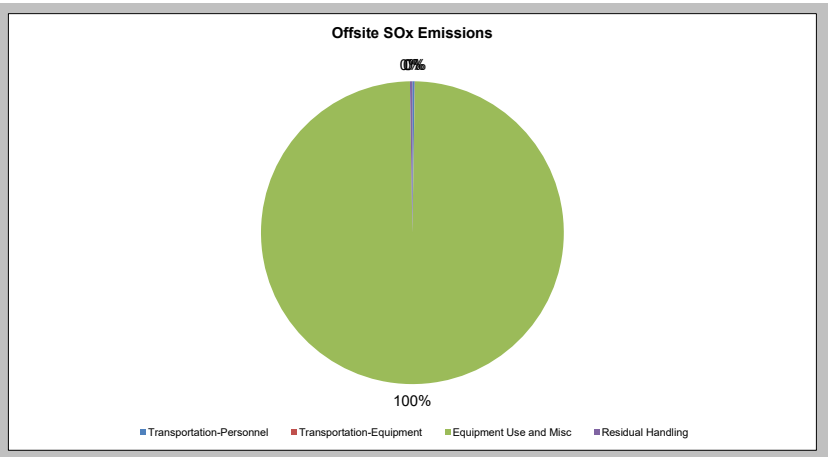

Water Consumption
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

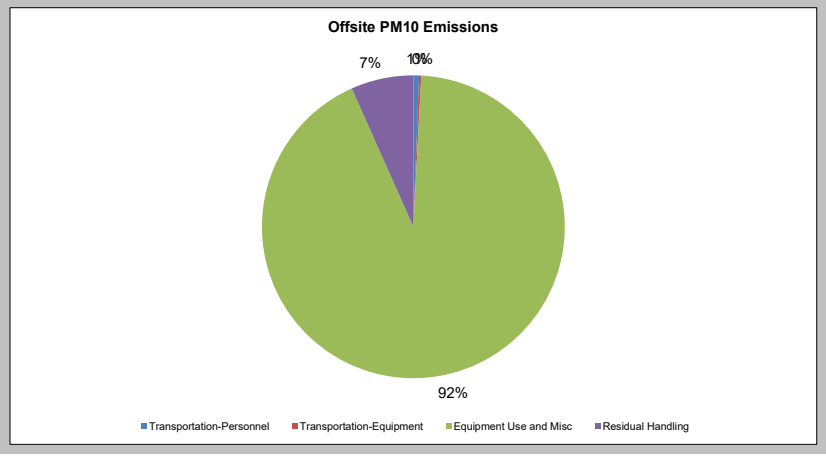

Onsite NOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

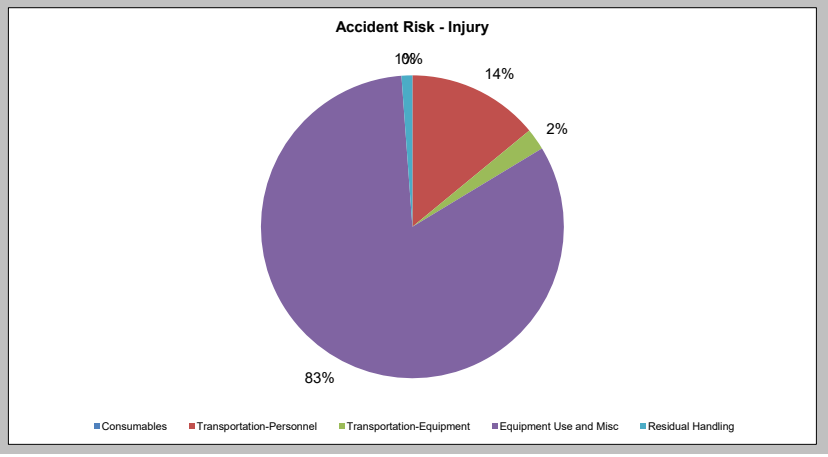

Onsite SOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

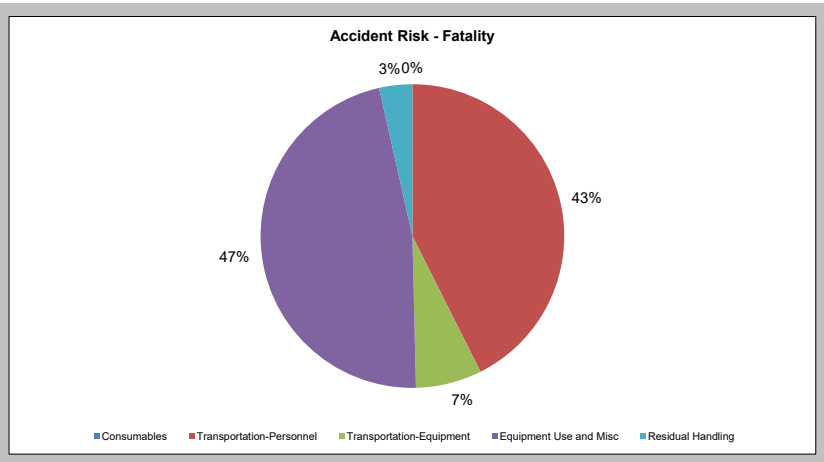

Onsite PM10 Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite NOx Emissions
1%
99%
Equipment Use and Misc
Residual Handling


Offsite SOx Emissions
100%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite PM10 Emissions
7%
92%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Injury
14%
2%
83%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Fatality
3%
0%
43%
47%
7%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

Component 5 – Contained-In Determination Sampling

Sustainable Remediation Summary - Contained-In Determination Sampling

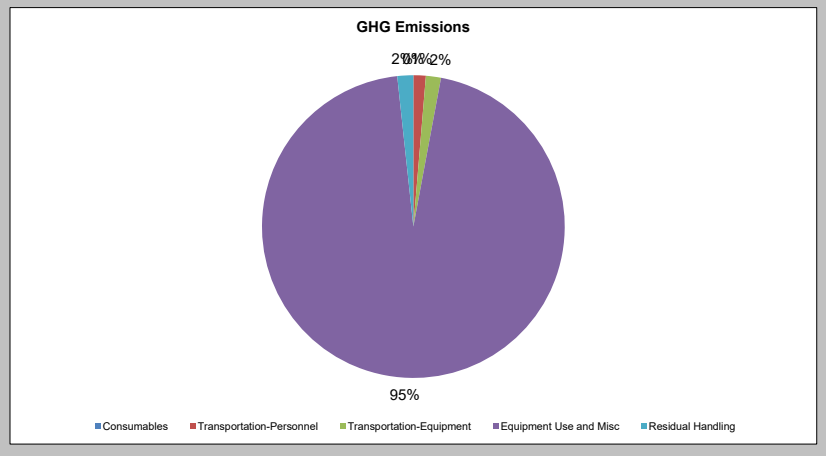
Activities	GHG Emissions	Percent Total	Total Energy Used	Percent Total	Water Consumption	Percent Total	Electricity Usage	Percent Total	Onsite NOx Emissions	Percent Total	Onsite SOx Emissions	Percent Total	Onsite PM10 Emissions	Percent Total	Total NOx Emissions	Percent Total	Total SOx Emissions	Percent Total	Total PM10 Emissions	Percent Total	Accident Risk Fatality	Percent Total	Accident Risk Injury	Percent Total
	metric ton	%	MMBTU	%	gallons	%	MWH	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%	metric ton	%		%		%
Consumables	0.00	-	0.0E+00	-	NA	NA	NA	NA	NA	-	NA	-	NA	-	0.0E+00	-	0.0E+00	-	0.0E+00	-	NA	NA	NA	NA
Transportation-Personnel	0.06	1.3	7.6E-01	1.2	NA	NA	NA	NA	NA	-	NA	-	NA	-	2.3E-05	0.1	7.5E-06	0.0	3.3E-06	0.2	1.6E-06	26.4	1.3E-04	8.7
Transportation-Equipment	0.07	1.6	1.0E+00	1.6	NA	NA	NA	NA	NA	-	NA	-	NA	-	2.4E-05	0.1	9.6E-07	0.0	1.9E-06	0.1	3.9E-07	6.5	3.1E-05	2.1
Equipment Use and Misc	4.35	95.4	6.2E+01	95.6	5.0E+00	100.0	0.0E+00	0.0	1.7E-03	100.0	1.8E-04	100.0	1.5E-04	100.0	2.2E-02	99.5	1.5E-02	99.8	1.8E-03	94.1	3.6E-06	60.5	1.3E-03	87.1
Residual Handling	0.08	1.7	1.1E+00	1.6	NA	NA	NA	NA	0.0E+00	-	0.0E+00	-	0.0E+00	-	6.0E-05	0.3	2.1E-05	0.1	1.1E-04	5.7	3.9E-07	6.5	3.1E-05	2.1
Total	4.56	100.0	6.46E+01	100.0	5.00E+00	100.0	0.00E+00	0.0	1.72E-03	100.0	1.76E-04	100.0	1.55E-04	100.0	2.19E-02	100.0	1.53E-02	100.0	1.95E-03	100.0	5.97E-06	100.0	1.47E-03	100.0

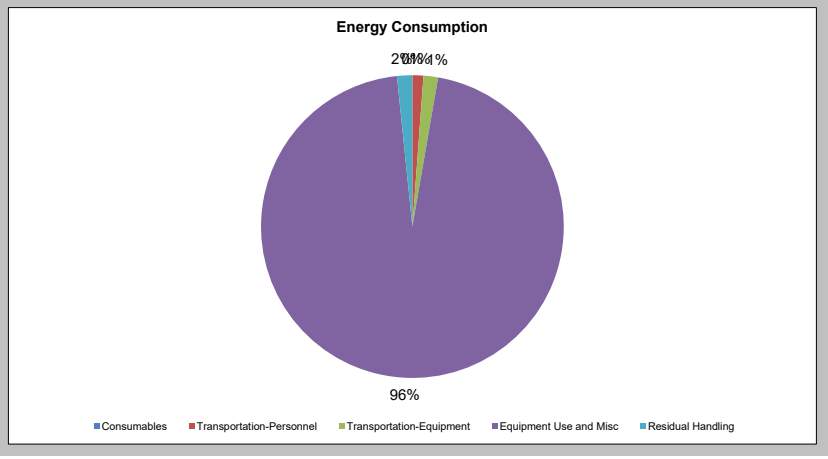
Additional Sustainability Metrics

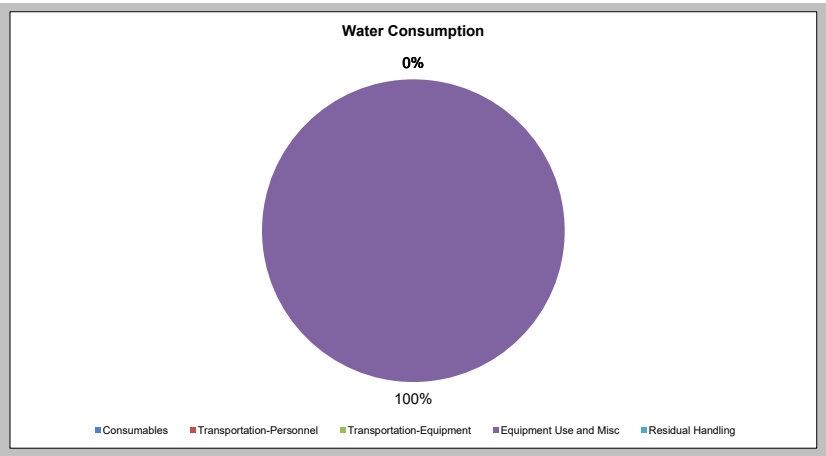
Non-Hazardous Waste Landfill Space (tons)	0.6
Hazardous Waste Landfill Space (tons)	0.0
Topsoil Consumption (yd^3)	0.0
Cost of Phase ($)	0.0
Lost Hours - Injury	0.0

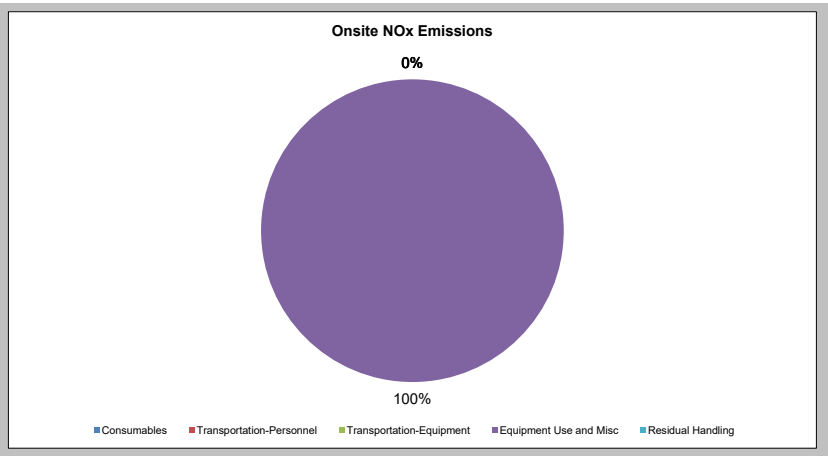
Footprint Reduction

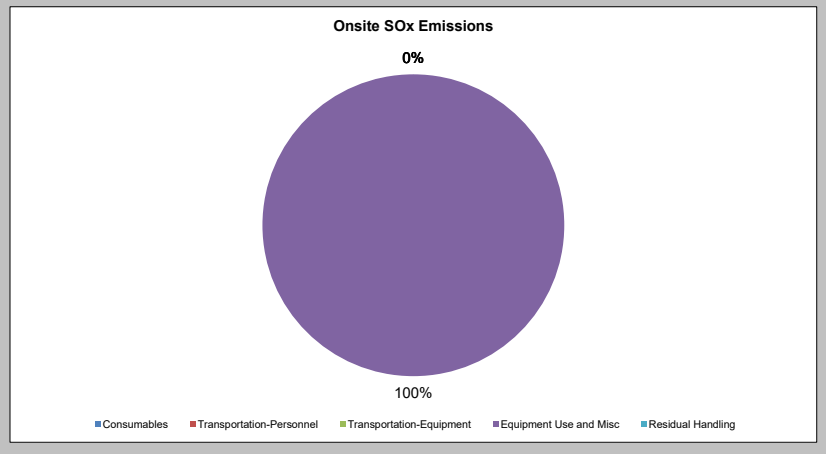
Total electricity replacement (MWh)	0.00E+00
Total electricity replacement (mmBtu)	0.00E+00
Percent electricity from renewable sources (%)	0.0%
Landfill gas reduction (metric ton CO_2 e)	0.00E+00
GHG emissions (metric ton CO2 e)	0.00E+00
NOx emissions (metric ton)	0.00E+00
SOx emissions (metric ton)	0.00E+00
PM10 emissions (metric ton)	0.00E+00

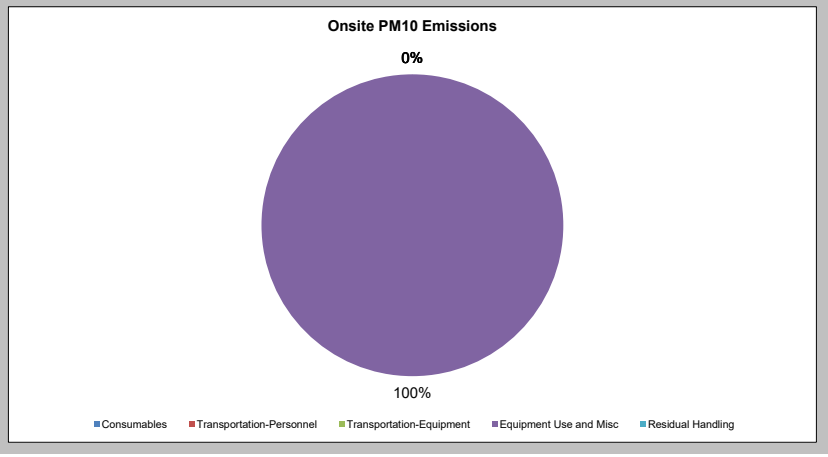


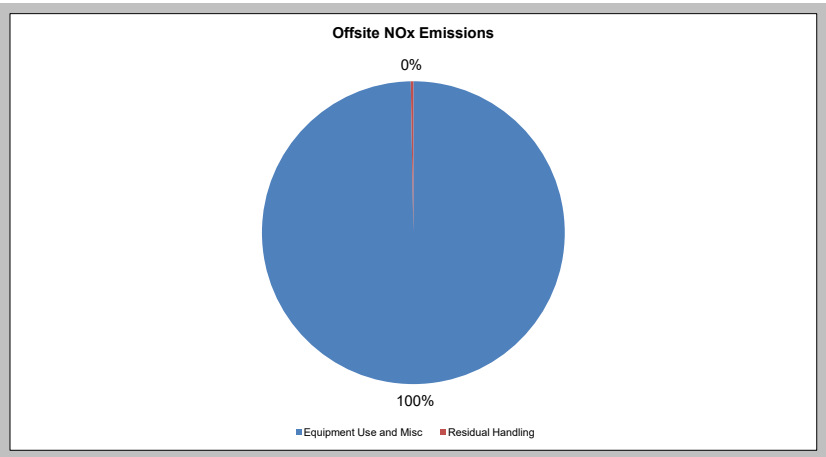


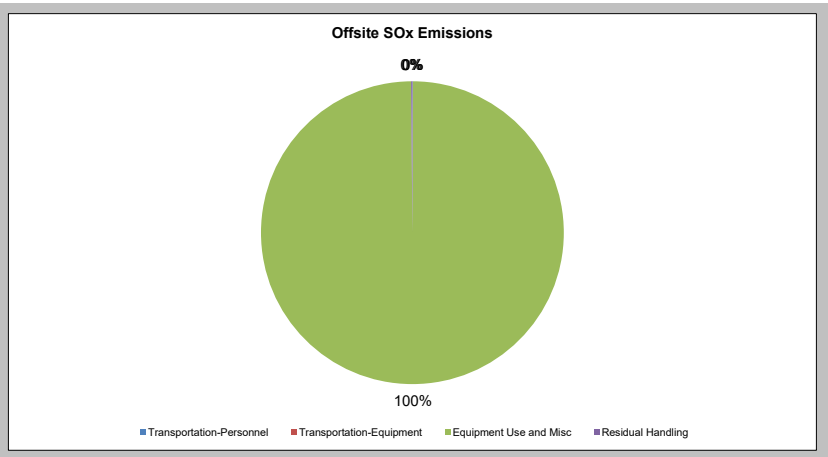

Water Consumption
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

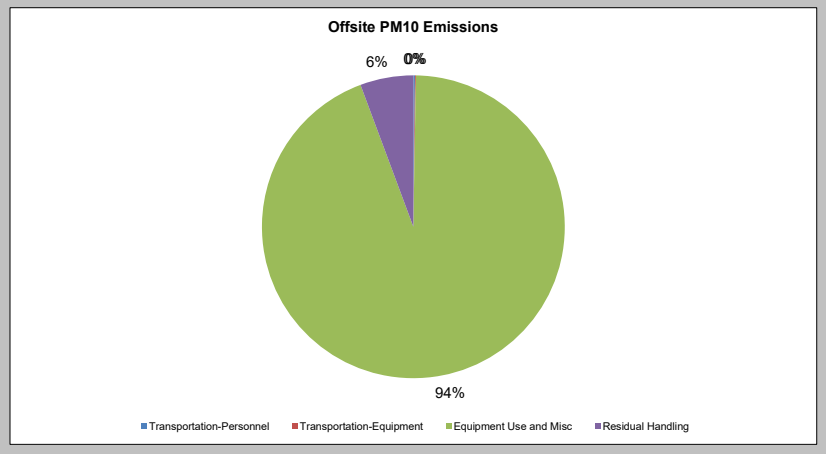

Onsite NOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

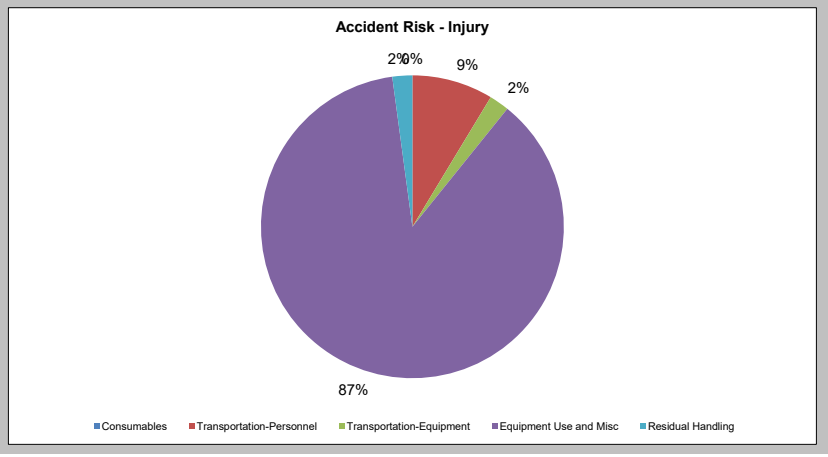

Onsite SOx Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

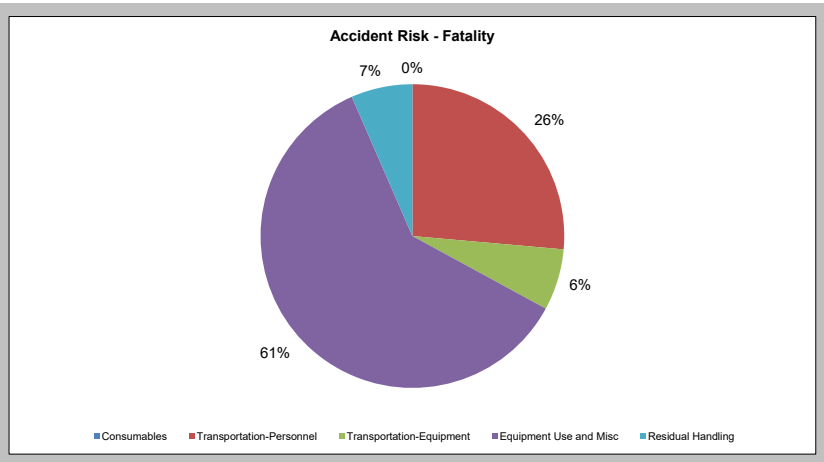

Onsite PM10 Emissions
0%
100%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite NOx Emissions
0%
100%
Equipment Use and Misc
Residual Handling


Offsite SOx Emissions
0%
100%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Offsite PM10 Emissions
6%
0%
94%
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling


Accident Risk - Injury
2%
0%
9%
2%
87%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

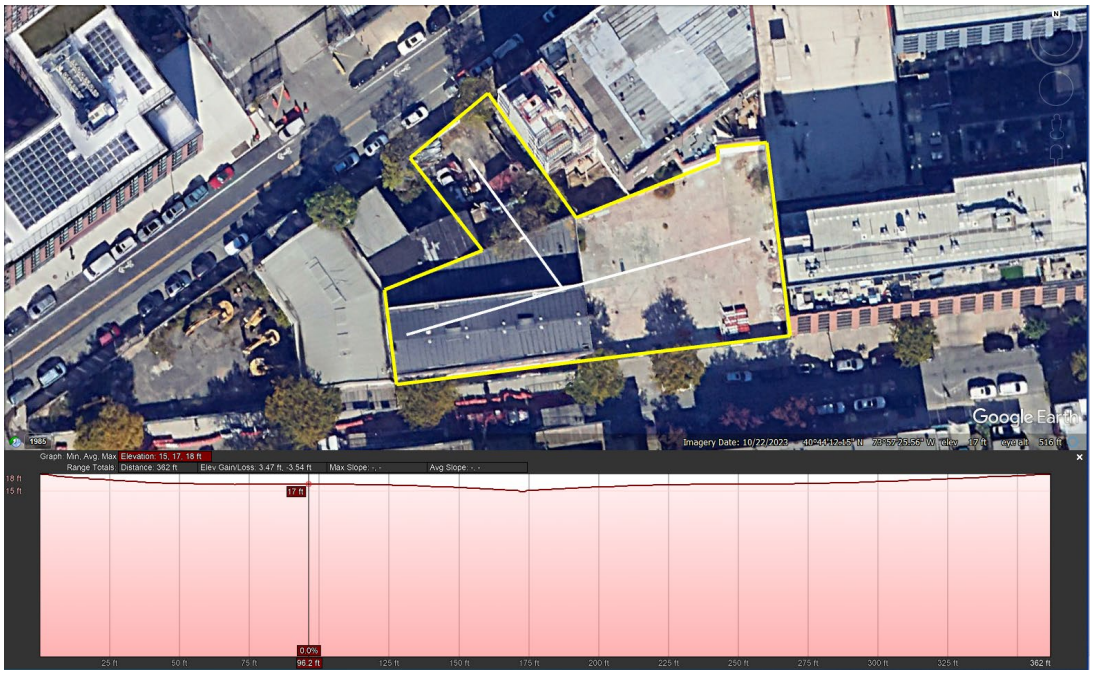

Accident Risk - Fatality
7%
0%
26%
6%
61%
Consumables
Transportation-Personnel
Transportation-Equipment
Equipment Use and Misc
Residual Handling

Attachment 2 – Climate Screening Checklist

Climate Screening Checklist -- Example

Background

- Project Manager: Victoria Whelan
- Site Name: 19-27 Clay Street & 60-62 Commercial Street
- Site Number: C224390
- Site Location: 19-27 Clay Street & 60-62 Commercial Street, Brooklyn, NY
- Site Elevation (average above sea level): Approximately 17 feet above sea level (from google earth).



- ClimAID region: Region 4—New York City and Long Island

- Remedial Stage/Site Classification: Site Classification A

- Contamination -- Media Impacted/Contaminants of Concern:

- Soil – VOCs (xylene, naphthalene, n-butylbenzene, 1,2,4-trimethylbenzene, PCE, TCE, cis-1,2- DCE, 1,1- DCA, trans-1,2- DCE, and acetone), SVOCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene), metals (copper, lead, mercury, and zinc), pesticides (4,4'-DDE and 4,4'-DDT), and perfluoroalkyl substances (PFOS)
- Groundwater – VOCs (1,2,4,5-tetramethylbenzene, 1,2,4-trimethylbenzne, ethylbenzene, isopropylbenzene, naphthalene, n-butylbenzene, n-propylbenzene, o-xylene, p/m-xylene, and sec-butylbenzene), SVOCs (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, and indeno[1,2,3-cd]pyrene), Metals (iron, magnesium, manganese, and sodium), pesticides (Dieldrin), and perfluoroalkyl substances (PFBS, PFOA, and PFOS)
- Soil Vapor – VOCs (PCE, TCE, 1,1,1-TCA, 1,1-cis DCE, carbon tetrachloride, cis 1,2 DCE, and vinyl chloride)

- Proposed/Current Remedy: The proposed interim remedial measures (IRMs) include pre-demolition survey and building demolition, dense non-aqueous phase liquid (DNAPL) recovery and delineation, groundwater injections, a temporary soil vapor extraction (SVE) system, and contained-in determination sampling of soils.

- What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years?
  The proposed IRMs are intended to be in place for approximately 3 months in order to limit the potential for exposure to hazardous materials prior to the construction phase and full scale remediation. The temporary SVE system is intended to be in operation during the 3 month period, but will be designed to operate during the construction phase if vapor sampling indicates the continued presence of VOCs above screening criteria.

Is the site in a disadvantaged community (DAC) or potential environmental justice area (PEJA) (Use DECinfolocator: DECinfo Locator (ny.gov))?

☐**Yes** ☐ **No**

If the site is in a DAC or PEJA, will climate impacts be magnified? If yes, list how and why.

☐**Yes** ☒ **No**

Should thresholds of concern be lowered to account for magnification of impacts? If yes, indicate how lower thresholds will be used in the screening.

☐**Yes** ☒ **No**

Climate Screening Table*

Potential Climate Hazards	**Relevant to the Site Location (Y/N/NA)** [1]	**Projected Change (**Put the reference document/model used here) [3]	**Potential to Impact Remedy (Y/N)**	**Is remedy/site already resilient? (Y/N)** [4]
Precipitation	Potentially	Based upon FEMA's Resiliency Analysis Planning Tool the annual rain fall is projected to increase between 7.62 and 11.20 inches by the end of the century	Y	Y The remedy is already resilient as the SVE system is the only portion of the remedy that could be impacted from precipitation and the system will be equipped with a telemetry system to remotely notify loss of operations.
Temperature (Extreme Heat or Cold Weather Impacts) [2]	Y	Based upon FEMA's Resiliency Analysis Planning Tool, by the end of the century there will be an estimated increase of 525.15 cooling degree days.	N	N/A
Sea Level Rise	N	N - Based upon the NOAA's Sea Level Rise Viewer the site is not impacted at 10 feet of SLR.	N	N/A

Flooding[5]	Y	Based upon FEMA's Resiliency Analysis Planning Tool, a portion of the site falls within the 0.2% annual chance flood hazard area.	N	N/A
Storm Surge	Y	Y – NOAA's Storm Surge Risk Maps tool indicates that the site could be impacted by less than 3 ft of water during category 1 hurricanes and over 9 ft of water for category 3 and higher hurricanes	N	N/A
Wildfire	N	N/A	N/A	N/A
Drought	N	N/A	N/A	N/A
Storm Severity (could include high winds, lightening, etc.)	Y	N - Based upon FEMA's Resiliency Analysis Planning Tool, there is no increase in storm severity outlook.	Y	Y The remedy is already resilient as the SVE system is the only portion of the remedy that could be impacted from sever weather and the system will be equipped with a telemetry system to remotely notify loss of power.
Landslides	N	N/A	N/A	N/A

Other Hazards:	Seismic Activity – N/A	N/A	N/A	N/A

*Links to potential data sources can be found on the following page

[1] If the first column is N --> The rest of the columns will be N/A, the hazard is not applicable to the site.

[2] Extreme Heat: periods of three or more days above 90°F- Extreme Cold: Individual days with minimum temperatures at or below 30 degrees F (NYSERDA ClimAID report), Note: this is important for sites with active remedial systems/sites where the remedy relies on the electrical grid

[3] List the projected change in specific terms or units e.g. inches of rain fall, feet of sea level rise, etc.

[4] If final column is Y, provide reasoning, if the final column is N --> Climate Vulnerability Assessment (CVA) required.

[5] For system sites- components (e.g. electrical wiring and panels) should be evaluated to determine if they would need to be raised to avoid flooding.

Required Next Steps (If no further action, provide justification):

The vulnerability that was assessed were primarily related to the SVE system as other portions of the IRM can be rescheduled from climate related impacts. The SVE system will be the only component requiring continual operation for an ongoing duration and remaining in place at the Site. The SVE system will be equipped with a telemetry system to notify times of lost operation that may occur from climate related impacts. No further actions are anticipated at this time.