Appendix F.2
RAP and CHASP
(2024)

REMEDIAL ACTION PLAN
NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT
NEW YORK, NEW YORK
CEQR # 23BPC001M

MATRIXNEWORLD

Engineering Progress

Prepared for:
AECOM USA, Inc.
605 Third Avenue
New York, NY 10158

On Behalf of:
Battery Park City Authority
200 Liberty Street
New York, NY 10281

Prepared by:
Matrix New World Engineering, Land Surveying
and Landscape Architecture, P.C.
20 West 37th Street, 12th Floor
New York, NY 10018

Matrix Project No. 20-1152

January 2023
Rev. 03, August 2024

Table of Contents

Section		Page
REMEDIAL ACTION PLAN		**1**
1.0	**INTRODUCTION**	**1**
1.1	Proposed Redevelopment Plan	1
1.2	Project Location and Current Usage	1
1.3	Geology and Hydrology	2
2.0	**PRIOR INVESTIGATIONS**	**3**
3.0	**DESCRIPTION OF CONSTRUCTION MEASURES**	**7**
3.1	Soil Excavation, Handling, and Disposal	8
3.1.1	Direct-Loading and Stockpile Methods	8
3.1.2	Handling of Contaminated and Potentially Contaminated Soil	9
3.1.3	Soil Waste Characterization	10
3.2	Off-Site Materials Transport	10
3.3	Materials Disposal Off-Site	11
3.4	Materials Reuse On-Site	11
3.5	Import of Backfill Soil from Off-Site Sources	12
3.6	Source Screening, Testing, and Reporting	12
3.7	Fluids Management	13
3.8	Dredged Material Management	13
3.9	Storm-water Pollution Prevention	14
3.10	Odor Control	14
3.11	Dust Control	15
3.12	Community Air Monitoring Plan (CAMP)	15
3.12.1	VOC Monitoring, Response Levels, and Actions	15
3.12.2	Particulate Monitoring, Response Levels, and Actions	16
3.13	Petroleum Storage Tank Closure	17
4.0	**REMEDIAL MEASURES**	**19**
4.1	Engineering Controls	19
4.2	Contingency Plan	19
4.3	Deviations from the Remedial Action Plan	20
5.0	**REMEDIAL CLOSURE REPORT**	**21**

LIST OF TABLES

Table No.	Title
1	Proposed Soil Cleanup Objectives

LIST OF FIGURES

Figure No.	Title
1	Regional Location Map
2A – 2B	Site Plan

LIST OF APPENDICES

Appendix A	Construction Health and Safety Plan
Appendix B	Relevant Sections of Prior Investigation Reports

1.0 INTRODUCTION

This Remedial Action Plan (RAP) has been developed by Matrix New World Engineering, Land Surveying, and Landscape Architecture, P.C. (Matrix) as a subconsultant to AECOM USA, Inc. (AECOM) on behalf of Battery Park City Authority (BPCA) for the North/West Battery Park City Resiliency (NWBPCR) Project which will provide flood risk reduction for Battery Park City (BPC) and its residents. The proposed Project includes construction of an integrated coastal flood risk management system in Lower Manhattan from 1st Place, north along the Battery Park City Esplanade, across to the east side of West Street/Route 9A, east across North Moore Street and terminates at a high point on Greenwich Street. The Project is under environmental review through New York City's Environmental Quality Review (CEQR) process, and has been assigned the CEQR # 23BPC001M.

A Project-specific Construction Health and Safety Plan (CHASP), included in **Appendix A**, addresses hazards, identified contaminants of concern, and safety requirements associated with remediation and mitigation activities in accordance with ASTM and Occupational Safety and Health Administration (OSHA) guidelines.

The Design-Build (DB) Team will update this RAP and the attached CHASP prior to the start of construction to reflect any design changes or additional relevant information.

1.1 Proposed Redevelopment Plan

Since 2014, BPCA has evaluated the threats of damage and injury to BPC and its residents caused by future severe storms and storm surges, as well as sea level rise associated with global climate change. The NWBPCR Project has been proposed to be designed in coordination with a broader coastal flood risk management system for Lower Manhattan, which includes several separate and distinct projects, specifically the South Battery Park City Coastal Resiliency Project (SBPCR), the Battery Coastal Resilience Project, Financial District and Seaport Master Plan, the Seaport Coastal Resilience Project, and the Brooklyn Bridge-Montgomery Coastal Resilience Project that collectively will support the overall Lower Manhattan Coastal Resiliency (LMCR) Strategy and reduce vulnerability to coastal floods.

The NWBPCR Project will connect to the northern limit of the SBPCR Project and provide flood barriers and interior drainage improvements. A variety of different flood barrier technologies are proposed including interceptor gates, an aboveground control house, and a continuous flood barrier along or adjacent to the Hudson River's shoreline.

1.2 Project Location and Current Usage

The Project Area is a corridor over 1-mile long, located generally along Lower Manhattan's shoreline with the Hudson River. A regional location map is included as **Figure 1**, and a site plan is included as **Figures 2A** and **2B**. The Project Area's land use consists of public right-of-ways (roadways and walking paths),

esplanades, and parkland. The northern extent of the corridor begins at North Moore Street and Greenwich Street and traverses east, continues south along Route 9A (West Street) before turning west toward the North Esplanade, then traverses the North Esplanade and continues southward along the shoreline. The NWBPCR continues to South Cove, where it would connect with the SBPCR Project at 1st Place. The Project Area has been broken down into seven reaches, which are listed below from north to south.

- Reach 1 – Route 9A (West Street) Crossing/Tribeca;
- Reach 2 – North Esplanade;
- Reach 3 – Rockefeller Park;
- Reach 4 – Belvedere Plaza;
- Reach 5 – North Cove;
- Reach 6 – South Esplanade; and
- Reach 7 – South Cove

1.3 Geology and Hydrology

According to the USDA Web Soil Survey, the soils underlying the Project Area are made up of approximately 43.4% of Urban land-Laguardia complex (ULA), 39% Urban land, reclaimed substratum (UrA), 17% Laguardia-Urban land complex (LUA), and 0.6% of Urban land, tidal marsh substratum (UmA). All soil types for the Project Area are described as having 0 to 3% slopes. According to the USGS Geologic Map of the New York City Region, the Project Area is located on Cambrian/Ordovician metamorphic rocks (lapetus Terrane). According to the New York State Department of Transportation (NYSDOT) Geotechnical Design Manual, Chapter 3 – Geology of New York State, the Project Area is located in the Manhattan Prong which includes a portion of Staten Island, all of Manhattan Island, a small portion of western Long Island and most of Westchester County.

Based on the topographic gradient and the relative direction of the Hudson River, shallow groundwater likely flows west toward the Hudson River. An environmental site investigation (ESI) was performed at the Project Area between December 2021 and May 2022, which is summarized in Section 2.0 of this RAP. The investigations encountered fill material (brown coarse, medium to fine sand and gravel with anthropogenic materials including brick and wood fragments) throughout the Project Area varying in thickness, as deep as 20 feet below ground surface (ft-bgs) according to Matrix's investigation. During this investigation, groundwater was encountered at depths ranging from 4 to 14.1 ft-bgs.

2.0 PRIOR INVESTIGATIONS

Pertinent sections of the prior subsurface investigation report, including analytical data tables and sample location maps, are provided in **Appendix B** and results are summarized briefly below:

Corridor Environmental Site Assessment Report – Matrix New World Engineering, July 2021:

Matrix performed a Corridor Environmental Site Assessment (ESA) in July 2021 as part of a due diligence evaluation to assess potential environmental impacts that may affect the Project or the community/construction workers during construction. The results of the ESA identified Recognized Environmental Conditions (RECs) in the Project Area which may have impacted subsurface conditions. The Corridor ESA revealed the following RECs in connection with the Project Area:

REC-ID	Description
1	Historic Fill (site-wide)
2	Current and Historical Dry-Cleaning Facilities

Subsurface Environmental Site Investigation Report – Matrix New World Engineering, August 2022:

The August 2022 ESI Report described the Matrix soil and groundwater investigation and sampling results. A geophysical survey was performed, which did not identify any underground storage tanks (USTs) in the Project Area. Soil and groundwater screening and sampling was performed to investigate identified RECs and characterize soil and groundwater conditions in the Project Area. In addition to collecting soil samples from environmental borings, geotechnical borings were inspected for signs of possible contamination. Matrix collected discrete soil and groundwater samples for laboratory analysis from environmental and select geotechnical soil boring locations. In addition, composite soil samples were collected for waste characterization analysis. Groundwater samples were collected from eight permanent monitoring wells (installed at SB-13, SB-16, SB-17, SB-20, SB-21, SB-24, SB-26, and SB-29) and one temporary monitoring well (installed at SB-07, located in Reach 1 of the Proposed Project).

Soil Analytical Results

Soil samples collected during the ESI did not indicate evidence of a petroleum spill or other release in the potential construction area. Obvious signs of fill, such as wood, brick fragments, and polystyrene foam were encountered in many soil borings. Analytical results detected elevated concentrations of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals exceeding New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Restricted-Residential Soil Cleanup Objectives (RRSCOs), which are consistent with soil contaminated with historic fill. Pesticides were also detected in several soil borings exceeding their UUSCOs, but not RRSCOs. Additional evidence of contamination was observed in two geotechnical borings (BH-05A from 8-22 ft-bgs, and BH-08 from 8-10 ft-bgs) located

within Reach 6 of the Proposed Project (South Esplanade). Obvious signs of contamination included creosote-treated wood at BH-05A, a tar-like substance at BH-08, along with staining, elevated PID readings, and odors at both locations. Soil sampled from BH-05A contained naphthalene above its UUSCO and RRSCO, which is consistent with contamination from creosote-treated wood. Soil sampled from BH-08 detected metals exceeding UUSCOs and no exceedances of organic compounds, which suggests the tar-like material was a historical release which naturally degraded over time. Soil samples from both BH-05A and BH-08 detected polycyclic aromatic hydrocarbons (PAHs), a class of SVOCs, exceeding protection of groundwater standards, and a calculated benzo(a)pyrene equivalent exceeds the criteria for limited-use fill. The results of the soil investigation did not identify evidence of a petroleum or hazardous substances release requiring spill reporting to the NYSDEC.

Groundwater Analytical Results

Groundwater analytical results identified contamination of SVOCs and metals exceeding their NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1, Ambient Water Quality Standards for Groundwater (AWQS – GA). The elevated concentrations of SVOCs are consistent with groundwater in soil containing historic fill. Dissolved metals detected above their AWQS – GA included iron, magnesium, manganese, and sodium, which naturally occur in regional groundwater. Additional metals were detected above their AWQS – GA in the total metals analysis of groundwater sampled from the temporary well at SB-07. The absence of these chemicals in the dissolved metals analysis suggests these exceedances are associated with soil particles suspended in the groundwater sample. One VOC (vinyl chloride) was detected exceeding its AWQS – GA in the groundwater sample collected at SB-07, which may be associated with contamination migrating from upgradient sources. No significant contamination associated with dry cleaning was detected in the soil and groundwater samples. If dewatering is required during construction, additional groundwater samples may need to be taken in order to obtain a NYCDEP sewer discharge permit.

Environmental Sampling Report – Arcadis, June 2024

In 2023 and 2024, Arcadis performed environmental sampling activities with a concurrent geotechnical investigation, which included the collection of soil, groundwater, and sediment samples. Environmental soil and groundwater samples were collected along the Project alignment to provide supplemental environmental data and support environmental characterization and waste management of excavated soil and groundwater during construction activities. In addition, sediment samples were collected from three geotechnical borings advanced in the river to provide information on environmental contamination which may be encountered during construction.

Arcadis collected discrete soil samples from geotechnical borings throughout the Project alignment. In addition, composite soil samples were collected for waste characterization analysis. Groundwater samples

were collected from six existing monitoring wells along the alignment (B(OW)-26, SB-17, SB-21, SB-24, SB-26, and SB-29). Discrete sediment samples were collected from three geotechnical borings, including one in Reach 4 (B-48) and two in Reach 6 (B-47 and B-46). A waste characterization composite sample was collected from the in-river boring B-46, the only one with sufficient sediment recovery for this analysis.

Soil Analytical Results

Evidence of contamination, including staining and petroleum-like odors, were observed in borings B-5 (40-52 ft-bgs), B-19 (65-67 ft-bgs), B-22 (50-65 ft-bgs), and B-33 (15-17 and 25-27 ft-bgs). These soil borings were located in Reach 7, Reach 4, Reach 3, and Reach 2, respectively. The results of the soil investigation did not identify evidence of a petroleum or hazardous substances release requiring spill reporting to the NYSDEC.

Soil sample analytical results contained elevated concentrations of SVOCs and metals exceeding NYSDEC UUSCOs, RSCOs, RRSCOs, and PGWSCOs. Evidence of historic fill, such as wood fragments, brick fragments, rubber, and concrete were encountered in several soil borings. One VOC (acetone) was detected at concentrations exceeding its UUSCO and PGWSCO in several borings; however, this compound is a common laboratory contaminant, and the detection of only this VOC is not necessarily indicative of contamination. Pesticides were detected in three soil borings (B-9 in Reach 6, B-19 in Reach 4, and B-44 in Reach 1) exceeding their respective UUSCOs. One soil sample from boring B-5, located in Reach 7, contained total PCBs exceeding its UUSCO.

Based on the collected soil waste characterization samples, the soil should be treated as non-hazardous contaminated soil for waste disposal purposes. The analytical results are consistent with the physical indications of historic fill in soils in the Project Area. Additional soil sampling was recommended to characterize soils deeper than 12 ft-bgs in Reach 2 and deeper than 6 ft-bgs in Reach 5.

Groundwater Analytical Results

Groundwater analytical results contained elevated concentrations of several total and dissolved metals exceeding their NYSDEC TOGS 1.1.1 AWQS – GA. Elevated metals included both total and dissolved iron, magnesium, manganese, and sodium, which are naturally occurring in regional groundwater and not indicative of contamination. One VOC (chloroform) was detected exceeding its AWQS – GA in the groundwater sample collected at SB-21 (Reach 3). No SVOCs were detected at concentrations exceeding their AWQS – GA. If dewatering is required during construction, additional groundwater samples may need to be taken in order to obtain a NYCDEP sewer discharge permit.

Sediment Sample Analytical Results

Sediment samples were collected from in-river geotechnical soil borings in Reach 4 (boring B-48) and Reach 6 (borings B-46 and B-47). In Reach 4 (boring B-48), sediment was sampled until weathered

bedrock was encountered approximately 2-feet below the mudline. In Reach 6, weathered bedrock was encountered in borings B-46 and B-47 at about 8 and 12 feet, respectively, below the mudline. Sediment samples were collected from borings B-46 and B-47 to depths of 6 and 11.3 feet below the mudline, respectively.

No visual signs of staining or elevated PID readings were observed in any of the sediment sampled. Analytical results showed all sampled sediment contained elevated metals with concentrations exceeding TOGS 5.1.9 sediment quality thresholds for chronic and acute toxicity to aquatic life. Additionally, metals in sediment samples exceeded UUSCOs, RSCOs, and RRSCOs. No organic compounds were detected in sediment exceeding TOGS 5.1.9 sediment quality thresholds or any applicable SCOs. The waste characterization sample from B-46 indicates that sediment is non-hazardous, contaminated material.

3.0 DESCRIPTION OF CONSTRUCTION MEASURES

The 2021/2022 ESI performed by Matrix encountered soil and fill materials containing concentrations of VOCs, SVOCs, metals, PCBs, and pesticides exceeding the regulatory objectives, specifically the NYSDEC UUSCOs and RRSCOs, and groundwater containing concentrations of SVOCs, metals, and vinyl chloride exceeding their AWQS – GA.

The 2023/20234 environmental investigation performed by Arcadis encountered soil and fill material containing concentrations of SVOCs, metals, PCBs, and pesticides exceeding the regulatory objectives, specifically the NYSDEC UUSCOs and RRSCOs. Evidence of petroleum contamination (stains and odors) was encountered; although, analytical results did not identify elevated compounds indicative of petroleum contamination. Groundwater was identified containing metals and chloroform exceeding their AWQS – GA. Sediment was identified containing metals with concentrations exceeding their respective UUSCOs, RSCOs, RRSCOs, and TOGS 5.1.9 thresholds for chronic and acute toxicity to aquatic life.

Remedial and mitigation measures described herein will be performed in accordance with applicable laws and regulations and the Project-specific CHASP (**Appendix A**) and will be protective of public health and the environment for the intended land use. Due to the proposed use, the applicable NYSDEC SCOs are the RRSCOs.

The proposed plan achieves all of the remedial action goals established for the Project. The proposed remedial action is effective in both the short-term and long-term, reduces the risk of exposure of contaminants to workers and the public, and uses standard methods well established in the industry.

The proposed remedial action will consist of:

1. Proper Handling, Storage, Transportation, and Disposal of Excavated Materials
2. Implementation of a Community Air Monitoring Program (CAMP) during ground-disturbing and soil-moving activities.
3. The construction and final surface restoration of the Project Area will prevent human exposure to residual soil/fill in excavated areas. Areas where excavation has occurred as part of the construction will either be occupied by flood barrier infrastructure, a replaced platform, an engineered composite cover, or a 1-foot clean soil cap with vegetation.
4. Although not anticipated, any previously undocumented petroleum storage tanks, including dispensers, piping, and fill-ports, will be properly removed/closed in accordance with all applicable NYSDEC regulations.
5. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
6. Implementation of storm-water pollution prevention measures in compliance with applicable laws

and regulations.

7. Submission of a Remedial Closure Report (RCR) that describes the remedial activities, certifies that the remedial requirements have been achieved, and describes any engineering and institutional controls implemented for the Project, and lists any changes from this RAP.

3.1 Soil Excavation, Handling, and Disposal

During construction, excavated soil that has evidence of contamination (i.e., staining, odors, elevated PID readings) should be removed and disposed off-site in accordance with applicable laws and regulations at a facility licensed to accept such material. This includes soil observed at BH-05A and BH-08 (both located in Reach 6).

Soil with no visual or olfactory evidence of contamination, excavated from areas where environmental samples exceeded RRSCOs, may be re-used as backfill in the same locations from which they were removed, or in other locations with similar physical and chemical characteristics. This includes soil sampled in the ESI from soil borings SB-06 and SB-08 (located in Reach 1), SB-17 (located in Reach 3), and SB-28 (located in Reach 7).

Soil with no evidence of contamination excavated from areas which did not exceed RRSCOs may be re-used as backfill throughout the Project Area in areas with similar physical characteristics.

Most soil anticipated to be encountered during construction may be treated as restricted-use fill (up to 40% inert, non-putrescible non-soil constituents) or limited-use fill (over 40% non-putrescible non-soil constituents) for disposal purposes. Soil that has further evidence of contamination, or where environmental samples detected PAHs exceeding protection of groundwater SCOs (PGWSCOs) may be treated as non-hazardous contaminated soil/fill (includes soil sampled in the ESI from BH-05A, BH-08, and SB-17).

Soil may be transported and disposed off-site in conformance with applicable laws and regulations. Trucks used for transporting soil off-site must be appropriately licensed/permitted to transport non-hazardous contaminated soil/fill material. Soil may only be transported to facilities appropriately licensed/permitted to accept non-hazardous contaminated soil/fill material. Soil/fill material will be sampled for final waste characterization as per disposal facility requirements before transporting off-site.

3.1.1 Direct-Loading and Stockpile Methods

During construction, excavated materials may be directly loaded to trucks for off-site disposal, as long as in-situ waste characterization has been completed prior to excavation and the material has been approved by the receiving facilities. If excavated materials must be stockpiled, contaminated and potentially contaminated materials will be segregated from clean soil and construction/demolition debris. Stockpiles

will be used only when absolutely necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily and before and after every storm event. Excavated soils/fill will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpiling activities will be compliant with applicable laws and regulations. Soil stockpile areas, if used, will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials will be kept at least of 50 feet from the boundaries of the Project Area, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

3.1.2 Handling of Contaminated and Potentially Contaminated Soil

Should stockpiling be required during excavation, the Contractor will segregate suspected contaminated material, confirmed contaminated material, and non-contaminated material from each other to prevent cross-contamination and comingling of materials. Contaminated material and suspected contaminated material will be kept separate from adjacent, undisturbed areas to prevent cross-contamination of waste. Contaminated excavated material that needs to be temporarily stockpiled prior to off-site disposal will be stored on and covered by 8-mil plastic sheeting. Hazardous waste will not be stockpiled.

If soil showing evidence of contamination indicative of a spill or release, such as discoloration, staining, or odors, is encountered during excavation activities the following procedures will be implemented.

1. A spill will be reported to the NYSDEC Spill Hotline (800-457-7362), as necessary.
2. The suspect soil will be sampled for laboratory analyses in accordance with NYSDEC DER-10. Additional sample analysis may be required by disposal facilities.
3. If the suspect soil is contaminated based on sampling results, it will be excavated and removed in accordance with the stockpiling and/or direct-loading procedures presented above. Soils intended for off-site disposal will be disposed in accordance with applicable federal, state, and local requirements and tested in accordance with the requirements of the receiving facility.
4. The excavation will be enlarged vertically and horizontally until no evidence of contamination is noted in the base or sidewalls of the excavation or until groundwater or bedrock are encountered. Post-excavation endpoint samples will be collected from the sides and bottom of the excavated area, as required by the NYSDEC DER-10. If post-excavation samples exceed action levels, then additional excavation will be performed, as warranted. A New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) certified laboratory

will be used for all sample analyses. Quality Assurance/Quality Control (QA/QC) samples will be collected, including trip blanks, field blanks and field duplicates.

5. Copies of correspondence with disposal facilities concerning classification of materials, testing results, and permits/approvals will be maintained and will be submitted to NYSDEC in a Spill Closure Report.

When applicable, hazardous waste manifest forms and/or non-hazardous waste records will be completed as required by the appropriate regulatory agencies for verifying the type and quantity of each load of the material in units of volume and weight.

3.1.3 Soil Waste Characterization

Soil/fill or other excavated material to be transported off-site for disposal will be sampled for waste characterization in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse in the Project Area will be managed as defined in this plan. Material quantities and waste characterization analytical results must be submitted to the intended disposal facility for review and approval prior to removing from the Project Area. Proposed disposal facilities and transporters will have current licenses for receiving/transporting materials to be removed from the Project Area in accordance with federal, state, and local requirements.

Hazardous contaminated soil, although not anticipated to be found in the Project Area, will be handled, transported, and disposed in accordance with applicable federal, state, and local regulations.

3.2 Off-Site Materials Transport

A manifest system for off-site transportation of exported materials will be employed. Loaded vehicles leaving the Project Area 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. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed within the Project Area, when possible, in order to minimize off-site disturbance. Off-site queuing will be minimized.

All vehicles leaving the Project Area will be inspected to ensure that soil adhering to the wheels or under carriage is removed prior to the vehicle leaving. Any situations involving material spilled in transit or mud and/or dust tracked off-site will be remedied. The truck access routes will be evaluated for road conditions, overhead clearance, and weight restrictions. Outbound truck transport routes will take into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-site queuing of trucks entering the facility; (d) limiting total distance to major

highways; (e) promoting safety in access to highways; and (f) overall safety in transport. Trucks will not stop or idle in the neighborhood after leaving the Project Area.

3.3 Materials Disposal Off-Site

Disposal of soil/fill from this Project may qualify for unregulated disposal (i.e., clean soil removed to be re-used as fill material for development purposes). Such soil would need to be sampled for beneficial use determination (BUD), per the requirements of 6NYCRR Part 360-13. If soil meets fill material use criteria, NYSDEC must be notified at least 5 days in advance of transfers for quantities greater than 10 cubic yards, as well as 5 days before the delivery or placement of greater than 10 cubic yards of fill material. Notification must be made on NYSDEC Part 360 forms, or in a manner acceptable to NYSDEC, and must include quantities and analytical data. This material will be appropriately handled on-site to prevent mixing with impacted or potentially impacted material. Soil that meets the requirements of general fill may be sent to a clean soil recycling facility. Soil recycling facilities may have additional requirements prior to accepting material, including completion of applications and material/chemical components of the soil.

All impacted soil/fill or other waste excavated and removed from the Project Area will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Contaminated soil/fill taken off-site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility.

3.4 Materials Reuse On-Site

“Reuse on-site” means material that is excavated during the remedy or development does not leave the Project Area and is relocated within Project Area on comparable soil/fill material and is addressed pursuant to Engineering Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Project Area and that procedures defined for material reuse in this RAP are followed.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing will not be buried on-site. Soil or fill excavated for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

During construction, soil reuse is allowed under the following circumstances:

- Soil with no visual or olfactory evidence of contamination, excavated from areas which did not exceed RRSCOs during the Phase II ESI, may be re-used as backfill throughout the Project Area in areas with similar physical characteristics.
- Soil excavated from areas where environmental samples collected as part of the Phase II ESI exceeded RRSCOs may be re-used on-site as backfill in the same locations from which it was

removed or in other locations with similar physical and chemical characteristics as long as there is no visual or olfactory evidence of contamination.

Soil with evidence of contamination (i.e., staining, odors, elevated PID readings) may not be re-used on-site. Soil sampling is not required prior to re-use as long as the above criteria are met.

3.5 Import of Backfill Soil from Off-Site Sources

All imported soil will be uncontaminated, clean soil that meets the appropriate NYSDEC 6 NYCRR Part 375-6.8(a) RRSCOs, shown on **Table 1**. A process will be established to evaluate sources of backfill and cover soil to be imported for this Project, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the site.

3.6 Source Screening, Testing, and Reporting

Clean fill must be segregated at the source/facility for import for this Project. The PE/QEP will collect a representative sample of the segregated material before importing for the Project. The material will be inspected for evidence of contamination, including use of visual/olfactory observations and PID screening for volatile organic compounds. Materials will be analyzed by an ELAP certified laboratory for the full Target Compound List (TCL) and Target Analyte List (TAL); which includes TCL VOCs (USEPA Method 8260), TCL SVOCs (USEPA Method 8270), TCL PCBs (USEPA Method 8082), TCL pesticides (USEPA Method 8081), and TAL metals (USEPA Method 6010/7471). Analytical results will be compared to NYSDEC 6 NYCRR Part 375-6.8(a) RRSCOs, shown on **Table 1**. Samples will be collected at frequencies in accordance with NYSDEC DER-10, shown on the table below.

Soil Sampling Frequency for Importing from Off-Site Sources

Soil Quantity (Cubic Yards)	Discrete Soil Samples (TCL VOCs)	3-to-5-Part Composite Soil Samples (TCL SVOCs, TCL PCBs, TCL Pesticides, TAL Metals)
0-50	1	1
50-100	2	1
100-200	3	1
200-300	4	1
300-400	4	2
400-500	5	2
500-800	6	2
800-1,000	7	2
> 1,000	Add an additional 2 discrete and 1 composite for each additional 1,000 cubic yards	

Table sourced from NYSDEC DER-10, Table 5.4(e)10

Once it is determined that the fill material is non-hazardous, lacks petroleum contamination, and meets imported backfill or cover soil chemical requirements, the sampling and investigation results will be summarized in a clean soils report to be submitted to the DB team, BPCA, and New York City Department

of Environmental Protection (NYCDEP) for review/approval. The report should include, at a minimum, an executive summary, narrative of the field activities, laboratory data, and comparison of soil analytical results (i.e., NYSDEC 6 NYCRR Part 375 Environmental Remediation Programs). After BPCA and NYCDEP have approved the investigation report and material, the material will be loaded onto trucks and imported for the Project. The proposed backfill should continue be segregated after sampling so that it does not mix with other materials.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. It is the DB team's responsibility to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. Imported RCA must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for and will not be used as cover material.

3.7 Fluids Management

All liquids to be removed during construction, including dewatering fluids, will be handled, transported, and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by NYCDEP. The NYCDEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the water meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYCDEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) or to a storm sewer that does not connect to a NYCDEP wastewater treatment plant is prohibited without a SPDES permit issued by NYSDEC.

3.8 Dredged Material Management

Sediment samples were collected by Arcadis in 2023 from geotechnical borings in Reaches 4 and 6. Although dredging from these areas is not currently anticipated for this project, the presence of contaminated sediment in these Reaches suggests sediment contamination may be encountered in other Reaches during the Project.

Prior to performing any dredging activities, sediment samples will be collected from the proposed dredging areas in accordance with a NYSDEC-approved Sediment Sampling and Analysis Plan (SSAP) and TOGS

5.1.9. Other requirements for water quality sampling and water quality monitoring prior to and/or during intrusive in-water activities must be followed per the approved SSAP.

Dredged material will be placed into and contained within an adjacent barge immediately after the material is removed from the water. Excess water will be decanted [return flow] to the waterway at the dredge site after a minimum of 24 hours settling time prior to removal from the Project Area.

After completing sediment sampling activities per the SSAP, the analytical results of this program will determine re-use and/or disposal options. Transport and disposal of dredged sediment must be done in accordance with Sections 3.2 and 3.3 of this RAP, as well as any other applicable federal, state, and local regulations. Dredged material will only be transported by appropriately licensed transporters and will only be disposed at off-site State-approved beneficial-use, treatment, or recycling facilities.

3.9 Storm-water Pollution Prevention

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAP (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained in the Project Area and available for inspection by NYCDEP and/or NYSDEC. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

3.10 Odor Control

All necessary means will be employed to prevent odor nuisances in and around the Project Area. 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 foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. 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. The DB team and BPCA will be notified of all odor complaint events.

3.11 Dust Control

In order to prevent the potential migration of dust that may contain above-background levels of contaminants, the following measures will be implemented during all soil disturbance activities:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.
- Construction entrances will be stabilized to ensure that trucks departing the Project Area will not track soil, fill or debris off-site. Such actions may include use of cleaned asphalt or concrete roads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.
- An outbound-truck inspection station will be set up close to the Project Area exit. Before exiting the Project Area, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. Soil and debris will be removed. Brooms, shovels, and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary.

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. The DB team and BPCA will be notified of all dust complaint events.

3.12 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. Continuous monitoring will be performed for all ground-intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells. Exceedances of action levels observed during performance of the CAMP will be reported to the DB team and BPCA and included in the Daily Report, and all CAMP monitoring data will be maintained and available for NYCDEP review.

3.12.1 VOC Monitoring, Response Levels, and Actions

VOCs will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The 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.

Instrument	Action Level[1]	Response Action
Volatile Organic Compound Monitoring	Exceeds 5 ppm	**Work activities temporarily halted.** Monitoring continued until the total organic vapor level readily decreases below 5 ppm over background, in which work activities may resume.
	Exceeds 5 ppm over background but less than 25 ppm	**Work activities will be halted**, the source of the vapors identified, corrective actions to abate emissions, and monitoring continued. Resume work provided that the total organic vapor level200 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.
	Exceeds 25 ppm	**Work activities will be shut down.** Work will not resume until the source ofvapors is abated and readings are less than 25 ppm above background.
Note [1] : The ambient air concentration of total organic vapors at the downwind perimeter of thework area or exclusion zone for the 15-minute average, in parts per million (ppm).		

All 15-minute readings must be recorded and be available for the DB team, BPCA, and NYCDEP personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

3.12.2 Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. 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 monitoring equipment will include an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

Instrument	Action Level[1]	Response Action
Particulate Monitoring	Between 100 mcg/m^3 and 150mcg/m^3	**Dust suppression techniques employed.** Work will continue provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area
	Exceeds 150 mcg/m^3	**Work activities will be halted, and activities re-evaluated.** 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/m^3 of the upwind level and in preventing visible dust migration
Note[1]: The ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone for the 15-minute average, milligrams per cubic meter (mg/m^3).		

All readings will be recorded and be available for the DB team, BPCA, and NYCDEP personnel to review.

3.13 Petroleum Storage Tank Closure

Any tanks (and piping or other associated equipment), while not anticipated to be found, will be cleaned, removed from the Project Area, and disposed of in accordance with accepted industry standards and applicable federal, state, and local regulatory agency requirements. Tank decommissioning and removal, and soil sampling and removal from the vicinity of any discovered USTs, will be conducted in accordance with the NYSDEC Commissioner Policy (CP) 51, "Soil Cleanup Guidance," dated October 21, 2012, and NYSDEC, Division of Spills and Responses Memorandum regarding Permanent Closure of Petroleum Storage Tanks (January 20, 1987 and last modified December 3, 2003).

According to 6 NYCRR Part 612.2, the existing State Petroleum Bulk Storage listing for the property must be updated to reflect the discovery and subsequent removal of any known or previously undocumented tanks from the Project Area. Tank removal activities and any associated petroleum-contaminated soil removal must be documented in a Spill Closure Report, which will be submitted to NYSDEC. In addition, the removal of any gasoline USTs must be reported to the New York City Fire Department.

Typical UST removal procedures are summarized below:

1. Open fill cap or vent pipe and measure for product. Collect a sample of the product. Tank contents will be sampled in accordance with applicable federal, state, and local requirements and tested in accordance with the requirements of the receiving facility. Proper disposal of tank contents at an approved facility will be dictated by sample results.
2. Excavate to expose the tank. Vacuum liquid tank contents and pumpable tank bottom residue.
3. Excavate around the tank with care to avoid release of tank and piping contents. Hand excavation around the tank may be necessary. The sides of all excavated areas will be properly stabilized in accordance with OSHA regulations. Continuously monitor the excavated areas in the worker breathing zone for the presence of flammable, toxic or oxygen deficient atmosphere with a PID, a combustible gas indicator (CGI), and an oxygen meter.
4. Inert the tank of flammable vapors using dry ice and verify using an oxygen meter (less than 7 percent). An access hole will be cut in the tank and the tank will be thoroughly cleaned of residual liquids and sludges.
5. Entry of the tank, if necessary, will be conducted in conformance with OSHA confined space requirements.
6. Remaining fuels, loose slurry, sludge materials and wastewater will be collected in DOT approved drums, sampled, and analyzed for disposal characterization. After disposal characterization, waste material will be removed and disposed of in accordance with applicable regulations.
7. Remove the tank and all associated piping from the ground and clean the outside of the tank. The tank and piping will be rendered "not reusable," removed from the Project Area, and disposed of

according to applicable regulations with proper documentation. Remove and dispose of all concrete tank support structures or vaults as encountered.

8. Spill reporting to the NYSDEC Spill Hotline (800-457-7362) will be conducted, as necessary.
9. After tank removal, examine for evidence of petroleum releases in accordance with NYSDEC CP-51, “Soil Cleanup Guidance,” dated October 21, 2012.
10. Suspect petroleum contaminated materials will be field-screened with a PID. If soil contamination is present, excavate and remove contaminated soil from the tank areas in accordance with the stockpiling and/or direct- loading procedures presented in Sections 3.1.1 and 3.1.2.. Material will be excavated until field screening with a PID yields concentrations of less than 20 ppm and until there are no remaining visible signs of contamination or odors. After contaminated soil removal, collect endpoint samples at each sidewall and at the bottom of the excavation for analytical testing as specified in the NYSDEC CP-51, “Soil Cleanup Guidance,” dated October 21, 2012.
11. Photo-document all procedures and record all procedures in a bound field notebook.
12. Copies of all testing results, correspondence with disposal facilities concerning classification of materials, and permits/approvals will be maintained by the project manager and will be submitted to the NYSDEC in a Tank Closure Report.
13. A signed affidavit will be prepared by the licensed tank installation (removal) contractor and submitted to the New York City Fire Department certifying proper removal of the tank(s).
14. Update the PBS listing to reflect UST closure.

4.0 REMEDIAL MEASURES

4.1 Engineering Controls

Engineering Controls will be employed in the remedial action to address residual contamination remaining in the Project Area by preventing human exposure to residual soil/fill in excavated areas. The Project's Engineering Controls (EC) include:

- Site Cap:
    a. A demarcation barrier, such as orange snow fence, will be placed at the bottom of and along the sidewalls of excavation areas, indicating the boundary between existing subsurface materials and any imported clean fill, flood barrier infrastructure, reconstructed platform, and/or other composite cover system.
    b. Constructed flood barrier infrastructure that occupies the surface and prevents human contact with residual soils/fill below is sufficient in lieu of a composite cover or clean soil cap.
    c. An engineered composite cover will be constructed and maintained to prevent human exposure to residual soils/fill. The composite cover system may consist of the reconstructed platform, asphalt pavement, concrete pavement, masonry pavers, or similar materials.
    d. Any landscaped areas disturbed as part of the Proposed Project will have a "soil cap" consisting of one foot of imported clean soil. The clean topsoil to be imported will be segregated at the source facility and sampled by a QEP. The QEP will collect samples at the frequency described in Section 3.6.
    e. Upon completion of the clean soil/fill investigation activities described in Sections 3.4 through 3.6, a detailed clean soil report will be submitted to the DB team, , BPCA, and NYCDEP for review and approval prior to importation and placement within the Project Area. These results will be provided to the DB team, , BPCA, and NYCDEP for approval and summarized in the RCR. Clean soil reporting requirements are summarized in Section 3.6.
    f. Once approved by the DB team, BPCA, and NYCDEP the clean soil/fill may be imported for the Project.

4.2 Contingency Plan

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 Project work will be promptly communicated to the DB team and BPCA. Petroleum spills will be reported to the NYSDEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during remedial excavation or development-related

excavation for the Project, sampling will be performed of contaminated source material and surrounding soils. BPCA will be notified of any such sampling activities, and findings will be evaluated by the DB team and reported to BPCA. Chemical analytical testing will be performed for full TCL/TAL, as appropriate.

4.3 Deviations from the Remedial Action Plan

All changes to the RAP will be reported to BPCA in the RCR, including the following information:

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

5.0 REMEDIAL CLOSURE REPORT

A PE-Certified RCR will be submitted to BPCA and NYCDEP for review and approval following implementation of the remedial action defined in this RAP. The RCR will document that the remedial work required under this RAP has been completed and has been performed in compliance with this plan. The RCR will include:

- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Description of any changes in the remedial action from the elements provided in this RAP and associated design documents;
- A Site Management Plan (SMP) describing procedures and requirements for post-construction maintenance, inspections, and reporting of engineering controls;
- Regulatory correspondence, as applicable, including from NYCOER, NYCDEP, or NYSDEC;
- Tabular summary of any end-point sampling results, if applicable, and all material characterization results, including comparison of analytical results to NYSDEC 6NYCRR Part 375 SCOs, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action;
- Copies of all CAMP monitoring data and laboratory analytical reports;
- Account of the disposal destination of all contaminated material removed from the Project Area. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported for the Project, including comparison of analytical results to the site's SCOs.

TABLE 1

PROPOSED SOIL CLEANUP OBJECTIVES

Table 1
NYSDEC Soil Cleanup Objectives (6 NYCRR Part 375)
Restricted-Residential Use

MATRIXNEWORLD
Engineering Progress

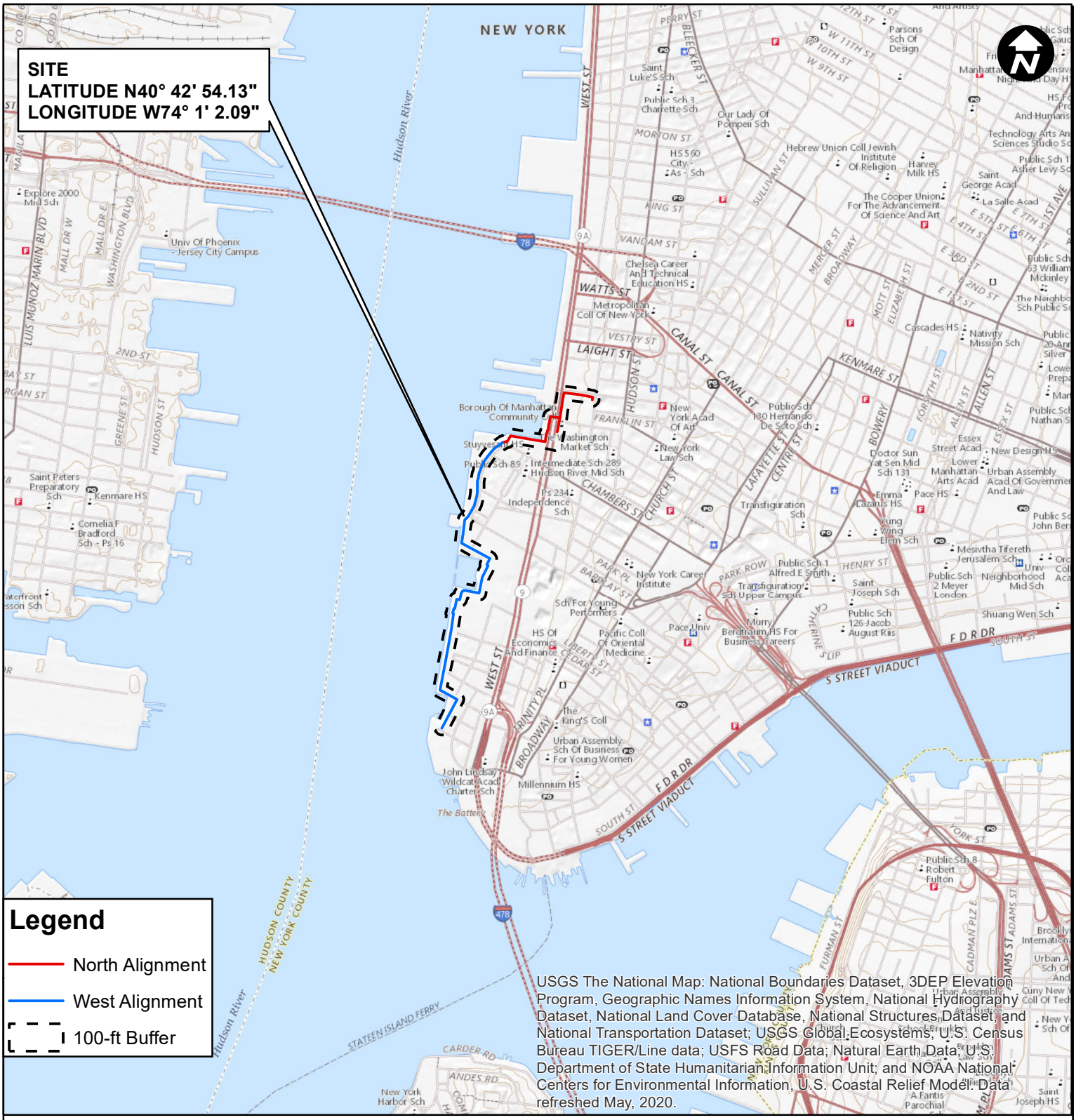
Volatile Organic Compounds	mg/kg
1,1,1-Trichloroethane	100
1,1-Dichloroethane	26
1,1-Dichloroethene	100
1,2,4-Trimethylbenzene	52
1,2-Dichlorobenzene	100
1,2-Dichloroethane	3.1
1,3,5-Trimethylbenzene	52
1,3-Dichlorobenzene	49
1,4-Dichlorobenzene	13
1,4-Dioxane	13
2-Butanone	100
Acetone	100
Benzene	4.8
Carbon tetrachloride	2.4
Chlorobenzene	100
Chloroform	49
cis-1,2-Dichloroethene	100
Ethylbenzene	41
Methyl tert butyl ether	100
Methylene chloride	100
n-Butylbenzene	100
n-Propylbenzene	100
Naphthalene	100
sec-Butylbenzene	100
tert-Butylbenzene	100
Tetrachloroethene	19
Toluene	100
trans-1,2-Dichloroethene	100
Trichloroethene	21
Vinyl chloride	0.9
Xylenes, Total	100

Semi-Volatile Organic Compounds	mg/kg
1,2-Dichlorobenzene	100
1,3-Dichlorobenzene	49
1,4-Dichlorobenzene	13
1,4-Dioxane	13
2-Methylphenol	100
3-Methylphenol/4-Methylphenol	100
Acenaphthene	100
Acenaphthylene	100
Anthracene	100
Benzo(a)anthracene	1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	1
Benzo(ghi)perylene	100
Benzo(k)fluoranthene	3.9
Chrysene	3.9
Dibenzo(a,h)anthracene	0.33
Dibenzofuran	59
Fluoranthene	100
Fluorene	100
Hexachlorobenzene	1.2
Indeno(1,2,3-cd)pyrene	0.5
Naphthalene	100
Pentachlorophenol	6.7
Phenanthrene	100
Phenol	100
Pyrene	100

Pesticides / PCBs / Herbicides	mg/kg
4,4'-DDD	13
4,4'-DDE	8.9
4,4'-DDT	7.9
Aldrin	0.097
Alpha-BHC	0.48
Beta-BHC	0.36
cis-Chlordane	4.2
Delta-BHC	100
Dieldrin	0.2
Endosulfan I	24
Endosulfan II	24
Endosulfan sulfate	24
Endrin	11
Heptachlor	2.1
Lindane	1.3
PCBs / Aroclors	1
Silvex	100

Inorganics	mg/kg
Arsenic, Total	16
Barium, Total	400
Beryllium, Total	72
Cadmium, Total	4.3
Chromiium, Trivalent	180
Chromium, Hexavalent	110
Copper, Total	270
Cyanide, Total	27
Lead, Total	400
Manganese, Total	2000
Mercury, Total	0.81
Nickel, Total	310
Selenium, Total	180
Silver, Total	180
Zinc, Total	10000

FIGURES



REGIONAL LOCATION MAP

MATRIXNEWORLD
Engineering Progress

Matrix New World Engineering, Land Surveying
and Landscape Architecture, P.C.
333 W 39th Street, Suite 202
New York, New York 10018
WBE/DBE
STATE OF NEW YORK CERTIFICATE OF AUTHORIZATION No. 17-082661

Tel: 973-240-1800
Fax: 973-240-1818
www.matrixneworld.com

NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT
BATTERY PARK CITY AUTHORITY
NEW YORK, NEW YORK

SCALE:	DATE:	JOB NO.:	FILENAME:	FIGURE NO.:
1:24,000	JULY 2021	20-1152	NWBPCregional.mxd	1



Legend

- North Alignment
- West Alignment
- Approximate Extents of Existing Platform

Notes:

1. Reach 1: West St. Crossing / Tribeca
2. Reach 2: North Esplanade
3. Reach 3: Rockefeller Park
4. Reach 4: Belvedere Plaza
5. Reach 5: North Cove

0 200 400 600 800 Feet

MATRIXNEWORLD
Engineering Progress

Matrix New World Engineering, Land Surveying
and Landscape Architecture, P.C.
333 W 39th Street, Suite 202
New York, New York 10018
WBE
Tel: 973-240-1800
Fax: 973-240-1818
www.matrixneworld.com
STATE OF NEW YORK CERTIFICATE OF AUTHORIZATION No. 17-082661

SITE PLAN
PART 1 OF 2

NORTH/WEST BPC RESILIENCY PROJECT
BATTERY PARK CITY AUTHORITY
NEW YORK, NY

JANUARY 2023 | **Figure 2A**



Legend

- North Alignment
- West Alignment
- Approximate Extents of Existing Platform

Notes:

1. Reach 5: North Cove
2. Reach 6: South Esplanade
3. Reach 7: South Cove.

0 200 400 600 800 Feet

MATRIXNEWORLD
Engineering Progress

Matrix New World Engineering, Land Surveying
and Landscape Architecture, P.C.
333 W 39th Street, Suite 202
New York, New York 10018
WBE
Tel: 973-240-1800
Fax: 973-240-1818
www.matrixneworld.com
STATE OF NEW YORK CERTIFICATE OF AUTHORIZATION No. 17-082661

SITE PLAN
PART 2 OF 2

NORTH/WEST BPC RESILIENCY PROJECT
BATTERY PARK CITY AUTHORITY
NEW YORK, NY

JANUARY 2023 | **Figure 2B**

APPENDIX A

CONSTRUCTION HEALTH AND SAFETY PLAN

CONSTRUCTION HEALTH AND SAFETY PLAN
NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT
NEW YORK, NEW YORK

MATRIXNEWORLD

Engineering Progress

Prepared for:
AECOM
605 Third Avenue, Second Floor
New York, NY 10158

On Behalf of:
Battery Park City Authority
200 Liberty Street
New York, NY 10281

Prepared by:
Matrix New World Engineering, Land Surveyingand Landscape Architecture, P.C.
20 West 37th Street, 12th Floor
New York, NY 10018

Matrix Project No. 20-1152

January 2023
Rev. 02, June 2024

Table of Contents

Section			Page
CONSTRUCTION HEALTH AND SAFETY PLAN			i
1.0	INTRODUCTION		1
	1.1	Scope and Applicability of the Construction Health and Safety Plan	1
	1.2	Visitors	2
	1.3	Project Scope-of-Work	3
2.0	IDENTIFICATION OF HEALTH AND SAFETY PERSONNEL		4
3.0	HAZARD ASSESSMENT		5
	3.1	Summary	5
	3.2	Physical Hazards	5
	3.3	Chemical Hazards	6
	3.4	Fire and Explosion Hazard	6
	3.5	Environmental Hazards	6
	3.6	Utilities	7
4.0	PERSONNEL TRAINING REQUIREMENTS		8
	4.1	Pre-Assignment and Annual Refresher Training	8
	4.2	Site Supervisors Training	8
	4.3	Respirator Fit Testing and Training	8
	4.4	Training and Briefing Topics	8
5.0	PERSONNEL PROTECTIVE EQUIPMENT TO BE USED		10
	5.1	Levels of Protection	10
	5.2	Level A Personnel Protective Equipment	10
	5.3	Level B Personnel Protective Equipment	10
	5.4	Level C Personnel Protective Equipment	11
	5.5	Level D Personnel Protective Equipment	11
	5.6	Reassessment of Protection Program	12
	5.7	Work Duration	12
	5.8	Specific Levels of Protection Planned	12
6.0	MEDICAL SURVEILLANCE REQUIREMENTS		13
	6.1	Baseline or Pre-Assignment Monitoring	13
	6.2	Periodic Monitoring	13
	6.3	Site Specific Medical Monitoring	13
7.0	FREQUENCY AND TYPES OF AIR MONITORING AND PERSONNEL AIR SAMPLING		14
	7.1	Direct-Read Monitoring Instruments	14
	7.2	Personal Sampling	14
	7.3	Action Levels	14
8.0	SITE CONTROL MEASURES		15
	8.1	Buddy System	15
	8.2	Site Communications Plan	15
	8.3	Work Zone Definition	15
9.0	DECONTAMINATION PLAN		16
	9.1	Standard Operating Procedures for Minimizing the Potential for Contamination	16
	9.2	Levels of Decontamination Protection Required for Personnel	16
	9.3	Equipment Decontamination	16
	9.4	Disposition of Decontamination Waste	16
10.0	EMERGENCY RESPONSE/CONTINGENCY PLAN		17
	10.2	Personnel Role and Lines of Authority	17
	10.3	Emergency Recognition and Prevention	17

10.4 Evacuation Routes and Procedures/Safe Distances 18
10.5 Emergency Decontamination Procedures 18
10.6 Emergency Contact/Notification System and Alerting Procedures 18
10.7 Emergency Medical Treatment Procedures 19
10.8 Fire or Explosion Response Procedures 19
10.9 Spill or Leaks Response Procedures 20
11.0 CONFINED SPACE ENTRY PROCEDURES 21
11.1 Confined Space Entry 21
11.2 Permit Required Confined Space 21
11.3 Non-Permit Required Confined Space 21
11.4 Confined Space Observer 21
12.0 SPILL CONTAINMENT PROGRAM 22

List of Tables

Table	Title
1.	Instrument Applications
2.	Action Levels for Changes in Levels of Protection

List of Figures

Figure No.	Title
1 – 6	Hospital Map and Directions

List of Appendices

Appendix	Title
A	Protection Measures for Heat Stress and Cold Stress Prevention
B	Preventative Measures Regarding Poisonous Plants and Insects
C	Air Monitoring Forms
D	Safety Meeting Documentation
	HASP Acknowledgement Form
	New Employee Orientation Form
	Accident/Incident Investigation Form
E	SDS Forms

1.0 INTRODUCTION

This Construction Health and Safety Plan (CHASP) has been prepared for general guidance and compliance with federal, state, and city health and safety requirements for the Battery Park City Authority (BPCA) for the North/West Battery Park City Resiliency (NWBPCR) Project construction activities. The Project Area is over 1 mile long, located generally along Lower Manhattan's shoreline with the Hudson River in New York. The northern extent of the Project Area begins at North Moore Street and Greenwich Street and traverses east, continues south along Route 9A (West Street) before turning west toward the North Esplanade, then traverses the North Esplanade and continues southward along the shoreline to South Cove. This CHASP establishes personnel protection standards and mandatory safety practices and procedures for all employees who are involved with Project activities thatmay involve contact with contaminated soil and/or groundwater identified by the environmental site investigation (ESI). The Construction Contractor ("Contractor") shall prepare their own version of a CHASP that is at least as stringent as this CHASP prior to beginning construction activities.

1.1 Scope and Applicability of the Construction Health and Safety Plan

The purpose of this CHASP is to define the procedures, practices, and equipment to be used by the Contractor during the Project construction to protect the health and safety of allpersonnel. This CHASP establishes minimum standards and levels of protection that must be used by project personnel while performing the various project-related tasks. The work subject to this CHASP areactivities that disturb existing soil and/or groundwater in the Project Area.

This CHASP is based on safety standards as defined by the United States Environmental Protection Agency (USEPA), Occupational Safety and Health Administration (OSHA), National Institute of Occupational Safety and Health (NIOSH), health effects and standards for known contaminants, and procedures designed to account for the potential for exposure to unknown substances. Specifically, the following references have been consulted:

- 29 CFR Part 1910.120 (OSHA) and 40 CFR Part 311 (USEPA)
- OSHA/NIOSH/USEPA/USCG Occupational Health and Safety Guidelines
- USEPA, Office of Emergency and Remedial Response, Standard Operating Safety Guides
- NIOSH/OSHA Pocket Guide to Chemical Hazards
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values

All work outlined in this CHASP is subject to the Remedial Action Plan (RAP) prepared for the Site. This CHASP is not intended toaddress potential mechanical or structural safety concerns, such as shoring and bracing of excavations,and does not replace or supersede any OSHA regulation and/or local and state construction codes or regulations.

All contractors and subcontractors are required to develop their own health and safety related procedures and programs required for work activities that are at least as stringent as this program. The Contractor and their subcontractors involved in construction of the project shall provide a copy of this CHASP to all employees whose work involves any potential exposure to on-site chemical hazards and shall complete all work in accordance with this CHASP.

Health and safety requirements for visitors are included in this CHASP.

1.2 Visitors

All visitors entering the contaminant reduction zone or the exclusion zone, as defined in Section 8 of this CHASP, will be required to sign the field notebook, and read and verify compliance with the provisions of this CHASP. Visitors must comply with the relevant OSHA requirements such as medical monitoring (Section 6 of this CHASP), training (Section 4 of this CHASP), and respiratory protection, if applicable. Visitors must provide their own personnel protective equipment (PPE).

Visitors who do not comply with the provisions of this CHASP will be required to leave the work area. All non-conformance incidents will be recorded in the field notebook.

All visitors who enter the work area while intrusive activities are being performed must identify and understand the potential hazards to health and safety. Prior to entering the Project Area, all construction personnel must attend a safety meeting, with the purpose of the meeting being to:

- Make workers aware of the potential hazards they may encounter;
- Instruct workers on how to identify potential hazards;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- Make workers aware of the use and limitations of safety equipment; and
- Describe procedures for avoiding or escaping emergencies.

Each member of the construction crew will be instructed in these objectives before entering the Project Area and will be instructed to sign the acknowledgment forms provided in **Appendix D**. Construction personnel will be responsible for identifying potential hazards in the work zone. The Site Safety Officer (SSO) or designee will be responsible for conducting the training program. Visitors entering the Project Area must be accompanied by a properly trained project worker. The exclusions zones will be field determined by the SSO at the start of each workday depending on several variables, including access points, work areas,stockpile areas, etc.

1.3 Project Scope-of-Work

This CHASP covers construction-related field activities which have the potential to disturb and/or displace contaminated soil and/or groundwater identified in the Project Area. These activities include:

- Excavation and off-site disposal of soil generated during construction as part of the proposed resiliency plan; and
- Possible dewatering and associated groundwater treatment and disposal during excavation.

While the development plans are not finalized, the proposed North/West Resiliency Projects will include construction of an integrated coastal flood risk management system, provide flood barriers and interior drainage improvements in Battery Park City, and will connect with the South Battery Park City Coastal Resiliency Project (SBPCR). A variety of different flood barrier technologies are proposed for specific segments of the Project Area, including an interceptor gate and aboveground control house on the east side of West Street/Route 9A and a continuous flood barrier along or adjacent to the Hudson River's shoreline.

2.0 IDENTIFICATION OF HEALTH AND SAFETY PERSONNEL

The Contractor will be required to designate a Site Safety Officer (SSO). The SSO will be a competent person responsible for implementing this CHASP. The SSO will have completed a 40-hour training course and have updated annual refreshers that meet the OSHA requirements of 29 CFR Part 1910 – Occupational Safety and Health Standards. The SSO will have stop-work authorization, which he/she will execute on his/her determination of an imminent safety hazard, emergency situation, or other potentially dangerous situation. If the SSO is absent from the Project Area for any reason, he/she will designate a suitable qualified replacement that is familiar with the requirements of this CHASP and corresponding Materials Management Plan (MMP).

Prior to the start of the Project, the overall responsibilities for project personnel will be established, including the chain of command. The roles identified in the table below will be assigned prior to the start of construction, and the CHASP will be updated with their names and contact information.

Title	Name	Phone #	Email
Project Manager	TBD		
Project Supervisor	TBD		
Site Safety Officer	TBD		
Alternate Site Safety Officer	TBD		

The SSO or their designees are responsible for the following:

1. Monitoring to determine the degree of hazard;
2. Establish work zones;
3. Ensure that all personnel in the work zone are wearing proper hearing protection.
4. Determining the protection levels and equipment required to ensure the safety of personnel;
5. Evaluating on-site conditions (i.e., weather and chemical hazard information) and recommending to the project manager and/or the field coordinator modifications to the work plan and personal protection level;
6. Monitoring performance of all personnel to ensure compliance with the required safety procedures;
7. Notifying emergency authorities (police, fire and ambulance) of the team's presence, assignments and emergency procedures (as required);
8. Ensuring that all personnel have been trained in proper site safety procedures and the use of PPE, and have read and signed the Acknowledgement Forms provided in **Appendix D**.
9. Conducting daily briefings as necessary;
10. Halting work if necessary;
11. Ensuring strict adherence to the CHASP; and,
12. Reviewing personnel medical monitoring participation and health and safety training.

3.0 HAZARD ASSESSMENT

3.1 Summary

The Project scope of work includes disturbing soil, groundwater, and sediment that are contaminated but non-hazardous. Known contaminants of concern (COCs) in the Project Area include naphthalene, vinyl chloride, chloroform, SVOCs, pesticides, PCBs, and metals. Most contamination is likely due to the presence of urban fill; except for where evidence of contamination (creosote-treated wood, a tar-like substance, dark staining, petroleum odors, and elevated PID readings) was observed in Reach 2 (B-33), Reach 3 (B-22), Reach 4 (B-19), Reach 6 (soil borings BH-05A and BH-08), and Reach 7 (B-5) during environmental investigations performed between 2021 and 2024. Elevated concentrations of vinyl chloride and chloroform were found in groundwater samples only, which exceeded New York State Ambient Groundwater Quality Standards in Reach 1 (temporary well TWP-07) and Reach 3 (monitoring well SB-21), respectively.

3.2 Physical Hazards

Project employees may be exposed to physical hazards associated with the use of heavy equipment during drilling activities. Other physical hazards may include:

- Falling or flying objects
- Noise levels exceeding 90 DBA
- Getting caught or pinched in moving parts of equipment
- Slips, trips, and falls
- Hazards associated with heavy machinery
- Hazards associated with excavation and construction
- Hazards associated with construction vehicles and heavy car and truck traffic

The SSO will conduct initial and periodic inspections to identify these and other physical hazards and implement employee protection programs to address the hazards, including the removal of the hazard, the use of safety equipment within the PPE level specified for the activity, and the practice of good housekeeping.

Personnel will be instructed to stay out of the range of motion of all equipment and to make visual contact with the operator prior to entering the work zone. Personnel will be encouraged not to wear loose clothing around rotating machinery and to stay at least 30 feet away from the machinery when not directly operating the machinery.

All project employees working in the exclusion zone, as defined in Section 8, must use hearing, eye, skin, and head protection devices unless otherwise instructed by the SSO.

3.3 Chemical Hazards

The Project Area is active and will be for the duration of the Project. Contaminants in soil are known to include naphthalene, SVOCs, pesticides, PCBs, and metals. Contaminants in groundwater are known to contain vinyl chloride, chloroform, SVOCs, and metals. Contaminants in sediment are known to contain metals.

3.4 Fire and Explosion Hazard

No fire or explosion hazards are anticipated during construction. A geophysical contractorwill be retained to clear areas where ground disturbing activities are proposed of potential subsurface utilities.

Parameter	Action Levels
Explosive Levels	>=10% of the LEL in the borehole
PID Reading	>1 unit above background (sustained in breathing zone for 15 minutes)
Oxygen	<19.5% or >23.5% by volume in the borehole

3.5 Environmental Hazards

Weather: If electrical storm activity appears to be within the immediate area, operations will be discontinued, and personnel will seek shelter in a building or a rubber tired vehicle. If shelter is unavailable, seek lowest ground and squat. Exercise caution for up to thirty minutes after the storm has appeared to pass.

Heat Stress: The risk of heat stress is directly influenced by the weather and the amount of PPE worn. PPE adds bulk weight, severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection, and radiation), and increases energy expenditure. Additional information regarding heat stress symptoms and preventative measures are included as **Appendix A**. Measures such as frequent breaks and increased fluid consumption will be implemented by the SSO to reduce the risk of heat stress.

Cold Stress: Persons working outdoors for a short time may sustain injury to exposed body surfaces, resulting in frostbite, general body cooling, or hypothermia. Areas of the body with high surface area to volume ratio, such as fingers, toes, and ears are the most susceptible. Additional information regarding cold stress symptoms and preventative measures are included as **Appendix A**.

Noise: The use of energized equipment and hand tools creates the potential for exposure to noise levels above OSHA guidelines. All project personnel will wear hearing protection when working in proximity to operating mechanized or powered equipment. Audiometric examinations will be conducted as part of the medical surveillance program.

Other Potential Environmental Hazards: Poisonous plants (e.g. poison ivy), snakes, ticks, bees, and other insects, wild mammals, and pigeons may be encountered during the investigation. All project employees will be required to follow the protective measures listed in **Appendix B**.

3.6 Utilities

Underground utilities may be present in the vicinity of the proposed activities. A private utility markout will be performed prior to initiating construction activities and that construction activities will begin within two weeks of the markout. New York 811 (One Call) is (800) 524-7603. The private utility markout will investigate all proposed excavation locations.

4.0 PERSONNEL TRAINING REQUIREMENTS

In accordance with OSHA's standard covering hazardous waste operations and emergency response (29 CFR Part 1910.120), all personnel who will be working in the Project Area will be trained in accordance with thestandard. In addition, all personnel will participate in a medical surveillance program. Copies of training certifications and proof of participation in a medical surveillance program will be maintained by the SSO.

4.1 Pre-Assignment and Annual Refresher Training

All project personnel who may be required to perform work, defined as hazardous waste operation in 29 CFR Part 1910.120(a), that expose or potentially expose workers to hazardous substances and health hazards must have completed the initial 40-hour training. If the 40-hour training was completed more than 12 months prior to the project start-up, than an additional 8-hour refresher training must have been provided to the employee. Proof of this training is required.

4.2 Site Supervisors Training

Consistent with OSHA 29 CFR 1910.120(e)(4), individuals designated as Site Supervisors will have completed an additional eight hours of specialized training.

4.3 Respirator Fit Testing and Training

All project employees who may be required to use respiratory protection will be required to participate in a respirator training program, which covers respirator selection, fit testing, cleaning, maintenance, and storage of respirators.

The respiratory protection for this project will be selected based on the following criteria:

- The nature of the contaminant (i.e. gas, vapor, mist, dust or fume)
- The warning properties of known or suspected contaminants (i.e. odor, taste, irritation)
- The permissible exposure limits
- The potential for immediately dangerous to life or health (IDLH) conditions in the work zones
- Quality estimates of contaminant concentrations in work zone air
- Air Monitoring results
- The nature of the work being performed for which respiratory protection is being required

4.4 Training and Briefing Topics

All project personnel, including subcontractors and visitors, will be informed of the project specific health and safety hazards that may be encountered. This may be accomplished by reviewing this CHASP.

Specifically, all project personnel will be required to participate in a project start-up meeting. Items covered in this meeting, at a minimum, include:

- Review of potential health and safety hazards associated with the various tasks that will be performed during this project.
- The correct use of the PPE required for the project
- Personal hygiene and decontamination
- Emergency Procedures

5.0 PERSONNEL PROTECTIVE EQUIPMENT TO BE USED

Whenever engineering controls and/or work practices are not adequate to control potential employee exposure to health and/or safety risk, employee protection will be ensured through the use of PPE.

5.1 Levels of Protection

The level of protection selected is based on the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity
- Potential for exposure to substances in air, splashing of liquids, or other direct contact with hazardous materials due to the work being performed
- Knowledge of chemicals in the Project Area along with the properties such as toxicity, route of exposure, and contaminant matrix
- Monitoring results, as described in Section 7 of this CHASP.

In situations where the type of chemical, concentration, and potential for contact are not known, the levelof protection must be selected based on professional judgement until the hazards can be better defined.

5.2 Level A Personnel Protective Equipment

Level A PPE provides the greatest level of skin, respiratory, and eye protection. If Level A conditions are encountered, all personnel will be evacuated from the area and the situation will be reviewed with the SSO. The specific PPE for this level of protection must consist of the following:

- NIOSH and/or Mine Safety Health Association (MSHA) approved pressure demand full face self-contained breathing apparatus (SCBA), or positive pressure demand supplied air respirator with escape SCBA
- Hooded chemical resistant clothing
- Chemical resistant outer gloves
- Chemical resistant inner gloves
- Chemical resistant outer boots
- Inner boots with steel toe and shank
- Hard Hat
- Two-way radio (optional, if the situation warrants)
- Long cotton underwear (optional)

5.3 Level B Personnel Protective Equipment

Level B provides the highest level of respiratory protection and a lesser level of skin protection as compared to Level A. If Level B conditions are encountered, all personnel will be evacuated from the

area and the situation will be reviewed with the SSO. The specific PPE for this level of protection must consist of the following:

- NIOSH and/or MSHA approved pressure demand full face SCBA, or positive pressure demand supplied air respirator with escape SCBA
- Hooded chemical resistant clothing
- Chemical resistant outer gloves
- Chemical resistant inner gloves
- Chemical resistant outer boots
- Inner boots with steel toe and shank
- Hard Hat
- Two-way radio (optional, if the situation warrants)
- Long cotton underwear (optional)

5.4 Level C Personnel Protective Equipment

Level C is necessary when the concentrations and the type of airborne contaminants are known and the criteria for using air purifying respirators are met, and/or the chemical hazards are unknown. The specific PPE for this level of protection must consist of the following:

- NIOSH and/or MSHA approved full face air purifying respirator equipped with dual cartridges for protection against chemical vapors, dusts, mists, or fumes
- Chemical resistant clothing (such as coveralls, two-piece chemical splash suit, disposable chemical resistant coveralls)
- Chemical resistant outer gloves
- Inner chemical resistant gloves
- Chemical resistant outer boots
- Inner boots with steel toe and shank
- Hard Hat
- Two-way radio (optional, if the situation warrants)
- Long cotton underwear (optional)

5.5 Level D Personnel Protective Equipment

Level D PPE consists of the following:

- Disposable or non-disposable coveralls (when handling waste or product)
- Safety glasses
- Chemical resistant gloves
- Safety boots with steel toe and shank, and chemical resistant soles
- Hard Hat (when working around heavy equipment or equipment above shoulder level)
- Hearing protection (as necessary)

5.6 Reassessment of Protection Program

The level of protection provided by the PPE selection may be upgraded or downgraded by the SSO based on changes in site conditions and/or the findings of the monitoring and investigation. If a significant change in the scope-of-work occurs, the hazards will be reassessed. Some changes that result in the need for reassessment include:

- Commencement of a new phase of work
- Change in job tasks during a work phase
- Changes in season/weather
- When temperature extremes or individual medical considerations limit the effectiveness of the PPE
- When contaminants other than those previously identified are encountered
- Change in ambient levels of contaminants, as determined by on-site monitoring
- Changes in the scope-of-work that affects the degree of, or potential for contact with, contaminated materials

5.7 Work Duration

Before workers begin work in their PPE ensembles, the anticipated duration of work should be established. Several factors limiting the duration of work include:

- Air supply consumption (SCBA use)
- Suit/ensemble permeation and penetration rates of chemicals
- Ambient temperature and weather conditions (heat stress, cold stress)
- Capacity/ability of personnel to work in PPE

The SSO will be responsible to select the level of protection necessary for each task.

5.8 Specific Levels of Protection Planned

Level D PPE is anticipated for the duration of the Project.

6.0 MEDICAL SURVEILLANCE REQUIREMENTS

6.1 Baseline or Pre-Assignment Monitoring

All project personnel required to potentially work in restricted areas will participate in a Medical Surveillance Program and will undergo a baseline medical examination in accordance with 29 CFR 1910.120(f).

6.2 Periodic Monitoring

Periodic medical monitoring will be conducted as follows:

- All project personnel will undergo a medical examination at least once every twelve months unless the attending physician believes a longer interval (but not greater than biennially) is appropriate.
- A medical examination will be conducted at the termination of employment or reassignment to an area where the employee would not be covered if the employee has not had an examination within the previous six months.
- A medical examination will be conducted as soon as possible after an employee has developed signs or symptoms indicating possible overexposure to hazardous substances or other health hazards, or if the employee has been injured or exposed above the permissible exposure limits.
- A medical examination will be conducted on a more frequent basis if the attending physician determines it to be medically necessary.

6.3 Site Specific Medical Monitoring

No Project-specific medical monitoring is anticipated for this project.

7.0 FREQUENCY AND TYPES OF AIR MONITORING AND PERSONNEL AIR SAMPLING

This section refers to work zone air monitoring. Community Air Monitoring is addressed in the project RAP. The location, frequency, and type of monitoring for the identified project tasks will be assessed once the project begins and protocols will be set for the remainder of the project. If work zone air monitoring is determined to be necessary by the SSO based on odors or other evidence of contamination, the procedures in this section should be followed.

If determined to be necessary, work zone air monitoring will be conducted for the following purposes:

- Identification of work areas and activities that require the use of engineering or work practice controls, or that requires the use of PPE
- To provide data to confirm that levels of PPE selected are adequate for the protection of workers
- Provides data for the documentation of employee exposures, or lack thereof
- Provides data to document that all necessary controls and precautions are being taken for the protection of the public and the environment
- Provides data to determine the need to implement emergency control procedures and contingency plans

If work zone air monitoring is determined to be necessary, the SSO will be responsible for implementing the air-monitoring program. However, the actual air monitoring may be conducted by a health and safety technician. An individual trained in the operation, calibration, care, and limitations of the instruments will use all air monitoring and air sampling equipment. The SSO will make sure appropriate air monitoring equipment is available at all times. Instrument calibration, instrument readings, serial numbers, and sample locations will be documented on the forms included as **Appendix C**.

7.1 Direct-Read Monitoring Instruments

Direct reading survey instruments will be used to monitor for airborne contaminants and for concentrations of vapors and gases, when applicable. Direct monitoring will include both worker breathing zone and ambient work zone air. At a minimum, the air monitoring equipment used on the Project will include a photoionization detector (PID) and an aerosol particle monitor. **Table 1** describes the instrument application, the monitoring location, and the frequency of monitoring for this project.

7.2 Personal Sampling

No personal sampling is proposed for this Project.

7.3 Action Levels

The action levels presented on **Table 2** will be used to determine the level of PPE required.

8.0 SITE CONTROL MEASURES

During the Project, appropriate protection measures will be implemented to provide protection of Project employees and the environment. Such protective measures may include the following.

8.1 Buddy System

Most activities in contaminated areas should be conducted with a buddy who is able to provide his/her partner with assistance; observe his/her partner for signs of chemical or heat exposure; periodically check the integrity of his/her partners PPE; and provide notification if emergency help is needed.

8.2 Site Communications Plan

Emergency alert communications will consist of verbal and telephone communications. If a telephone is not available in close proximity to the work area, the Project Supervisor will provide and maintain a mobile cellular phone to be used in the event of a major medical, fire, or other environmental emergency. Any necessary passcodes will be made available to all personnel for emergency use. The SSO or his/her designee shall implement emergency communications. A listing of emergency contacts is included as Section 10.

8.3 Work Zone Definition

Three work zones will be established as outlined below:

The exclusion zone is defined as the area that is considered to be contaminated, potentially contaminated, or that could become contaminated. All projectpersonnel who work in the exclusion zone are required to use the appropriate level of PPE for the task, as determined by the SSO. Exclusion zones are typically separated from the project area with fencing, caution tape, and/or traffic cones. For drilling operations, a radius of 30 feet will be used for the exclusionzone. For other operations, a radius equivalent to the reach of the equipment or 10 feet, whichever is greater, will be used.

The contamination reduction zone serves as the buffer zone between the exclusion zone and the support zone. Materials and supplies are staged in this zone for servicing equipment and project personnelin the exclusion zone. All vehicles, equipment, and project personnel coming out of the exclusion zone pass through the contamination reduction zone for decontamination. All protective clothing removed by employees coming out of the exclusion zone will be staged in this area for disposal.

The support zone is considered uncontaminated. The support zone will be clearly delineated to prevent active or passive contamination from the work area. This area serves as the entry point for project personnel, equipment, materials, and visitors.

9.0 DECONTAMINATION PLAN

9.1 Standard Operating Procedures for Minimizing the Potential for Contamination

The following practices will be used to minimize contact with potentially hazardous materials and therefore the potential for contamination:

- Work practices that minimize contact with hazardous substances will be stressed (i.e. not walking through areas of obvious contamination, not directly touching potentially hazardous substances).
- Use of remote sampling, handling, and container opening techniques.
- Protect monitoring and sampling instruments by bagging, leaving openings in the bag sample ports and sensors that must contact potentially contaminated materials.
- Wear disposable outer garments and use disposable equipment where appropriate.

9.2 Levels of Decontamination Protection Required for Personnel

All project personnel will be instructed to remove their contaminated work clothing in a specific area and deposit them into designated containers. In addition, the employees will be instructed to use the wash facilities provided before leaving the work area.

9.3 Equipment Decontamination

All project equipment will be properly decontaminated prior to being moved to another location or off-site. The equipment decontamination will be done in the contamination reduction zone or a separate designated area.

Small equipment will be decontaminated by wiping or spraying the equipment with paper towels dipped in water and laboratory-grade detergent solution followed by a water rinse.

Larger equipment will be steam cleaned. If there is evidence of contamination, steam cleaning will be conducted in a manner that will allow for the collection of the water. The water will be containerized pending proper disposal.

9.4 Disposition of Decontamination Waste

All contaminated clothing and water will be disposed at an authorized facility along with other project-derived wastes, as needed. All construction derived wastes will be handled in accordance with the procedures outlined in the New York State Department of Environmental Conservation (NYSDEC) DER-10 / Technical Guidance for Site Investigation and Remediation (May 2010).

10.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

This section is designed to provide guidance in the event of an emergency. The information provided cannot account for all emergency scenarios and do not take the place of professional judgement or common sense. The first course of action should be to stabilize the situation, if necessary and/or possible. Secondly, the appropriate emergency contacts should be notified.

A review of this emergency/contingency plan will be given to all personnel at the initial safety meeting prior to the start of Site activities. A form to be used to document the safety meeting is included as **Appendix D**.

10.1 Pre-Emergency Planning

Pre-emergency planning will involve the following:

- Training and education necessary to implement this emergency response plan, including spill control measures and other anticipated Project emergencies
- Training of project personnel in appropriate emergency procedures
- Coordination with the local emergency response coordinators, as applicable
- Modification of this plan, as necessary

10.2 Personnel Role and Lines of Authority

The lines of authority and responsibilities for emergency action will coincide with the health and safety responsibilities discussed in Section 2 of this CHASP. The SSO has the overall authority for the implementation of emergency response procedures and all Project emergency actions.

Specific roles and responsibilities to be carried out by project personnel will correlate to the nature of the incident. The SSO is responsible for assigning responsibilities to appropriate personnel. The SSO is also responsible for notifying the appropriate agencies, as outlined in Section 10.6 below.

10.3 Emergency Recognition and Prevention

Incidents of emergency situations can be prevented or limited by implementing the following preventative measures:

- Use of prescribed PPE during all Project activities. The wind directions will be monitored, and the information will be used in locating the contamination reduction zone and clean zones upwind of the exclusion zone.
- Personal Hygiene Practices – Eating, smoking, and drinking are prohibited within the exclusion zone and contaminant reduction zone. Personnel are required to wash their hands before eating.
- Prior to the start of each specific task, such as drilling, excavation, etc., the evacuation route(s) will be established and communicated with the project personnel during the initial safety meeting.
- To the extent possible, all sources of ignition will be kept away from the work areas and fire

extinguishers will be maintained throughout the Project Area.

- Absorbent materials, shovels, and containers will be kept in the Project Area to contain a spill or leak.
- Operations will be stopped when inclement or hazardous weather conditions pose a threat to the safety of project personnel or the environment. Examples of such hazardous conditions include the potential for heat or cold stress, treacherous weather conditions, or limited visibility.
- Preventative measures will be used to minimize heat stress and cold exposure (**see Appendix A**).
- Preventative measures for contact with poisonous plants, animals, and insects will be followed (see **Appendix B**).
- Confined space entry procedures, as outlined in Section 11, will be followed.

10.4 Evacuation Routes and Procedures/Safe Distances

In the event of an incident that could potentially expose project personnel or the public to hazardous materials or conditions, the SSO will be responsible for initiating the following actions:

- Evacuate all personnel from any area in the Project Area where the potential for exposure exists.
- Stop Project operations until the added risk is adequately addressed.
- Provide for the immediate medical treatment of any injured or exposed personnel.
- Notify the appropriate agencies for response to the incident.

In the event of an evacuation, safe distances and places of refuge will correlate to the wind direction, topography and type of incident. Personnel will be advised to move to an upwind location at least 300 yards from any fires and/or chemical releases and will be advised to continually monitor wind direction for changes. The SSO is responsible to account for all personnel at the refuge location. If moving upwind from these types of incidents is not possible without encountering the incident and subsequent exposure potential, personnel will be advised to move cross wind or downwind to a distance necessary to be out of the path of smoke, odors, or releases.

10.5 Emergency Decontamination Procedures

Generally, emergency decontamination procedures for a medical emergency will consist of the removal of the victim's outer protective clothing. Where chemical contamination is involved, the victim will be washed with excess water until emergency assistance arrives. If the medical emergency is life threatening, decontamination may be postponed until emergency medical attention is received. The provider of medical attention must be advised of the potential contamination.

10.6 Emergency Contact/Notification System and Alerting Procedures

Emergency communications will be implemented by the SSO. The following is a list of emergency contacts:

Organization	Phone Number
Ambulance	911
Police	911
Fire Department	911
Hospital – New York Presbyterian Lower Manhattan Hospital 170 William St, New York, NY	718-206-6066
Poison Control Center	800-222-1222
Chemtrec (chemical information resources)	800-262-8200
NYSDEC Hotline	800-457-7362

10.7 Emergency Medical Treatment Procedures

In the event of an injury, all personnel will assemble at the decontamination area. If the injured person is immobile, one or more persons will remain nearby to provide the necessary first aid. If medical assistance is required, the SSO will summon the appropriate assistance and arrange for the transportation of the injured to the hospital.

The following emergency procedures will be used for overt personnel exposure:

- Skin/Eye Contact: Wash exposed skin immediately and flush the affected area for at least 15 minutes. Transport to medical facility.
- Inhalation: Get to fresh air, artificial respiration as necessary, transport to medical facility.
- Ingestion: Transport to medical facility immediately.

The nearest hospital to the project Site area is listed in Section 10.6. The directions to the hospital are depicted on **Figures 1-6.**

10.8 Fire or Explosion Response Procedures

The best preventative measure for the risk of fire or explosion is to eliminate all possible ignition sources when handling flammable materials. Potential ignition sources include, but are not limited to, sparking tools, electrical motors, open flames, lit cigarettes, static spark, static built up during the transfer of liquids, and heat. Non-sparking tools should be used around any flammable materials.

In the event of fire or explosion, all personnel will be evacuated from the area immediately. The SSO or his/her designee will contact the Fire Department and Medical Emergency Response Unit.

10.9 Spill or Leaks Response Procedures

In the event of a spill or release of a potentially hazardous material, the following response will be implemented with a commonsense approach.

- Administer first aid or obtain emergency medical assistance if necessary.
- Warn unsuspecting persons of the hazard if necessary.
- Stop the spill or release at the source if possible.
- Use available containment or cleanup methods.
- Notify the SSO and the Matrix project manager.

Contact NYSDEC to report the spill (1-800-457-7362). They will request information including your name and affiliation; the location of the spill; the estimated volume; date and time of release; actions taken to address the spill; and what if any media was impacted. Request and record the spill number in the field notebook.

11.0 CONFINED SPACE ENTRY PROCEDURES

11.1 Confined Space Entry

Confined spaces refer to a space which, by design, has limited openings for entry and exit; has unfavorable natural ventilation which could contain or produce dangerous air contaminants; and which is not intended for continuous employee occupancy. Confined spaces include, but are not limited to, storage tanks, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, and pipelines.

11.2 Permit Required Confined Space

A permit required confined space is a confined space with one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere
- Contains or formerly contained a material that has the potential for engulfing an entrant
- Has an internal configuration in which an entrant could become entrapped or asphyxiated by inwardly converging walls
- Contains any other recognized serious safety or health hazard

11.3 Non-Permit Required Confined Space

A non-permit required confined space is a confined space that contains atmospheric hazards or any potential to contain atmospheric conditions capable of causing death or serious physical harm.

Potential hazards associated with confined space entry may include an oxygen deficient atmosphere (less than 19.5% oxygen), high vapor concentrations, and physical entrapment. Initial hazard assessment of potentially confined spaces shall include:

- Assessment of entrapment (if it appears too small, do not enter)
- Air Monitoring for vapors and oxygen levels (see Section 7, action levels)
- A ladder must be used for access and egress of any pit or trench greater than 3 feet deep

11.4 Confined Space Observer

If entry into a non-permit confined space is required, a person capable of anticipating, recognizing, and evaluating employee exposure to hazardous substances or other unsafe conditions will remain on the outside of the confined space and will remain in communication with those working inside.

12.0 SPILL CONTAINMENT PROGRAM

The SSO will direct response activities with regard to spill containment. For small releases, project personnel will:

1. Notify/alert others in the area of the release
2. Notify the Project Manager
3. Obtain appropriate personal protective equipment and contain the release using sorbent materialand/or booms

For larger releases, the SSO will direct the efforts of the designated employees and contact the Project Manager for assistance. The SSO will determine if evacuation is required.

In the event an emergency release has occurred, the SSO shall be responsible for the following:

- The SSO shall be responsible for insuring that, in the areas affected by the release, no materials that may be incompatible with the discharged material is treated, stored, or disposed of until cleanup procedures are completed.
- The SSO shall be responsible for ensuring that all emergency equipment is cleaned and ready for its intended use before operations are resumed in affected area(s).
- The SSO is responsible for maintaining a written record of the release incident and required Contingency Plan implementation.
- Notify NYSDEC of the release in accordance with the procedures outlined in Section 10.9 above. A written report of the release incident must be submitted to NYSDEC within fifteen (15) days of the incident. At a minimum, the report shall include:
    - Name, address and telephone number of the facility.
    - Date, time and type of incident;
    - Name and quantity of material(s) involved;
    - The extent of injuries, if any;
    - An assessment of actual or potential hazards to human health or the environment, where this is applicable;
    - Assessment of the scope and magnitude of the problem;
    - Description of the immediate actions that have been taken and the estimated quantity and disposition of recovered material that resulted from the incident; and;
    - Implementation schedule for undertaking measures to eliminate the problem.

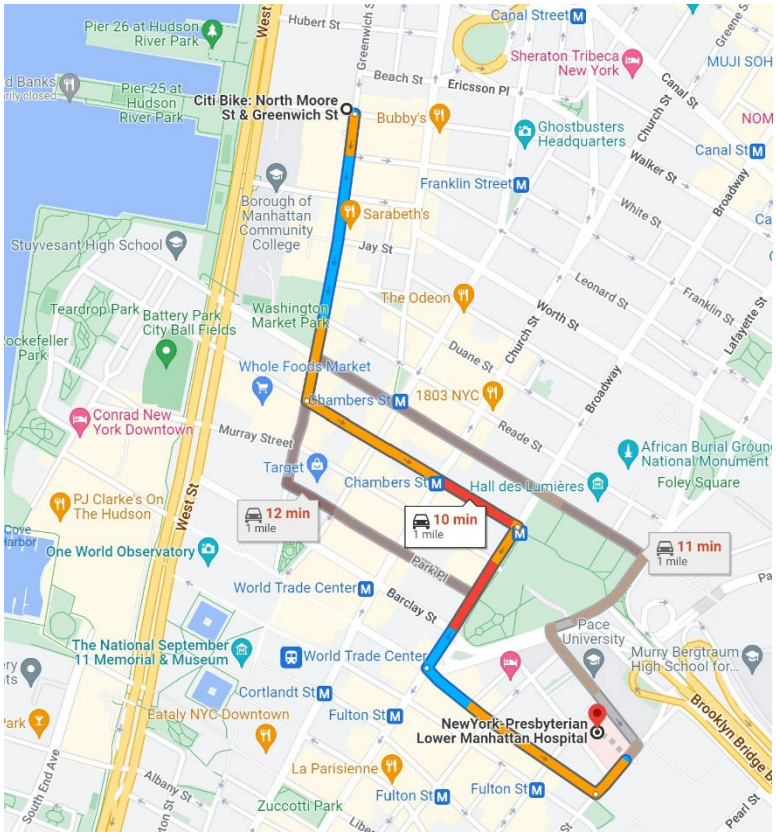
All wastes generated in response to a spill will be disposed of in accordance with federal and state regulations.

FIGURES

Figure 1

HOSPITAL MAP AND DIRECTIONS FROM NORTH MOORE STREET & GREENWICH STREET

To: **New York-Presbyterian Lower Manhattan Hospital Emergency Department**
170 William St, New York, NY 10038



↑ Head south on Greenwich St toward Franklin St

0.3 mi

↰ Turn left onto Warren St

0.3 mi

↱ Turn right onto Broadway/Canyon of Heroes

ⓘ Continue to follow Broadway

0.2 mi

↰ Turn left onto Ann St

0.2 mi

↰ Turn left onto Gold St

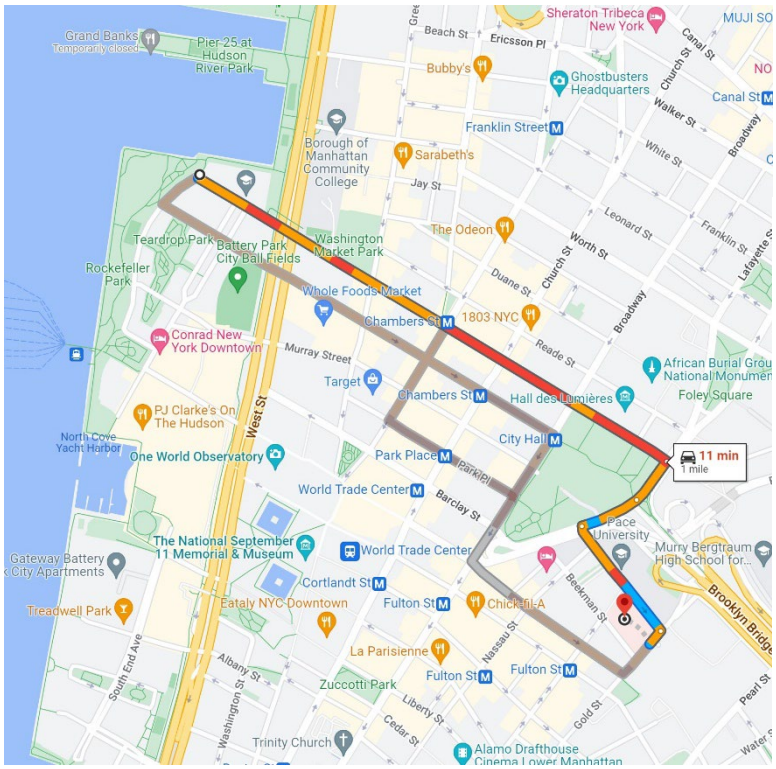
ⓘ Destination will be on the left

259 ft

Figure 2

HOSPITAL MAP AND DIRECTIONS FROM NORTH ESPLANADE & CHAMBERS STREET

To: **New York-Presbyterian Lower Manhattan Hospital Emergency Department**
170 William St, New York, NY 10038



↑ Head southeast on Chambers St toward North End Ave

0.7 mi

↱ Turn right onto Centre St

315 ft

↑ Continue onto Park Row

390 ft

↰ Turn left onto Spruce St

0.2 mi

↱ Turn right onto Gold St

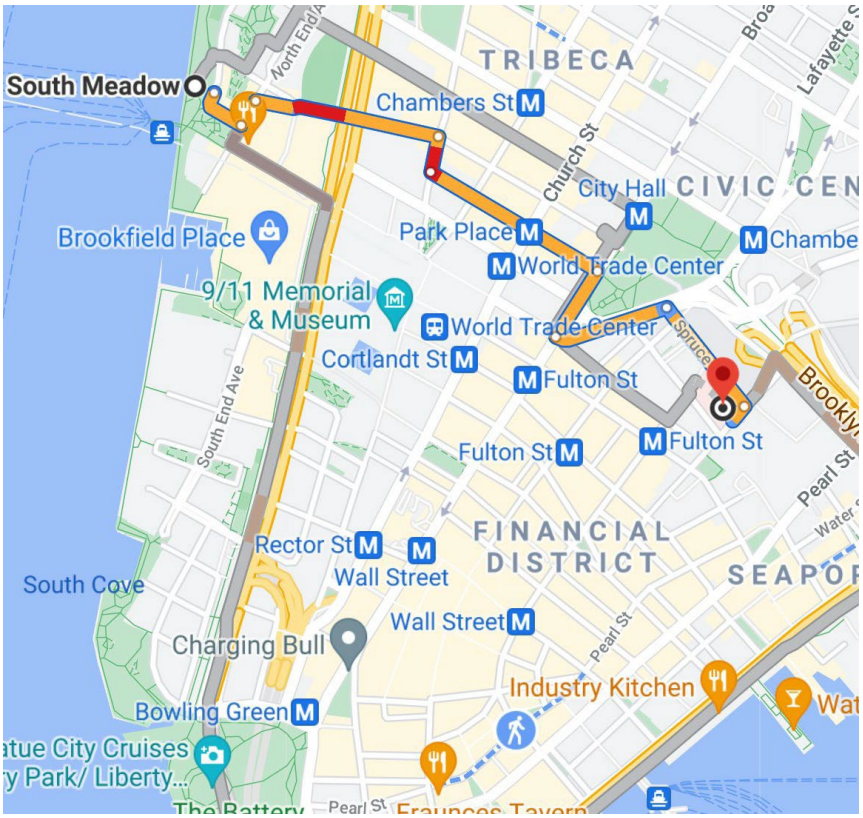
ⓘ Destination will be on the right

108 ft

Figure 3

HOSPITAL MAP AND DIRECTIONS FROM ROCKEFELLER PARK & RIVER TERRACE

To: **New York-Presbyterian Lower Manhattan Hospital Emergency Department**
83 Gold St, New York, NY 10038



Take Murray Street and Park Pl to Broadway — 6 min (0.6 mi)

1. Head southwest on River Terrace toward North End Ave — 331 ft
2. Turn left onto North End Ave — 180 ft
3. Turn right onto Murray Street — 0.2 mi
4. Turn right onto Greenwich St — 230 ft
5. Turn left onto Park Pl — 0.2 mi

Take Park Row to Spruce St — 2 min (0.2 mi)

6. Turn right onto Broadway — 499 ft
7. Sharp left onto Park Row — 0.1 mi

Continue on Spruce St. Drive to Gold St — 2 min (0.2 mi)

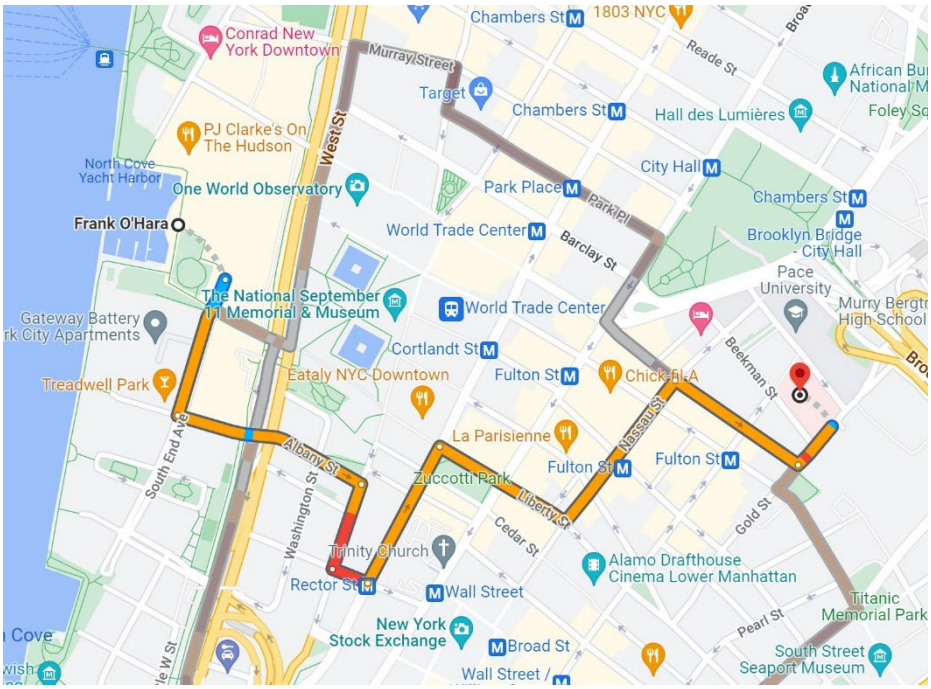
8. Turn right onto Spruce St — 0.2 mi
9. Turn right onto Gold St — 121 ft
   Destination will be on the right

NewYork-Presbyterian Lower Manhattan Hospital Emergency Department
83 Gold St, New York, NY 10038

Figure 4

HOSPITAL MAP AND DIRECTIONS FROM NORTH COVE / BPC ESPLANADE

To: **New York-Presbyterian Lower Manhattan Hospital Emergency Department**
170 William St, New York, NY 10038



Take South End Ave and Albany St to Trinity Pl
5 min (0.4 mi)

- Head southwest on South End Ave toward Liberty St
  0.1 mi
- Turn left onto Albany St
  0.2 mi
- Turn right onto Greenwich St
  449 ft
- Turn left onto Rector St
  190 ft

Turn left at the 1st cross street onto Trinity Pl
1 min (0.1 mi)

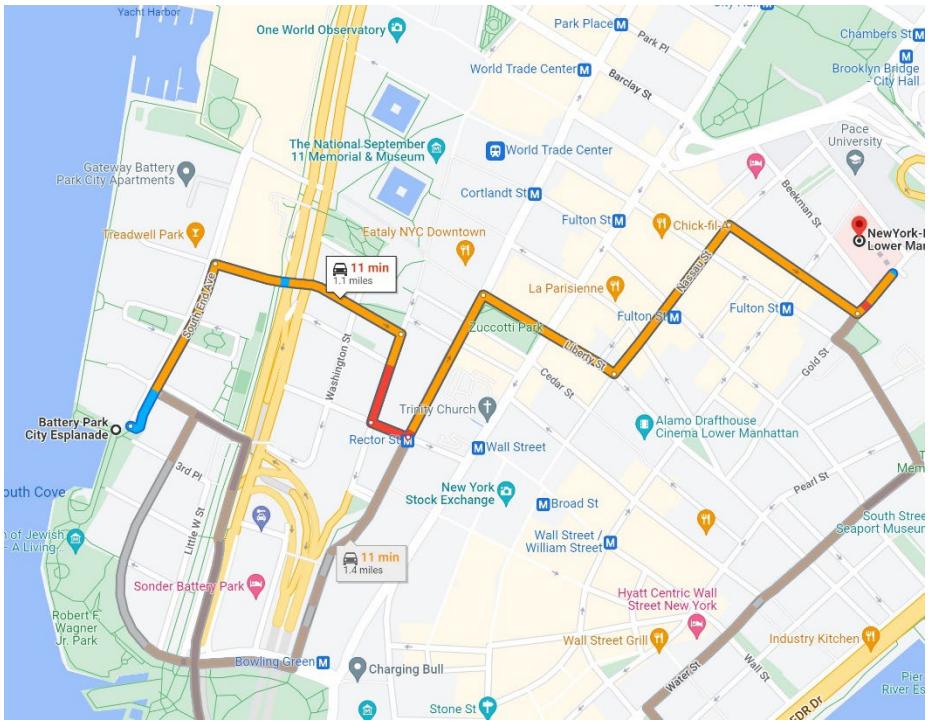
Follow Liberty St, Nassau St and Ann St to Gold St
5 min (0.5 mi)

- Turn right onto Liberty St
  0.1 mi
- Turn left onto Nassau St
  0.2 mi
- Turn right onto Ann St
  0.1 mi
- Turn left onto Gold St
  Destination will be on the left
  259 ft

Figure 5

HOSPITAL MAP AND DIRECTIONS FROM SOUTH COVE / BPC ESPLANADE

To: **New York-Presbyterian Lower Manhattan Hospital Emergency Department**
170 William St, New York, NY 10038



Take South End Ave and Albany St to Trinity Pl

5 min (0.5 mi)

- Head east on South End Ave toward W Thames St
  0.2 mi
- Turn right onto Albany St
  0.2 mi
- Turn right onto Greenwich St
  449 ft
- Turn left onto Rector St
  190 ft

Turn left at the 1st cross street onto Trinity Pl

1 min (0.1 mi)

Follow Liberty St, Nassau St and Ann St to Gold St

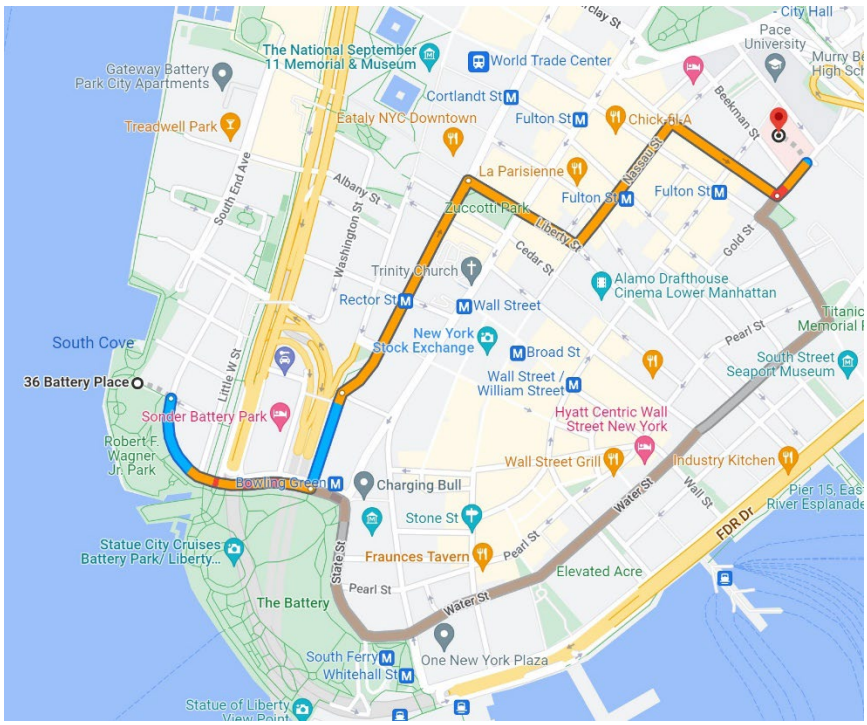
5 min (0.5 mi)

- Turn right onto Liberty St
  0.1 mi
- Turn left onto Nassau St
  0.2 mi
- Turn right onto Ann St
  0.1 mi
- Turn left onto Gold St
  Destination will be on the left
  259 ft

Figure 6

HOSPITAL MAP AND DIRECTIONS FROM SOUTH COVE & 1ST PLACE

To: **New York-Presbyterian Lower Manhattan Hospital Emergency Department**
170 William St, New York, NY 10038



↑ Head south on Battery Pl toward Battery Park City Esplanade

0.2 mi

↰ Turn left onto Greenwich St

⚠ Parts of this road may be closed at certain times or days

0.1 mi

↗ Greenwich St turns slightly right and becomes Trinity Pl

0.3 mi

↱ Turn right onto Liberty St

0.1 mi

↰ Turn left onto Nassau St

0.2 mi

↱ Turn right onto Ann St

0.1 mi

↰ Turn left onto Gold St

ⓘ Destination will be on the left

259 ft

TABLES

TABLE 1: INSTRUMENT APPLICATIONS

Instrument	Application	Monitoring Location	Frequency
PID	Total organic vapor detection Excluding methane	Work area in breathing zone	Continuous
Aerosol Particulate Monitor	Total particulate concentrations	Work area in breathing zone and downwind of soil disruptive activities	Continuous
CGI	Monitoring of levels of combustible gases (lower explosive limit), oxygen and hydrogen sulfide gases	Work area in breathing zone, particularly within excavation	Continuous

PID: Photo-ionization detector (total organic vapor detection instrument)

CGI: Combustible gas indicator

TABLE 2
ACTION LEVELS FOR CHANGES IN LEVELS OF PROTECTION

Hazard Monitored	Tasks	Action Level	Response/Level of Protection
Organic/Inorganic gases and vapors (known contaminants)	Excavation and construction	Chemical dependent accordingto PEL/TLV/REL	Consult standard references to toxicity data. Action level usually set at 50% of PEL/TLV/REL. When multiple chemicals are present, use lowest published exposure limit.
Unknown organic gases and vapors	Excavation and construction	PID: Background to 5 ppm 5-25 ppm above background >25 ppm above background (at the work area perimeter)	 No further action Halt work activities. If levels readily decrease, work may resume with continued monitoring. If levels persist, the source must be identified, corrective actions taken, and monitoring continued; then work may resume provided areas 200 ft downwind of the exclusion zone (or ½ the distance to the nearest potential receptor or residential/commercial structure, but in no case less than 20 ft) is below 5ppm over background. Shut down work activities. Evaluate sources and possible mitigation measures. SSO determine sampling needs and evaluate PPE.
Explosive Atmosphere	Excavation and construction	<10% LEL 10-20% LEL >20% LEL	Work with caution. Continue monitoring. Work with extreme caution. Continuous monitoring required. Explosion hazard. Withdraw from area immediately. Note: Combustible gas readings may not be accurate in atmospheres with <19.5% oxygen.
Oxygen	Excavation	<19.5% 19.5-21.5% 21.5-25% >25%	Oxygen deficient. Level B required. Continue work. Continue work with continuous monitoring. Use extreme caution under oxygen-enhanced conditions. Fire potential. Withdraw from work area immediately. Consult a fire safety specialist.
Radiation	NA		Consult Health and Safety Director
Particulates	Excavation and construction	<100 ug/m^3 above background (over 15 minutes) 100 – 150 ug/m^3 above background >150 ug/m^3 above background	Continue work. Continue work with dust suppression. Stop work and reevaluate dust suppression techniques.

* = these are not criteria, but are to be used as guidelines only.

APPENDIX A
PROTECTION MEASURES FOR HEAT STRESS AND COLD STRESS PREVENTION

APPENDIX A
PROTECTION AGAINST HEAT STRESS AND HEAT STRESS SITUATIONS

Heat Stress

Heat stress is a major hazard for hazardous waste site workers, particularly for those who may be required to work with Level A or Level B protective equipment. Depending upon the ambient conditions and the type of work being performed, heat stress conditions can develop very rapidly. The key to preventing excessive heat stress is educating personnel on the hazards associated with working in heat and how to control such hazards. Following is a summary of the various heat stress conditions that the hazardous waste site workers may experience:

1. **Heat Rash:** This condition may result from continuous exposure to heat or humid air where the skin remains wet due to lack of evaporation.

   Preventive Measures: Rest in cool place during breaks and follow good personal hygiene practices.

2. **Heat Cramps:** Heat cramps are muscular spasms, usually in the abdomen or limbs because of loss of salt following profuse sweating.

   Preventive Measures: The drinking of large quantities of water, with salt supplements can prevent the occurrence of heat cramps.

3. **Heat Exhaustion:** Heat exhaustion is a result of overexertion in warm and hot weather, particularly for workers using high level of personal protective equipment.

   Preventive Measures: If possible, schedule work during early morning hours, particularly during hot weather. Provide more frequent breaks and cool liquid so that workers could replace body fluid. The workers should be trained to monitor for heat stress signs and symptoms.

4. **Heat Stroke:** This heat stress related condition is very serious and is related to a rapid increase in the body core temperature. It can result in brain damage and even death if the body core temperature is not reduced immediately.

   Preventive Measures: Provide more frequent breaks and cool rest areas, such as air-conditioned trailers or fans. Look for symptoms and use plenty of cold fluid to replace body fluids lost through perspiration.

APPENDIX A
PROTECTION AGAINST HEAT STRESS AND COLD STRESS SITUATIONS

Cold Stress

Employees working under extremely cold conditions, particularly under windy conditions may develop cold stress related injuries that can impair their ability to work safely. Therefore, the project employees should be trained to recognize warning signs and symptoms, which include reduced coordination, drowsiness, impaired judgment, fatigue and numbness in toes and fingers. The following is a summary of the cold stress related conditions that may develop in the field and the protective measures that should be implemented:

1. **Hypothermia:** This condition develops as a result of rapid decrease in body temperature to below 90^0F. This condition does not require extremely cold conditions. This typical hypothermia conditions are rainy and windy days with temperature of 50^0F or below. Employees who develop this condition start shivering and have a feeling of being chilly. Continued exposure to cold and wet conditions can result in lack of coordination, mild unresponsiveness, drowsiness, stumbling, coma and even death. Such cold stress related injuries can be prevented by wearing appropriate warm clothing, moving in to warm shelters, by carefully scheduling work/rest periods and by monitoring the weather conditions.

   Preventive Measures: Provide sufficiently warm clothing and protective clothing against rain and/or wet conditions. If the employees start experiencing signs and symptoms described above, then check the clothing and provide supplemental warm clothing. If the employee is wearing wet clothing, it should be removed. They should move indoors and consume warm drinks and food. If the sign or symptoms persist, or the condition starts to deteriorate, take the affected employee to the nearest hospital emergency room.

2. **Frostbite:** Frostbite is a localized injury that results from the freezing of the bodily tissues. It is most common in fingers and toes, and on the face and the ears. This condition occurs in subfreezing temperatures (20^0F or below), and the condition is compounded by windy conditions. The signs and symptoms of this cold stress related condition include reddening of the tissues and feeling of extreme pain in the affected areas. The more severe condition can result in numbness and freezing of the tissues and/or fluid in the underlying soft tissues.

   Preventive Measures: The employees working under extremely cold and/or windy conditions with low wind chill factors should be trained to use adequate warm clothing. They should be instructed to cover bodily extremities, such as hands and fingers, toes, face and ears with protective coverings. If they experience any signs and symptoms described above, they should move indoors and drink warm fluids. The frozen tissues can be re-warmed by immersing in warm water. If the feeling of pain persists, they should be taken to the nearest hospital emergency room.

APPENDIX B
PREVENTATIVE MEASURES REGARDING POISONOUS PLANTS AND INSECTS

APPENDIX B
PROTECTIVE MEASURES AGAINST POISONOUS PLANTS AND INSECTS

1. Poisonous Plants	Avoid contact with such plants. Wear long sleeve shirts and pants.
2. Insects	Wear long sleeves and pants. Use insect repellent if necessary.
3. Deer Tick	Wear long sleeves and pants. Use insect repellent if necessary.
4. Wild Mammals	Avoid contact with wild mammals. Wear long sleeves and pants.
5. Wild Pigeons	Avoid disturbing accumulations of pigeon droppings. Wear dust mask in such areas.

APPENDIX C
AIR MONITORING FORMS

MATRIXNEWORLD
Engineering Progress

Instrument Calibration Log Sheet

Instrument Type (Type, Model No., Serial No. etc.)		
Temperature (if applicable)	Calibration Source	Results
Calibration Gas	Location (On-Site. Off-Site, Office, etc.)	
Operator Initials	Date/Time	
Temperature (if applicable)	Calibration Source	Results
Calibration Gas	Location (On-Site. Off-Site, Office, etc.)	
Operator Initials	Date/Time	
Temperature (if applicable)	Calibration Source	Results
Calibration Gas	Location (On-Site. Off-Site, Office, etc.)	
Operator Initials	Date/Time	

Comments:

Signature

MATRIXNEWORLD
Engineering Progress

Air Monitoring Log
NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT

SSO:_____

Date:_____

Health and Safety Monitoring (list any CHASP violations, times, and corrective measures)

_____

_____

_____

_____

_____

_____

_____

_____

Air Monitoring

Time	PID (ppm)	MiniRam (ug/m³)	LEL (%)	Oxygen (%)	H2S (ppm)	Comments

APPENDIX D
SAFETY MEETING DOCUMENTATION
CHASP ACKNOWLEDGEMENT FORM
NEW EMPLOYEE ORIENTATION FORM
ACCIDENT/INCIDENT INVESTIGATION FORM

MATRIXNEWORLD
Engineering Progress

TAILGATE SAFETY MEETING FORM [1]

Project Name: _____ Job No.: _____

Date: _____ Time: _____

MEETING ATTENDEES - I have received Health and Safety Training and will abide by its conditions.

Name/Signature	Affiliation

Safety Topics Discussed:

_____

_____

_____

_____

_____

_____

_____

Name of Presenter: _____

Title of Presenter: _____

Signature: _____ Date: _____

[1] To be used for daily safety meetings

ACKNOWLEDGEMENT FORM (CHASP)

The following personnel have read the site-specific CHASP and have been trained and informed of its contents through daily tailgate safety briefings.

Print Name	*Signature*	*Company*	*Function*	*Date*

MATRIXNEWORLD
Engineering Progress

NEW EMPLOYEE ORIENTATION CHECKLIST

Employee Name:_____ Contractor: _____

Start Date:_____ Date of Orientation: _____

1. Statement of the Contractor's commitment to Safety & Health:
   Safety & Health is a value associated with every priority _____

2. Personal Protective Equipment & Clothing:

   Hard Hat: _____
   Safety Glasses: _____
   Safety Shoes: _____
   Gloves: _____
   Hearing Protection: _____

3. Company's Drug and Alcohol Policy: _____

4. The four major hazards:

   Falls and fall protection policy: _____
   Electrocution: _____
   Struck by/ Caught In between: _____
   Hazardous Materials/ HazCom: _____

5. Special Training as appropriate (scaffolds, trenching, cranes, etc.):

   _____

6. Procedures for reporting accidents and injuries: _____

7. Emergency Evacuation Procedures: _____

8. Positive Discipline Policy- Consequences: _____

9. Followed by a job walk down pointing out the exposures:

   _____

Comments: _____

_____

Signature of Employee: _____

Orientation Performed By: _____

MATRIXNEWORLD
Engineering Progress

ACCIDENT/INCIDENT REPORT FORM
NORTH & WEST BATTERY PARK CITY RESILIENCY
PROJECT NEW YORK, NEW YORK

Employee(s) name (s): _____

Time & date of accident/incident: _____

Job title(s) and department(s): _____

Supervisor/lead person: _____

Witnesses: _____

Brief Description of the accident or incident: _____

_____

Indicate body part affected: _____

Did the injured employee(s) see a doctor? ( ) Yes ( ) No
If yes, did you file an employer's portion of a worker's compensation form? ( ) Yes ( ) No

Did the injured employee(s) go home during their shift? ( ) Yes ( ) No
If yes, list the date and time injured employee(s) left job(s): _____

Supervisor's Comments: _____

_____

What could have been done to prevent this accident/incident? _____

_____

Have the unsafe conditions been corrected: ( ) Yes ( ) No

If yes, what has been done? _____

If no, what needs to be done? _____

Employer or Supervisor's signature: _____

Date: _____

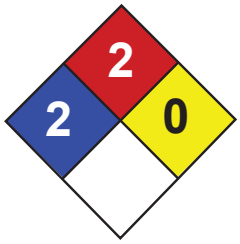
Additional comments/notes: _____

_____

_____

APPENDIX E
SDS FORMS





Health	2
Fire	2
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Naphthalene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Naphthalene

Catalog Codes: SLN1789, SLN2401

CAS#: 91-20-3

RTECS: QJ0525000

TSCA: TSCA 8(b) inventory: Naphthalene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C10H8

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
Naphthalene	91-20-3	100

Toxicological Data on Ingredients: Naphthalene: ORAL (LD50): Acute: 490 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit]. VAPOR (LC50): Acute: 170 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate 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 immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 567°C (1052.6°F)

Flash Points: CLOSED CUP: 88°C (190.4°F). OPEN CUP: 79°C (174.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

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.

Fire Fighting Media and Instructions:
Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. 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 locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. 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:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust 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:
Israel: TWA: 10 (ppm) TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [1995] TWA: 52 STEL: 79 (mg/m3) from ACGIH [1995] Australia: STEL: 15 (ppm) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid.)

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties:
Partially dispersed in hot water, methanol, n-octanol. Very slightly dispersed in cold water. See solubility in methanol, n-octanol.

Solubility:
Partially soluble in methanol, n-octanol. Very slightly soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: May attack some forms of rubber and plastic

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 490 mg/kg [Rat]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Other Toxic Effects on Humans:
Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

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 more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: Naphthalene Pennsylvania RTK: Naphthalene Florida: Naphthalene Minnesota: Naphthalene Massachusetts RTK: Naphthalene TSCA 8(b) inventory: Naphthalene TSCA 8(a) PAIR: Naphthalene TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87 SARA 313 toxic chemical notification and release reporting: Naphthalene: 1% CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

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-4: Flammable solid. CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R36- Irritating to eyes. R40- Possible risks of irreversible effects. R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed. R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation. R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 01:30 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.

Acetone

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Date of issue: 11/12/1998 Revision date: 04/24/2018 Supersedes: 04/24/2018 Version: 1.3

SECTION 1: Identification

1.1. Identification

Product form	:	Substance
Substance name	:	Acetone
Chemical name	:	2-Propanone
CAS-No.	:	67-64-1
Product code	:	LC10420, LC10425
Formula	:	C3H6O
Synonyms	:	2-propanone / beta-ketopropane / dimethyl formaldehyde / dimethyl ketone / dimethylketal / DMK (=dimethyl ketone) / keto propane / methyl ketone / pyroacetic acid / pyroacetic ether / pyroacetic spirit

1.2. Recommended use and restrictions on use

Use of the substance/mixture	:	Solvent Cleaning product Chemical raw material
Recommended use	:	Laboratory chemicals
Restrictions on use	:	Not for food, drug or household use

1.3. Supplier

LabChem, Inc.

Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court

Zelienople, PA 16063 - USA

T 412-826-5230 - F 724-473-0647

1.4. Emergency telephone number

Emergency number : CHEMTREC: 1-800-424-9300 or +1-703-741-5970

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS-US classification

Flammable liquids Category 2	H225	Highly flammable liquid and vapour
Serious eye damage/eye irritation Category 2A	H319	Causes serious eye irritation
Specific target organ toxicity (single exposure) Category 3	H336	May cause drowsiness or dizziness

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements

GHS US labeling

Hazard pictograms (GHS US) :



GHS02 GHS07

Signal word (GHS US) : Danger

Hazard statements (GHS US) :
H225 - Highly flammable liquid and vapour
H319 - Causes serious eye irritation
H336 - May cause drowsiness or dizziness

Precautionary statements (GHS US) :
P210 - Keep away from heat, hot surfaces, open flames, sparks. - No smoking.
P233 - Keep container tightly closed.
P240 - Ground/bond container and receiving equipment.
P241 - Use explosion-proof electrical, lighting, ventilating equipment
P242 - Use only non-sparking tools.
P243 - Take precautionary measures against static discharge.
P261 - Avoid breathing mist, spray, vapors.

P264 - Wash exposed skin thoroughly after handling.
P271 - Use only outdoors or in a well-ventilated area.
P280 - Wear eye protection, face protection, protective clothing, protective gloves.
P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 - IF INHALED: Remove 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
P312 - Call a POISON CENTER or doctor/physician if you feel unwell.
P337+P313 - If eye irritation persists: Get medical advice/attention.
P370+P378 - In case of fire: Use dry chemical powder, alcohol-resistant foam, carbon dioxide (CO2) to extinguish
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P405 - Store locked up.
P501 - Dispose of contents/container to comply with local, state and federal regulations
P235 - Keep cool.

2.3. Other hazards which do not result in classification

Other hazards not contributing to the classification : None.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Substance type : Mono-constituent

Name	Product identifier	%	GHS-US classification
Acetone (Main constituent)	(CAS-No.) 67-64-1	100	Flam. Liq. 2, H225 Eye Irrit. 2A, H319 STOT SE 3, H336

Full text of hazard classes and H-statements : see section 16

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general : Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with labored breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital.

First-aid measures after inhalation : Remove the victim into fresh air. Respiratory problems: consult a doctor/medical service.

First-aid measures after skin contact : Wash immediately with lots of water. Soap may be used. Do not apply (chemical) neutralizing agents. Remove clothing before washing. Take victim to a doctor if irritation persists.

First-aid measures after eye contact : Rinse immediately with plenty of water. Remove contact lenses, if present and easy to do. Continue rinsing. Do not apply neutralizing agents. Take victim to an ophthalmologist if irritation persists.

First-aid measures after ingestion : Rinse mouth with water. Immediately after ingestion: give lots of water to drink. Do not give milk/oil to drink. Do not induce vomiting. Give activated charcoal. Call Poison Information Centre (www.big.be/antigif.htm). Consult a doctor/medical service if you feel unwell. Ingestion of large quantities: immediately to hospital. Doctor: gastric lavage.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects : Not expected to present a significant hazard under anticipated conditions of normal use.

Symptoms/effects after inhalation : EXPOSURE TO HIGH CONCENTRATIONS: Feeling of weakness. Irritation of the respiratory tract. Nausea. Vomiting. Headache. Central nervous system depression. Dizziness. Narcosis. Excited/restless. Drunkenness. Disturbed motor response. Respiratory difficulties. Disturbances of consciousness.

Symptoms/effects after skin contact : ON CONTINUOUS EXPOSURE/CONTACT: Dry skin. Cracking of the skin.

Symptoms/effects after eye contact : Irritation of the eye tissue.

Symptoms/effects after ingestion	:	Dry/sore throat. Risk of aspiration pneumonia. Symptoms similar to those listed under inhalation. AFTER ABSORPTION OF LARGE QUANTITIES: Irritation of the gastric/intestinal mucosa. Change in the blood composition. Change in urine output. Renal disease. Enlargement/disease of the liver.
Symptoms/effects upon intravenous administration	:	Not available.
Chronic symptoms	:	ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Red skin. Skin rash/inflammation. Dry/sore throat. Headache. Nausea. Feeling of weakness. Loss of weight. Possible inflammation of the respiratory tract.

4.3. Immediate medical attention and special treatment, if necessary

Obtain medical assistance.

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media	:	Quick-acting ABC powder extinguisher. Quick-acting BC powder extinguisher. Quick-acting class B foam extinguisher. Quick-acting CO2 extinguisher. Class B foam (alcohol-resistant). Water spray if puddle cannot expand.
Unsuitable extinguishing media	:	Water (quick-acting extinguisher, reel); risk of puddle expansion. Water; risk of puddle expansion.

5.2. Specific hazards arising from the chemical

Fire hazard	:	DIRECT FIRE HAZARD. Highly flammable liquid and vapour. Gas/vapor flammable with air within explosion limits. INDIRECT FIRE HAZARD. May be ignited by sparks. Gas/vapor spreads at floor level: ignition hazard. Reactions involving a fire hazard: see "Reactivity Hazard".
Explosion hazard	:	DIRECT EXPLOSION HAZARD. Gas/vapour explosive with air within explosion limits. INDIRECT EXPLOSION HAZARD. Heat may cause pressure rise in tanks/drums: explosion risk. may be ignited by sparks. Reactions with explosion hazards: see "Reactivity Hazard".
Reactivity	:	Violent to explosive reaction with many compounds. Prolonged storage: on exposure to light: release of harmful gases/vapours.

5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions	:	Cool tanks/drums with water spray/remove them into safety. Physical explosion risk: extinguish/cool from behind cover. Do not move the load if exposed to heat. After cooling: persistant risk of physical explosion.
Protection during firefighting	:	Heat/fire exposure: compressed air/oxygen apparatus.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Protective equipment	:	Gloves. Protective goggles. Protective clothing. Large spills/in enclosed spaces: compressed air apparatus.
Emergency procedures	:	Keep upwind. Mark the danger area. Consider evacuation. Seal off low-lying areas. Close doors and windows of adjacent premises. Stop engines and no smoking. No naked flames or sparks. Spark- and explosion-proof appliances and lighting equipment. Keep containers closed. Wash contaminated clothes.

6.1.2. For emergency responders

Protective equipment	:	Equip cleanup crew with proper protection.
Emergency procedures	:	Ventilate area.

6.2. Environmental precautions

Prevent spreading in sewers.

6.3. Methods and material for containment and cleaning up

For containment	:	Contain released substance, pump into suitable containers. Plug the leak, cut off the supply. Dam up the liquid spill. Try to reduce evaporation. Measure the concentration of the explosive gas-air mixture. Dilute/disperse combustible gas/vapour with water curtain. Provide equipment/receptacles with earthing. Do not use compressed air for pumping over spills.
Methods for cleaning up	:	Take up liquid spill into inert absorbent material, e.g.: sand, earth, vermiculite. Scoop absorbed substance into closing containers. Spill must not return in its original container. Carefully collect the spill/leftovers. Damaged/cooled tanks must be emptied. Do not use compressed air for pumping over spills. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Measure the concentration in the air regularly. Work under local exhaust/ventilation. Comply with the legal requirements. Remove contaminated clothing immediately. Clean contaminated clothing. Handle uncleaned empty containers as full ones. Thoroughly clean/dry the installation before use. Do not discharge the waste into the drain. Do not use compressed air for pumping over. Keep container tightly closed.

Hygiene measures : Do not eat, drink or smoke when using this product. Wash contaminated clothing before reuse. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Keep only in the original container in a cool, well ventilated place away from : Heat sources, Direct sunlight, incompatible materials. Keep container closed when not in use.

Incompatible products : Strong bases. Strong acids.

Incompatible materials : Sources of ignition. Direct sunlight.

Storage temperature : 15 - 20 °C

Heat-ignition : KEEP SUBSTANCE AWAY FROM: heat sources. ignition sources.

Prohibitions on mixed storage : KEEP SUBSTANCE AWAY FROM: oxidizing agents. reducing agents. strong acids. (strong) bases. halogens. amines.

Storage area : Store in a cool area. Keep out of direct sunlight. Store in a dry area. Store in a dark area. Ventilation at floor level. Fireproof storeroom. Provide for an automatic sprinkler system. Provide for a tub to collect spills. Provide the tank with earthing. Meet the legal requirements.

Special rules on packaging : SPECIAL REQUIREMENTS: closing. with pressure relief valve. clean. opaque. correctly labelled. meet the legal requirements. Secure fragile packagings in solid containers.

Packaging materials : SUITABLE MATERIAL: steel. stainless steel. carbon steel. aluminium. iron. copper. nickel. bronze. glass. MATERIAL TO AVOID: synthetic material.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Acetone (67-64-1)		
ACGIH	ACGIH TWA (ppm)	250 ppm
ACGIH	ACGIH STEL (ppm)	500 ppm
NIOSH	NIOSH REL (TWA) (mg/m³)	590 mg/m³
NIOSH	NIOSH REL (TWA) (ppm)	250 ppm

8.2. Appropriate engineering controls

Appropriate engineering controls : Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Safety glasses. Gloves. Protective clothing. Face shield. High gas/vapor concentration: gas mask with filter type A.



Materials for protective clothing:

GIVE GOOD RESISTANCE: butyl rubber. tetrafluoroethylene. GIVE LESS RESISTANCE: chlorosulfonated polyethylene. natural rubber. neoprene. polyurethane. PVA. styrene-butadiene rubber. GIVE POOR RESISTANCE: nitrile rubber. polyethylene. PVC. viton. nitrile rubber/PVC

Hand protection:

Gloves

Eye protection:

Safety glasses

Skin and body protection:

Head/neck protection. Protective clothing

Respiratory protection:

Full face mask with filter type AX at conc. in air > exposure limit

Other information:

Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Appearance	:	Liquid.
	:	Colourless
	:	Aromatic odour Sweet odour Fruity odour
Odor threshold	:	No data available
pH	:	7 (10 g/l)
Melting point	:	-95 °C
Freezing point	:	No data available
Boiling point	:	56 °C
Critical temperature	:	235 °C
Critical pressure	:	47010 hPa
Flash point	:	-17 °C (Closed cup)
Relative evaporation rate (butyl acetate=1)	:	6
Relative evaporation rate (ether=1)	:	2
Flammability (solid, gas)	:	Non flammable.
Vapor pressure	:	247 hPa (20 °C)
Vapor pressure at 50 °C	:	828 hPa
Relative vapor density at 20 °C	:	2
Relative density	:	0.79
Relative density of saturated gas/air mixture	:	1.2
Specific gravity / density	:	786 kg/m³
Molecular mass	:	58.08 g/mol
Solubility	:	Soluble in water. Soluble in ethanol. Soluble in ether. Soluble in dimethyl ether. Soluble in petroleum spirit. Soluble in chloroform. Soluble in dimethylformamide. Soluble in oils/fats. Water: complete Ethanol: complete Ether: complete
Log Pow	:	-0.24 (Test data)
Auto-ignition temperature	:	465 °C
Decomposition temperature	:	No data available
Viscosity, kinematic	:	0.417 mm²/s
Viscosity, dynamic	:	0.32 mPa·s (20 °C)
Explosion limits	:	2 - 12.8 vol % 60 - 310 g/m³ Lower explosive limit (LEL): 2 vol % UEL: 12.8 vol %
Explosive properties	:	No data available.
Oxidizing properties	:	None.

9.2. Other information

Minimum ignition energy	:	1.15 mJ
Specific conductivity	:	6000000 pS/m (25 °C)
Saturation concentration	:	589 g/m³
VOC content	:	100 %
Other properties	:	Gas/vapour heavier than air at 20°C. Clear. Highly volatile. Neutral reaction.

SECTION 10: Stability and reactivity

10.1. Reactivity

Violent to explosive reaction with many compounds. Prolonged storage: on exposure to light: release of harmful gases/vapours.

10.2. Chemical stability

Unstable on exposure to light.

10.3. Possibility of hazardous reactions

Reacts with (strong) oxidizers.

10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures.

10.5. Incompatible materials

Strong acids. Strong bases. Strong oxidizers.

10.6. Hazardous decomposition products

fume. Carbon monoxide. Carbon dioxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Likely routes of exposure	:	Inhalation; Skin and eye contact
Acute toxicity	:	Not classified

Acetone (67-64-1)	
LD50 oral rat	5800 mg/kg (Equivalent or similar to OECD 401, Rat, Female, Experimental value, Oral)
LD50 dermal rabbit	20000 mg/kg (Equivalent or similar to OECD 402, Rabbit, Male, Experimental value, Dermal)
LC50 inhalation rat (mg/l)	76 mg/l (Other, 4 h, Rat, Female, Experimental value, Inhalation (vapours))
ATE US (oral)	5800 mg/kg body weight
ATE US (dermal)	20000 mg/kg body weight
ATE US (gases)	30000 ppmV/4h
ATE US (vapors)	71 mg/l/4h
ATE US (dust, mist)	71 mg/l/4h

Skin corrosion/irritation	:	Not classified pH: 7 (10 g/l)
Serious eye damage/irritation	:	Causes serious eye irritation. pH: 7 (10 g/l)
Respiratory or skin sensitization	:	Not classified
Germ cell mutagenicity	:	Not classified Based on available data, the classification criteria are not met
Carcinogenicity	:	Not classified
Reproductive toxicity	:	Not classified Based on available data, the classification criteria are not met
Specific target organ toxicity – single exposure	:	May cause drowsiness or dizziness.
Specific target organ toxicity – repeated exposure	:	Not classified
Aspiration hazard	:	Not classified
Potential Adverse human health effects and symptoms	:	Based on available data, the classification criteria are not met.

Symptoms/effects after inhalation	:	EXPOSURE TO HIGH CONCENTRATIONS: Feeling of weakness. Irritation of the respiratory tract. Nausea. Vomiting. Headache. Central nervous system depression. Dizziness. Narcosis. Excited/restless. Drunkenness. Disturbed motor response. Respiratory difficulties. Disturbances of consciousness.
Symptoms/effects after skin contact	:	ON CONTINUOUS EXPOSURE/CONTACT: Dry skin. Cracking of the skin.
Symptoms/effects after eye contact	:	Irritation of the eye tissue.
Symptoms/effects after ingestion	:	Dry/sore throat. Risk of aspiration pneumonia. Symptoms similar to those listed under inhalation. AFTER ABSORPTION OF LARGE QUANTITIES: Irritation of the gastric/intestinal mucosa. Change in the blood composition. Change in urine output. Renal disease. Enlargement/disease of the liver.
Symptoms/effects upon intravenous administration	:	Not available.
Chronic symptoms	:	ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Red skin. Skin rash/inflammation. Dry/sore throat. Headache. Nausea. Feeling of weakness. Loss of weight. Possible inflammation of the respiratory tract.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general	:	Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008.
Ecology - air	:	Not included in the list of substances which may contribute to the greenhouse effect (IPCC). Not included in the list of fluorinated greenhouse gases (Regulation (EU) No 517/2014). Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009).
Ecology - water	:	Not harmful to crustacea. Not harmful to fishes. Inhibition of activated sludge. Not harmful to algae. Not harmful to plankton.

Acetone (67-64-1)	
LC50 fish 1	5540 mg/l (EU Method C.1, 96 h, Salmo gairdneri, Static system, Fresh water, Experimental value, Nominal concentration)

12.2. Persistence and degradability

Acetone (67-64-1)	
Persistence and degradability	Biodegradable in the soil. Biodegradable in the soil under anaerobic conditions. Readily biodegradable in water.
Biochemical oxygen demand (BOD)	1.43 g O_2/g substance
Chemical oxygen demand (COD)	1.92 g O_2/g substance
ThOD	2.2 g O_2/g substance
BOD (% of ThOD)	0.872 (20 day(s), Literature study)

12.3. Bioaccumulative potential

Acetone (67-64-1)	
BCF fish 1	0.69 (Pisces)
BCF other aquatic organisms 1	3 (BCFWIN, Calculated value)
Log Pow	-0.24 (Test data)
Bioaccumulative potential	Not bioaccumulative.

12.4. Mobility in soil

Acetone (67-64-1)	
Surface tension	0.0237 N/m
Ecology - soil	No (test)data on mobility of the substance available.

12.5. Other adverse effects

Other information	:	Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Disposal methods

Waste disposal recommendations : Do not discharge into drains or the environment. Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle by distillation. Incinerate under surveillance with energy recovery.

Additional information : Hazardous waste according to Directive 2008/98/EC, as amended by Regulation (EU) No 1357/2014 and Regulation (EU) No 2017/997.

Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Transport document description : UN1090 Acetone, 3, II

UN-No.(DOT) : UN1090

Proper Shipping Name (DOT) : Acetone

Transport hazard class(es) (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120

Packing group (DOT) : II - Medium Danger

Hazard labels (DOT) : 3 - Flammable liquid



DOT Packaging Non Bulk (49 CFR 173.xxx) : 202

DOT Packaging Bulk (49 CFR 173.xxx) : 242

DOT Special Provisions (49 CFR 172.102) : IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.
T4 - 2.65 178.274(d)(2) Normal..... 178.275(d)(3)
TP1 - The maximum degree of filling must not exceed the degree of filling determined by the following: Degree of filling = 97 / 1 + a (tr - tf) Where: tr is the maximum mean bulk temperature during transport, and tf is the temperature in degrees celsius of the liquid during filling.

DOT Packaging Exceptions (49 CFR 173.xxx) : 150

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 5 L

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 60 L

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.

Transportation of Dangerous Goods

Transport document description : UN1090 ACETONE, 3, II

UN-No. (TDG) : UN1090

Proper Shipping Name (Transportation of Dangerous Goods) : ACETONE

TDG Primary Hazard Classes : 3 - Class 3 - Flammable Liquids

Packing group : II - Medium Danger

Explosive Limit and Limited Quantity Index : 1 L

Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index : 5 L

Passenger Carrying Ship Index : Forbidden

Transport by sea

Transport document description (IMDG)	:	UN 1090 acetone, 3, II
UN-No. (IMDG)	:	1090
Proper Shipping Name (IMDG)	:	acetone
Class (IMDG)	:	3 - Flammable liquids
Packing group (IMDG)	:	II - substances presenting medium danger
EmS-No. (1)	:	F-E
EmS-No. (2)	:	S-D

Air transport

Transport document description (IATA)	:	UN 1090 Acetone, 3, II
UN-No. (IATA)	:	1090
Proper Shipping Name (IATA)	:	Acetone
Class (IATA)	:	3 - Flammable Liquids
Packing group (IATA)	:	II - Medium Danger

SECTION 15: Regulatory information

15.1. US Federal regulations

Acetone (67-64-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	5000 lb
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Fire hazard

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

15.2. International regulations

CANADA

Acetone (67-64-1)
Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

No additional information available

National regulations

Acetone (67-64-1)
Listed on the Canadian IDL (Ingredient Disclosure List)

15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

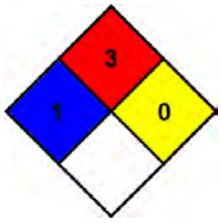
SECTION 16: Other information

Revision date	:	04/24/2018
Other information	:	None.

Full text of H-phrases: see section 16:

H225	Highly flammable liquid and vapour
H319	Causes serious eye irritation
H336	May cause drowsiness or dizziness

NFPA health hazard	:	1 - Materials that, under emergency conditions, can cause significant irritation.
NFPA fire hazard	:	3 - Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions.
NFPA reactivity	:	0 - Material that in themselves are normally stable, even under fire conditions.



Hazard Rating

Health	:	1 Slight Hazard - Irritation or minor reversible injury possible
Flammability	:	3 Serious Hazard - Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F. as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)
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.
Personal protection	:	C C - Safety glasses, Gloves, Synthetic apron

SDS US LabChem

Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.

SAFETY DATA SHEET

Vinyl Chloride (Chloroethylene)

Section 1. Identification

GHS product identifier : Vinyl Chloride (Chloroethylene)

Chemical name : vinyl chloride

Other means of identification : chloroethylene; Ethene, chloro-; Vinyl chloride monomer; Chloroethene; Vinyl chloride, monomer; Ethene, chloro- (vinyl chloride); VCM; VC; Monochloroethylene; Monochloroethene

Product use : Synthetic/Analytical chemistry.

Synonym : chloroethylene; Ethene, chloro-; Vinyl chloride monomer; Chloroethene; Vinyl chloride, monomer; Ethene, chloro- (vinyl chloride); VCM; VC; Monochloroethylene; Monochloroethene

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.
Contains gas under pressure; may explode if heated.
May cause frostbite.
May form explosive mixtures in Air.
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 when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : 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-; Vinyl chloride monomer; Chloroethene; Vinyl chloride, monomer; Ethene, chloro- (vinyl chloride); VCM; VC; Monochloroethylene; Monochloroethene

CAS number/other identifiers

CAS number : 75-01-4

Product code : 001067

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.

Section 4. First aid measures

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

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 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".

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. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
vinyl chloride	**ACGIH TLV (United States, 3/2016).** TWA: 1 ppm 8 hours. **OSHA PEL (United States, 2/2013).** 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 : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [COLORLESS GAS OR LIQUID (BELOW 7 F) WITH A PLEASANT ODOR AT HIGH CONCENTRATIONS. [NOTE: SHIPPED AS A LIQUEFIED COMPRESSED GAS.]

Color : Colorless.

Molecular weight : 62.5 g/mole

Molecular formula : C2-H3-Cl

Boiling/condensation point : -13.4°C (7.9°F)

Melting/freezing point : -153.8°C (-244.8°F)

Critical temperature : 158.45°C (317.2°F)

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: -78°C (-108.4°F)
Open cup: -78°C (-108.4°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Section 9. Physical and chemical properties

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 3.8%
Upper: 29.3%

Vapor pressure : Not available.

Vapor density : 2.2 (Air = 1)

Specific Volume (ft^3/lb) : 1.0989

Gas Density (lb/ft^3) : 0.91 (20°C / 68 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.

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

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.

Section 11. Toxicological information

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
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

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
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Reportable quantity** 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. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: 150 kg **Special provisions** 21, B44, T50	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2). **Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Road or Rail Index** Forbidden	-	-	**Passenger and Cargo Aircraft** Quantity limitation: 0 Forbidden **Cargo Aircraft Only** Quantity limitation: 150 kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Water Act (CWA) 307: 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

Section 15. Regulatory information

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Sudden release of pressure
Delayed (chronic) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
vinyl chloride	100	Yes.	Yes.	No.	No.	Yes.

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 contains a chemical known to the State of California to cause cancer.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
vinyl chloride	Yes.	No.	Yes.	No.

International regulations

International lists

National inventory

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : This material is listed or exempted.

Malaysia : 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.

Section 15. Regulatory information

Taiwan : This material is listed or exempted.

Canada

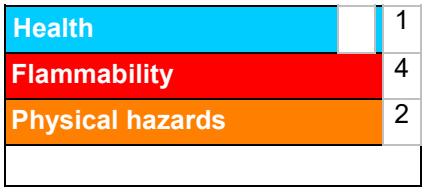
WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).
Class F: Dangerously reactive material.

CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).
Class F: Dangerously reactive material.

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)



Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Flam. Gas 1, H220	Expert judgment
Press. Gas Liq. Gas, H280	Expert judgment
Carc. 1, H350	Expert judgment
STOT RE 2, H373 (liver)	Expert judgment

History

Section 16. Other information

Date of printing : 10/11/2016

Date of issue/Date of revision : 10/11/2016

Date of previous issue : No previous validation

Version : 0.01

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

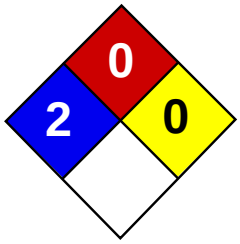
References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.





Health	2
Fire	0
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Chloroform MSDS

Section 1: Chemical Product and Company Identification

Product Name: Chloroform

Catalog Codes: SLC1888, SLC5044

CAS#: 67-66-3

RTECS: FS9100000

TSCA: TSCA 8(b) inventory: Chloroform

CI#: Not available.

Synonym: Trichloromethane; Methane, trichlor-

Chemical Name: Chloroform

Chemical Formula: CHCl3

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
Chloroform	67-66-3	100

Toxicological Data on Ingredients: Chloroform: ORAL (LD50): Acute: 695 mg/kg [Rat]. 36 mg/kg [Mouse]. 820 mg/kg [Guinea pig]. DERMAL (LD50): Acute: >20000 mg/kg [Rabbit]. VAPOR (LC50): Acute: 47702 mg/m 4 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects: CARCINOGENIC EFFECTS: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. 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 kidneys, liver, heart. 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: In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

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. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

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.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: May explode if it comes in contact with aluminum powder, lithium, perchlorate, pentoxide, bis(dimethylamino)dimethylstannane, potassium, potassium-sodium alloy, sodium (or sodium hydroxide or sodium methoxide), and methanol

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal. 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: Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as metals, alkalis.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. 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: 10 (ppm) [Australia] Inhalation TWA: 2 (ppm) from OSHA (PEL) [United States] Inhalation STEL: 9.78 (mg/m3) from NIOSH Inhalation STEL: 2 (ppm) from NIOSH Inhalation TWA: 9.78 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 10 (ppm) from ACGIH (TLV) [United States] [1999] Inhalation TWA: 2 (ppm) [United Kingdom (UK)] Inhalation TWA: 9.9 (mg/m3) [United Kingdom (UK)] InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Pleasant. Sweetish. Etheric. Non-irritating

Taste: Burning. Sweet.

Molecular Weight: 119.38 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 61°C (141.8°F)

Melting Point: -63.5°C (-82.3°F)

Critical Temperature: 263.33°C (506°F)

Specific Gravity: 1.484 (Water = 1)

Vapor Pressure: 21.1 kPa (@ 20°C)

Vapor Density: 4.36 (Air = 1)

Volatility: Not available.

Odor Threshold: 85 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, Light

Incompatibility with various substances: Reactive with metals, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Light Sensitive. Incompatible with triisopropyl phosphine, acetone, disilane, fluorine, strong bases and reactive metals (aluminum, magnesium in powdered form), light.

Special Remarks on Corrosivity: It will attack some forms of plastics, rubber, and coatings.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation.

Toxicity to Animals: WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 36 mg/kg [Mouse]. Acute dermal toxicity (LD50): >20000 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 47702 mg/m 4 hours [Rat]. 3

Chronic Effects on Humans: CARCINOGENIC EFFECTS: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, heart.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May affect genetic material (possible mutangen) and cause adverse reproductive effects(embryotoxicity and fetotoxicity) Suspected carcinogen (tumorigenic) and teratogen based on animal data. Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans: Acute Potential Health Effects: Skin: Causes skin irritation and may cause chemical burns. Eye: Causes eye irritation, burning pain and reversible injury to corneal epithelium. Inhalation: Causes irritation of the respiratory system (mucous membranes). May affect behavior/Nervous system (CNS depressant, fatigue, dizziness, nervousness, giddiness, euphoria, loss of coordination and judgement, weakness, hallucinations, muscle contraction/spasticity, general anesthetic, spastic paralysis, headache), anorexia (neurological and gastrointestinal symtoms resembling chronic alcoholism), and possibly coma and death. May affect the liver, kidneys and gastrointestinal tract (nausea, vomiting). Ingestion: Causes gastrointestinal tract irritation (nausea, vomiting). May affect the liver, urinary system (kidneys), respiration, behavior/nervous system (symptoms similar to inhalation),and heart. Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect the liver (hepatitis, jaundice, hepatocellular necrosis), metabolism (weight loss), respiration (fibrosis, pneumoconoisis), behavior/central nervous system (symptoms similar to acute inhalation), blood, musculoskeletal system, and kidneys. Ingestion: Prolonged or repeated ingestion may affect the liver, kidneys, metabolism (weight loss), endocrine system (spleen), blood (changes in cell count).

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 43.8 mg/l 96 hours [Trout].

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 as toxic as 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 6.1: Poisonous material.

Identification: : Chloroform UNNA: UN1888 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations: California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Chloroform California prop. 65 (no significant risk level): Chloroform: 0.02 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Chloroform New York release reporting list: Chloroform Rhode Island RTK hazardous substances: Chloroform Pennsylvania RTK: Chloroform Massachusetts RTK: Chloroform New Jersey: Chloroform California Director's List of Hazardous Subtances (8 CCR 339): Chloroform Tennessee: Chloroform TSCA 8(b) inventory: Chloroform TSCA 8(d) H and S data reporting: Chloroform: effective: 6/1/87; sunset: 6/1/97 SARA 302/304/311/312 extremely hazardous substances: Chloroform SARA 313 toxic chemical notification and release reporting: Chloroform CERCLA: Hazardous substances.: Chloroform: 10 lbs. (4.536 kg)

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 D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R20/22- Harmful by inhalation and if swallowed. R38- Irritating to skin. R40- Possible risks of irreversible effects. S36/37- Wear suitable protective clothing and gloves.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

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: Not available.

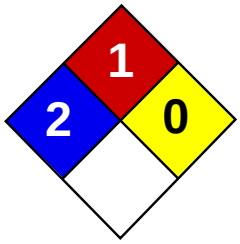
Other Special Considerations: Not available.

Created: 10/10/2005 08:16 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.





Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Acenaphthene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Acenaphthene

Catalog Codes: SLA2332

CAS#: 83-32-9

RTECS: AB1000000

TSCA: TSCA 8(b) inventory: Acenaphthene

CI#: Not applicable.

Synonym: Ethylenenaphthalene

Chemical Name: 1,8-Dehydroacenaphthalene

Chemical Formula: C10H6(CH2)2

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
Acenaphthene	83-32-9	100

Toxicological Data on Ingredients: Acenaphthene LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

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. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of oxidizing materials.

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.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Combustible.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust 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: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Solid needles.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 154.21 g/mole

Color: White.

pH (1% soln/water): Not applicable.

Boiling Point: 277.5°C (531.5°F)

Melting Point: 93.6 (200.5°F)

Critical Temperature: Not available.

Specific Gravity: 1.02 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol.

Solubility:
Partially soluble in methanol. Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Material is irritating to mucous membranes and upper respiratory tract.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: Acenaphthene Massachusetts RTK: Acenaphthene New Jersey: Acenaphthene TSCA 8(b) inventory: Acenaphthene CERCLA: Hazardous substances.: Acenaphthene

Other Regulations: Not available.

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC): R36/38- Irritating to eyes and skin.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II.

Other Special Considerations: Not available.

Created: 10/09/2005 03:35 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.

Material Safety Data Sheet
Acenaphthylene, 99+%

ACC# 98224

Section 1 - Chemical Product and Company Identification

MSDS Name: Acenaphthylene, 99+%
Catalog Numbers: AC310770000, AC310771000
Synonyms:
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
208-96-8	Acenaphthylene	>99	205-917-1

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Yellow crystals and chunks.
Warning! Causes eye, skin, and respiratory tract irritation.
Target Organs: Respiratory system, eyes, skin.

Potential Health Effects
Eye: Causes eye irritation.
Skin: Causes skin irritation.
Ingestion: The toxicological properties of this substance have not been fully investigated.
Inhalation: Causes respiratory tract irritation.
Chronic: Not available.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion: Get medical aid. Wash mouth out with water.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: Not available.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container.

Section 7 - Handling and Storage

Handling: Avoid breathing dust, mist, or vapor. Avoid contact with skin and eyes.
Storage: Store in a cool, dry place. Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Acenaphthylene	none listed	none listed	none listed

OSHA Vacated PELs: Acenaphthylene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: 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: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
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.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: Yellow crystals and chunks
Odor: Not available.
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 280 deg C
Freezing/Melting Point:88 - 91 deg C
Decomposition Temperature: Not available.
Solubility: Not available.
Specific Gravity/Density: Not available.
Molecular Formula: Not available.
Molecular Weight:152.20

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 208-96-8: AB1254000; AB1254200
LD50/LC50:
CAS# 208-96-8:
Oral, mouse: LD50 = 1760 mg/kg;
.

Carcinogenicity:
CAS# 208-96-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No data available.
Teratogenicity: No data available.
Reproductive Effects: No data available.

Mutagenicity: No data available.
Neurotoxicity: No data available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated	Not Regulated
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 208-96-8 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 208-96-8: 5000 lb final RQ; 2270 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
Section 313 No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 208-96-8 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 208-96-8 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XI
Risk Phrases:
R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of

water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger/Protection)
CAS# 208-96-8: No information available.
Canada - DSL/NDSL
CAS# 208-96-8 is listed on Canada's NDSL List.
Canada - WHMIS
not available.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
Canadian Ingredient Disclosure List
CAS# 208-96-8 is not listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/25/1999
Revision #4 Date: 9/26/2007

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 Fisher 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 Fisher has been advised of the possibility of such damages.

TCI AMERICA

Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
	**Toxic compound, do not ingest or inhale. Avoid all contact with this material.** **CARCINOGEN. MINIMIZE EXPOSURE.**	

Section I. Chemical Product and Company Identification

Chemical Name **Benz[a]anthracene**

Catalog Number	B0017
Synonym	Tetraphene
Chemical Formula	$C_{18}H_{12}$
CAS Number	56-55-3

Supplier
TCI America
9211 N. Harborgate St.
Portland OR
1-800-423-8616

In case of Emergency Call
Chemtrec®
(800) 424-9300 (U.S.)
(703) 527-3887 (International)

Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
Benz[a]anthracene	56-55-3	Min. 99.0 (GC)	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen.	Rat LD_{50} (intravenous) >200 mg/kg

Section III. Hazards Identification

Acute Health Effects

Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Chronic Health Effects

CARCINOGENIC EFFECTS : Possible carcinogen.
(sufficient evidence in animals, no adaquate data in humans)
Tumorigenic: Mouse (dermal) 18mg/kg. Neoplastic by RTECS criteria.
Tumorigenic: Mouse (implant) 80 mg/kg. Carcinogenic by RTECS criteria.
Tumorigenic: Mouse (subcutaneous) 2 mg/kg. Equivocal tumorigenic by RTECS criteria.
MUTAGENIC EFFECTS : Not available.
TERATOGENIC EFFECTS : Not available.
DEVELOPMENTAL TOXICITY:Not available.
The substance is toxic to kidneys. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section IV. First Aid Measures

Eye Contact

Check for and remove any contact lenses. DO NOT use an eye ointment. Flush eyes with running water for a minimum of 15 minutes, occasionally lifting the upper and lower eyelids. Seek medical attention. Treat symptomatically and supportively.

Skin Contact

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. Seek medical attention. Treat symptomatically and supportively. Wash any contaminated clothing before reusing.

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 artificial respiration. WARNING: It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention and, if possible, show the chemical label. Treat symptomatically and supportively.

Ingestion

INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. Loosen tight clothing such as a collar, tie, belt, or waistband. If the victim is not breathing, administer artificial respiration. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Seek immediate medical attention and, if possible, show the chemical label. Treat symptomatically and supportively.

Continued on Next Page

Section V. Fire and Explosion Data

Flammability	Combustible.	Auto-Ignition	Not available.
Flash Points	Not available.	Flammable Limits	Not available.

Combustion Products: These products are toxic carbon oxides (CO, CO_2).

Fire Hazards: No specific information is available regarding the flammability of this compound in the presence of various materials.

Explosion Hazards: Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
No additional information is available regarding the risks of explosion.

Fire Fighting Media and Instructions: SMALL FIRE: Use DRY chemicals, CO_2, water spray or foam.
LARGE FIRE: Use water spray, fog or foam. DO NOT use water jet.

Section VI. Accidental Release Measures

Spill Cleanup Instructions: Toxic solid. Harmful solid.
Stop leak if without risk. DO NOT get water inside container. DO NOT touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all sources of ignition.
Consult federal, state, and/or local authorities for assistance on disposal.

Section VII. Handling and Storage

Handling and Storage Information: TOXIC. POSSIBLE CARCINOGEN. Handle with caution and minimize exposure. Keep away from heat and sources of ignition. Mechanical exhaust required. When not in use, tightly seal the container and store in a dry, cool place. Avoid excessive heat and light. DO NOT ingest. DO NOT breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Treat symptomatically and supportively. Avoid contact with skin and eyes.
Always store away from incompatible compounds such as oxidizing agents.

Section VIII. Exposure Controls/Personal Protection

Engineering Controls: Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Splash goggles. Lab coat. Dust respirator. Boots. Gloves. A MSHA/NIOSH approved respirator must be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.



Exposure Limits: This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen.

Section IX. Physical and Chemical Properties

Physical state @ 20°C	Light yellow to tan powder.	Solubility	Soluble in diethyl ether, acetone. Very slightly soluble in methanol, n-octanol. Insoluble in cold water, hot water.
Specific Gravity	Not available.		
Molecular Weight	228.29	Partition Coefficient	0
Boiling Point	437.6°C (819.7°F)	Vapor Pressure	Not available.
Melting Point	157 to 159°C (314.6 to 318.2°F)	Vapor Density	Not available.
Refractive Index	Not available.	Volatility	Not available.
Critical Temperature	Not available.	Odor	Not available.
Viscosity	Not available.	Taste	Not available.

Section X. Stability and Reactivity Data

Stability: This material is stable if stored under proper conditions. (See Section VII for instructions)

Conditions of Instability: Avoid excessive heat and light.

Incompatibilities: Reactive with oxidizing agents.

Continued on Next Page

Section XI. Toxicological Information

RTECS Number	CV9275000
Routes of Exposure	Ingestion. Inhalation. Eye contact. Skin contact.
Toxicity Data	Rat LD_{50} (intravenous) >200 mg/kg
Chronic Toxic Effects	**CARCINOGENIC EFFECTS** : Possible carcinogen. (sufficient evidence in animals, no adaquate data in humans) Tumorigenic: Mouse (dermal) 18mg/kg. Neoplastic by RTECS criteria. Tumorigenic: Mouse (implant) 80 mg/kg. Carcinogenic by RTECS criteria. Tumorigenic: Mouse (subcutaneous) 2 mg/kg. Equivocal tumorigenic by RTECS criteria. **MUTAGENIC EFFECTS** : Not available. **TERATOGENIC EFFECTS** : Not available. **DEVELOPMENTAL TOXICITY**: Not available. The substance is toxic to kidneys. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
Acute Toxic Effects	Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	The pattern of benz(a)anthracene (BA) release into air and water is quite general since it is a universal product of combustion of organic matter. Both in air and water it is largely associated with particulate matter. When released into water it will rapidly become adsorbed to sediment or particulate matter in the water column, and bioconcentrate into aquatic organisms. In the unadsorbed state, it will degrade by photolysis in a matter of hours to days. Its slow desorption from sediment and particulate matter will maintain a low concentration of BA in the water. Because it is strongly adsorbed to soil it will remain in the upper few centimeters of soil and not leach into groundwater. BA will very slowly biodegrade when colonies of microorganisms are acclimated but this is too slow a process (half-life ca 1 yr to be significant). Benz(a)anthracene in the atmosphere will be transported long distances and will probably be subject to photolysis and photooxidation although there is little documentation about the rate of these processes in the literature. Humans will be exposed to benz(a)anthracene in ambient air, particularly in industrial areas, from stoves, cigarette smoke, food (particularly when smoked or charcoal broiled), and drinking water.(HSDB)

Section XIII. Disposal Considerations

Waste Disposal	Recycle to process, if possible. Consult your local or regional authorities. You may be able to dissolve or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. Observe all federal, state, and local regulations when disposing of this substance.

Section XIV. Transport Information

DOT Classification	DOT CLASS 6.1: Poisonous material.
PIN Number	UN2811
Proper Shipping Name	Toxic solids, organic, n.o.s.
Packing Group (PG)	II
DOT Pictograms	

Section XV. Other Regulatory Information and Pictograms

TSCA Chemical Inventory (EPA)	This compound is **ON** the EPA Toxic Substances Control Act (TSCA) inventory list.
WHMIS Classification (Canada)	WHMIS CLASS D-2B: Material causing other toxic effects (TOXIC).
EINECS Number (EEC)	200-280-6
EEC Risk Statements	R45- May cause cancer.
Japanese Regulatory Data	Not available.

Continued on Next Page

Section XVI. Other Information

Version 1.0
Validated on 11/3/1997.
Printed 1/20/2005.

Notice to Reader

TCI laboratory chemicals are for research purposes only and are NOT intended for use as drugs, food additives, households, or pesticides. The information herein is believed to be correct, but does not claim to be all inclusive and should be used only as a guide. Neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All chemical reagents must be handled with the recognition that their chemical, physiological, toxicological, and hazardous properties have not been fully investigated or determined. All chemical reagents should be handled only by individuals who are familiar with their potential hazards and who have been fully trained in proper safety, laboratory, and chemical handling procedures. Although certain hazards are described herein, we can not guarantee that these are the only hazards which exist. Our MSDS sheets are based only on data available at the time of shipping and are subject to change without notice as new information is obtained. Avoid long storage periods since the product is subject to degradation with age and may become more dangerous or hazardous. It is the responsibility of the user to request updated MSDS sheets for products that are stored for extended periods. Disposal of unused product must be undertaken by qualified personnel who are knowledgeable in all applicable regulations and follow all pertinent safety precautions including the use of appropriate protective equipment (e.g. protective goggles, protective clothing, breathing equipment, facial mask, fume hood). For proper handling and disposal, always comply with federal, state, and local regulations.

SAFETY DATA SHEET

Revision Date 19-Jan-2018 **Revision Number** 3

1. Identification

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

Cat No. : **AC105600010; AC105601000**

CAS-No 50-32-8
Synonyms Benzo[def]chrysene.; 3,4-Benzopyrene; 3,4-Benzpyrene

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone Number
For information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11
Emergency Number **US:**001-201-796-7100 / **Europe:** +32 14 57 52 99
CHEMTREC Tel. No.**US:**001-800-424-9300 / **Europe:**001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

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

Label Elements

Signal Word
Danger

Hazard Statements
May cause an allergic skin reaction
May cause genetic defects
May cause cancer
May damage fertility or the unborn child



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Avoid breathing dust/fume/gas/mist/vapors/spray
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Response
IF exposed or concerned: Get medical attention/advice
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation or rash occurs: Get medical advice/attention
Wash contaminated clothing before reuse
Storage
Store locked up
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

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

4. First-aid measures

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 May cause allergic skin reaction. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Unsuitable Extinguishing Media No information available

Flash Point
Method - No information available

Autoignition Temperature No information available

Explosion Limits

Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
None known
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up No information available.

7. Handling and storage

Handling Ensure adequate ventilation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Benzo[a]pyrene		TWA: 0.2 mg/m^3		

Legend

OSHA *- Occupational Safety and Health Administration*

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	Dark yellow
Odor	aromatic
Odor Threshold	No information available
pH	
Melting Point/Range	175 179 °C
Boiling Point/Range	°C @ 760 mmHg
Flash Point	
Evaporation Rate	No information available
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	No information available
Specific Gravity	No information available
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available
Molecular Formula	C20H12
Molecular Weight	252.31

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products None under normal use conditions

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Benzo[a]pyrene	50-32-8	Group 1	Reasonably Anticipated	A2	X	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known
STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information No information available

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Benzo[a]pyrene	Group III Chemical	Not applicable	Not applicable

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity
Do not empty into drains.

Persistence and Degradability No information available

Bioaccumulation/ Accumulation No information available.

Mobility No information available.

Component	log Pow
Benzo[a]pyrene	6.06

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Benzo[a]pyrene - 50-32-8	U022	-

14. Transport information

DOT
UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

TDG
UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

IATA
UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

IMDG/IMO

UN-No	UN3077
Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class	9
Packing Group	III

15. Regulatory information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Benzo[a]pyrene	X	X	-	200-028-5	-		X	-	-	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Benzo[a]pyrene	50-32-8	> 96	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Benzo[a]pyrene	-	-	X	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA Not applicable

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

California Proposition 65 This product does not contain any Proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Benzo[a]pyrene	50-32-8	Carcinogen	0.06 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Benzo[a]pyrene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ):	N
DOT Marine Pollutant	N
DOT Severe Marine Pollutant	N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

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

Revision Date 19-Jan-2018
Print Date 19-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

Revision Date: 12/08/16
www.restek.com

1. IDENTIFICATION

Catalog Number / Product Name:	**31272 / Benzo(b)fluoranthene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	9
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:





GHS Classification:	Flammable Liquid Category 2 Serious Eye Damage/Eye Irritation Category 2 Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Causes serious eye irritation. May cause drowsiness or dizziness.
GHS Precautions:	
Safety Precautions:	Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilation and lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Avoid breathing dust/fume/gas/mist/vapours/spray. Wash hands and skin thoroughly after handling. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a POISON CENTER or doctor/physician if you feel unwell. If eye irritation persists: Get medical advice/attention. In case of fire: Use extinguishing media in section 5 for extinction.
Storage:	Store in a well-ventilated place. Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.
Disposal:	Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: No data available.

Repeated Exposure Target Organs: No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.900000
benzo (b) fluoranthene	205-99-2	205-911-9	0.100000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Fire and/or Explosion Hazards: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from

incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	500 ppm STEL 750 ppm STEL; 1782 mg/m3 STEL	250 ppm TWA 500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (b) fluoranthene	205-99-2	ND		No TLV	No data available.

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.

Respiratory Protection: No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 3. A respirator is not normally required.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

Medical Conditions Aggravated By Exposure: Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color: Depends upon product selection
Odor: Strong
Physical State: No data available.
pH: No data available.
Vapor Pressure: No data available.
Vapor Density: 2.0 (air = 1)
Boiling Point: No data available.
Melting Point: -95.4 °C Melting Point
Flash Point: 39
Flammability: Highly Flammable
Upper Flammable/Explosive Limit, % in air: No data available.
Lower Flammable/Explosive Limit, % in air: No data available.
Autoignition Temperature: 465 deg C
Decomposition Temperature: No data available.
Specific Gravity: 0.7845 g/cm3 at 25 °C
Evaporation Rate: No data available.
Odor Threshold: ND
Solubility: Complete; 100%
Partition Coefficient: n-octanol in water: No data available.
VOC % by weight: 0
Molecular Weight: 58.08

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions.
Conditions to Avoid: No data available.
Materials to Avoid / Chemical Incompatiability: Strong oxidizing agents Strong acids
Hazardous Decomposition Products: Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure: Eyes, Central nervous system stimulation, Respiratory Tract, Skin
Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Can cause minor skin irritation, defatting, and dermatitis.
Eye Contact:	Can cause minor irritation, tearing and reddening.
Ingestion Irritation:	May be harmful if swallowed.
Ingestion Toxicity:	Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Inhalation:	Upon prolonged and/or repeated exposure, can cause minor respiratory irritation, dizziness, weakness, fatigue, nausea, and headache.
Skin Contact:	Upon prolonged or repeated contact, can cause minor skin irritation, defatting, and dermatitis.

Component Toxicological Data:
NIOSH:

Chemical Name	**CAS No.**	**LD50/LC50**
Acetone	67-64-1	Dermal LD50 Rabbit >15700 mg/kg; Oral LD50 Rat 5800 mg/kg; Inhalation LC50 Rat 50100 mg/m3 8 h

Component Carcinogenic Data:
OSHA:

Chemical Name	**CAS No.**	
Benzo(b)fluoranthene	205-99-2	Present

ACGIH:

Chemical Name	**CAS No.**	
Acetone	67-64-1	A4 - Not Classifiable as a Human Carcinogen
Benzo[b]fluoranthene	205-99-2	A2 - Suspected Human Carcinogen

NIOSH:

Chemical Name	**CAS No.**
No data available.	

NTP:

Chemical Name	**CAS No.**
No data available.	

IARC:

Chemical Name	**CAS No.**	**Group No.**
No data.		Group 1
No data.		Group 2A
Benzo(b)fluoranthene	205-99-2	Group 2B

12. ECOLOGICAL INFORMATION

Overview:	This material is not expected to be harmful to the ecology.
Mobility:	No data
Persistence:	No data
Bioaccumulation:	No data
Degradability:	No data
Ecological Toxicity Data:	No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product:	Spent or discarded material is a hazardous waste.
Disposal Methods:	Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging:	Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Acetone

UN Number: UN1090
Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Acetone	67-64-1	X	-	-	X
benzo (b) fluoranthene	205-99-2	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[b]fluoranthene	205-99-2	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Acetone	67-64-1	X	X	X	X
benzo (b) fluoranthene	205-99-2	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 03/23/15
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

Material Safety Data Sheet

Benzo[k]fluoranthene, 99+% (tlc)

MSDS# 54641

Section 1 - Chemical Product and Company Identification

MSDS Name:	Benzo[k]fluoranthene, 99+% (tlc)
Catalog Numbers:	AC279730000, AC279732500
Synonyms:	8,9-Benzofluoranthane.
Company Identification:	Acros Organics BVBA Janssen Pharmaceuticalaan 3a 2440 Geel, Belgium
Company Identification: (USA)	Acros Organics One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	800-ACROS-01
For information in Europe, call:	+32 14 57 52 11
Emergency Number, Europe:	+32 14 57 52 99
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300
CHEMTREC Phone Number, Europe:	703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#:	207-08-9
Chemical Name:	Benzo[k]fluoranthene, 99+% (TLC)
%:	99%
EINECS#:	205-916-6

Hazard Symbols: T



Risk Phrases: 45

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! May be fatal if swallowed. May be fatal if absorbed through the skin. Toxic. Carcinogen. May cause lung damage. Causes eye and skin irritation. Causes digestive and respiratory tract irritation. Cancer hazard. May be fatal if inhaled. Target Organs: Lungs, respiratory system.

Potential Health Effects

Eye:	Causes eye irritation.
Skin:	Causes skin irritation. May be fatal if absorbed through the skin.
Ingestion:	May be fatal if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation:	May be fatal if inhaled. Causes respiratory tract irritation.
Chronic:	May cause cancer according to animal studies.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower

eyelids. Get medical aid immediately.

Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion: Call a poison control center. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.

Autoignition Temperature: Not available

Flash Point: Not available

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: Not published

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not breathe dust, mist, or vapor. Do not get on skin or in eyes. Do not ingest or inhale.

Storage: Store in a cool, dry place. Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Benzo[k]fluoranthene, 99+% (TLC)	none listed	none listed	none listed

OSHA Vacated PELs: Benzo[k]fluoranthene, 99+% (TLC): None listed

Engineering Controls:

Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

Exposure Limits

Personal Protective Equipment

Eyes: 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: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

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.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Color: yellow
Odor: Not available
pH: Not available
Vapor Pressure: Not available
Vapor Density: Not available
Evaporation Rate: Not available
Viscosity: Not available
Boiling Point: 480 deg C @ 760.00mm Hg (896.00°F)
Freezing/Melting Point: 216 - 218 deg C
Decomposition Temperature: Not available
Solubility in water: Not available
Specific Gravity/Density:
Molecular Formula: C20H12
Molecular Weight: 252.32

Section 10 - Stability and Reactivity

Chemical Stability:	Stable under normal temperatures and pressures.
Conditions to Avoid:	Incompatible materials, dust generation.
Incompatibilities with Other Materials	Not available
Hazardous Decomposition Products	Carbon monoxide, carbon dioxide.
Hazardous Polymerization	Has not been reported.

Section 11 - Toxicological Information

RTECS#:	CAS# 207-08-9: DF6350000
LD50/LC50:	RTECS: Not available.
Carcinogenicity:	Benzo[k]fluoranthene, 99+% (TLC) - California: carcinogen, initial date 7/1/87 NTP: Suspect carcinogen IARC: Group 2B carcinogen
Other:	See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity: Not available

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: Not regulated as a hazardous material
Hazard Class:
UN Number:
Packing Group:
Canada TDG
Shipping Name: Not available
Hazard Class:
UN Number:
Packing Group:

USA RQ: CAS# 207-08-9: 5000 lb final RQ; 2270 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T

Risk Phrases:

R 45 May cause cancer.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 207-08-9: Not available

Canada

Canadian WHMIS Classifications: Not available

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 207-08-9 is not listed on Canada's Ingredient Disclosure List.

US Federal

TSCA

CAS# 207-08-9 is not listed on the TSCA Inventory. It is for research and development use only.

Section 16 - Other Information

MSDS Creation Date: 9/02/1997

Revision #6 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantibility 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 the company 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 the company has been advised of the possibility of such damages.

SAFETY DATA SHEET

Creation Date 03-May-2012 **Revision Date** 19-Jan-2018 **Revision Number** 4

1. Identification

Product Name **Benzo[ghi]perylene**

Cat No. : **AC105550000; AC105550050; AC105550250; AC105551000**

CAS-No 191-24-2
Synonyms 1,12-Benzoperylene

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
Classification under 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Label Elements
None required

Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Benzo(ghi)perylene	191-24-2	>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 soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention.
Inhalation	Remove from exposure, lie down. Move to fresh air. If not breathing, give artificial respiration. Obtain medical attention.
Ingestion	Clean mouth with water. Get medical attention.
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	No information available
Method -	No information available

Autoignition Temperature

Explosion Limits

Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous Combustion Products
Carbon monoxide (CO) Carbon dioxide (CO_2)
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
0	1	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions	Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.
Methods for Containment and Clean Up	Avoid dust formation. Sweep up or vacuum up spillage and collect in suitable container for disposal. Do not let this chemical enter the environment.

7. Handling and storage

Handling	Avoid contact with skin and eyes. Do not breathe dust.
Storage	Keep in a dry, cool and well-ventilated place. Keep container tightly closed.

8. Exposure controls / personal protection

Exposure Guidelines	This product does not contain any hazardous materials with occupational exposure 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 No protective equipment is needed under normal use conditions.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Solid
Appearance	Yellow
Odor	No information available
Odor Threshold	No information available
pH	No information available
Melting Point/Range	276 - 280 °C / 528.8 - 536 °F
Boiling Point/Range	> 500 °C @ 760 mmHg
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	No information available
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	C22 H12
Molecular Weight	276.33

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under recommended storage conditions.

Conditions to Avoid Excess heat. Exposure to light. Incompatible products.

Incompatible Materials Strong oxidizing agents

Hazardous Decomposition Products Carbon monoxide (CO), Carbon dioxide (CO_2)

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information No acute toxicity information is available for this product

Component Information

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation No information available

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Benzo(ghi)perylene	191-24-2	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure None known

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Persistence and Degradability Insoluble in water May persist

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility.

Component	log Pow
Benzo(ghi)perylene	6.58

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Proper technical name Benzo(ghi)perylene
Hazard Class 9
Packing Group III

TDG
UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

IATA
UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

IMDG/IMO
UN-No UN3077
Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
Hazard Class 9
Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: Complete Regulatory Information contained in following SDS's X = listed The product is classified and labeled according to EC directives or corresponding national laws The product is classified and labeled in accordance with Directive 1999/45/EC U.S.A. (TSCA) Canada (DSL/NDSL) Europe (EINECS/ELINCS/NLP) Australia (AICS) Korea (ECL) China (IECSC) Japan (ENCS) Philippines (PICCS)

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Benzo(ghi)perylene	-	-	-	205-883-8	-		-	-	-	-	-

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Benzo(ghi)perylene	191-24-2	>95	1.0

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants

Benzo(ghi)perylene	-	-	-	X

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Benzo(ghi)perylene	5000 lb	-

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Benzo(ghi)perylene	X	X	X	X	-

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

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

Creation Date 03-May-2012
Revision Date 19-Jan-2018
Print Date 19-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

Material Safety Data Sheet

Chrysene, 98%

MSDS# 95251

Section 1 - Chemical Product and Company Identification

MSDS Name:	Chrysene, 98%
Catalog Numbers:	AC224140000, AC224140010, AC224140050, AC224145000
Synonyms:	1,2-Benzophenanthrene; Benzo(a)phenanthrene; 1,2,5,6-Dibenzonaphthalene.
Company Identification:	Acros Organics BVBA Janssen Pharmaceuticalaan 3a 2440 Geel, Belgium
Company Identification: (USA)	Acros Organics One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	800-ACROS-01
For information in Europe, call:	+32 14 57 52 11
Emergency Number, Europe:	+32 14 57 52 99
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300
CHEMTREC Phone Number, Europe:	703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#:	218-01-9
Chemical Name:	Chrysene
%:	98
EINECS#:	205-923-4

Hazard Symbols: T



Risk Phrases: 45 50/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Caution! May cause respiratory tract irritation. May cause eye and skin irritation. May cause cancer in humans. Target Organs: Liver, skin.

Potential Health Effects

Eye:	May cause eye irritation.
Skin:	May cause skin irritation.
Ingestion:	May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
Inhalation:	May cause respiratory tract irritation.
Chronic:	May cause cancer according to animal studies.

Section 4 - First Aid Measures

Eyes:	Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

Skin: Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.

Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.

Autoignition Temperature: Not available.

Flash Point: Not applicable.

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: health: ; flammability: 1; instability: ;

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Avoid breathing dust.

Storage: Store in a tightly closed container. Store in a cool, dry area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Chrysene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Chrysene: 0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches)

Engineering Controls:

Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.

Exposure Limits

Personal Protective Equipment

Eyes: 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: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

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.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Color: very light beige
Odor: Not available
pH: Not available
Vapor Pressure: Not available
Vapor Density: Not available
Evaporation Rate: Not available
Viscosity: Not available
Boiling Point: 448 deg C @ 760 mm Hg (838.40°F)
Freezing/Melting Point: 250-255 deg C
Decomposition Temperature: Not available
Solubility in water: insoluble
Specific Gravity/Density:
Molecular Formula: C18H12
Molecular Weight: 228.29

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation.
Incompatibilities with Other Materials: Not available
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#: CAS# 218-01-9: GC0700000
LD50/LC50: RTECS: Not available.
Carcinogenicity: Chrysene - ACGIH: A1 - Confirmed Human Carcinogen (Coal tar pitches). California: carcinogen, initial date 1/1/90 NTP: Known carcinogen (Coal tar pitches). IARC: Group 1 carcinogen (Coal tar pitches).
Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity: Water flea LC50 = 1.9 mg/L; 2 Hr.; Unspecified

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: Please contact Fisher Scientific for shipping information
Hazard Class:
UN Number:
Packing Group:
Canada TDG
Shipping Name: Not available
Hazard Class:
UN Number:
Packing Group:

USA RQ: CAS# 218-01-9: 100 lb final RQ; 45.4 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T

Risk Phrases:

R 45 May cause cancer.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 53 Avoid exposure - obtain special instructions before use.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 60 This material and its container must be disposed of as hazardous waste.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 218-01-9: Not available

Canada

CAS# 218-01-9 is listed on Canada's DSL List

Canadian WHMIS Classifications: D2A

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 218-01-9 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 218-01-9 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 6/30/1999

Revision #6 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantibility 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 the company 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 the company has been advised of the possibility of such damages.

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

Version 6.0
Revision Date 04/15/2019
Print Date 06/28/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Dibenzofuran

Product Number : 236373
Brand : Aldrich
CAS-No. : 132-64-9

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

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

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Diphenylene oxide

Formula : $C_{12}H_8O$
Molecular weight : 168.19 g/mol
CAS-No. : 132-64-9

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

EC-No. : 205-071-3

No components need to be disclosed according to the applicable regulations.

SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

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

Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions

No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up

Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

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

Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder, finecrystalline Colour: white, beige
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 80 - 82 °C (176 - 180 °F) - lit.
f)	Initial boiling point and boiling range	154 - 155 °C 309 - 311 °F at 27 hPa - lit.
g)	Flash point	130 °C (266 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.3 g/cm3 at 20 °C (68 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 4.12 - (Lit.), Potential bioaccumulation
p)	Auto-ignition temperature	No data available
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
No data available

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Hazardous properties cannot be excluded.
Handle in accordance with good industrial hygiene and safety practice.

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 ecological problems are to be expected when the product is handled and used with due care and attention.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

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. (Dibenzofuran)
Reportable Quantity (RQ): 100 lbs
- Marine pollutant: yesPoison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Dibenzofuran)
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Dibenzofuran)

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
Dibenzofuran	132-64-9	2007-07-01

SARA 311/312 Hazards
No SARA Hazards

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Dibenzofuran	132-64-9	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Dibenzofuran	132-64-9	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SECTION 16: Other information

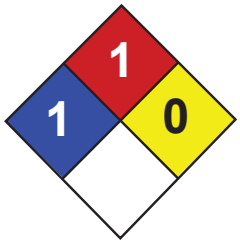
Further information

Copyright 2018 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: 6.0 Revision Date: 04/15/2019 Print Date: 06/28/2019

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada



Health	1
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Fluorene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Fluorene

Catalog Codes: SLF1195

CAS#: 86-73-7

RTECS: LL5670000

TSCA: TSCA 8(b) inventory: Fluorene

CI#: Not available.

Synonym: o-Biphenylenemethane

Chemical Formula: C13H10

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
Fluorene	86-73-7	100

Toxicological Data on Ingredients: Not applicable.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation.

Potential Chronic Health Effects:
Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available.

Section 4: First Aid Measures

Eye Contact: No known effect on eye contact, rinse with water for a few minutes.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

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.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not breathe dust.

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust 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: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Leaflets solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 166.21 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 295°C (563°F)

Melting Point: 116.5°C (241.7°F)

Critical Temperature: Not available.

Specific Gravity: 1.202 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Soluble in diethyl ether. Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant), of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Fluorene Massachusetts RTK: Fluorene TSCA 8(b) inventory: Fluorene CERCLA: Hazardous substances.: Fluorene

Other Regulations: Not available..

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
This product is not classified according to the EU regulations.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:34 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

Revision Date: 03/22/18
www.restek.com

2 Letter ISO country code/language code: US/EN

1. IDENTIFICATION

Catalog Number / Product Name:	**31279 / Indeno(1,2,3-c,d)pyrene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	10
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:	Carcinogenicity Category 2
GHS Signal Word:	Warning
GHS Hazard:	Suspected of causing cancer.
GHS Precautions:	
Safety Precautions:	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF exposed or concerned: Get medical advice/attention.
Storage:	Store locked up.
Disposal:	Dispose of contents/container according to section 13 of the SDS.
Single Exposure Target Organs:	No data available
Repeated Exposure Target Organs:	No data available

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Dichloromethane	75-09-2	200-838-9	99.9
indeno (1,2,3-c,d) pyrene	193-39-5	205-893-2	0.1

4. FIRST-AID MEASURES

Inhalation:	Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately
Eyes:	Immediately flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention and monitor the eye daily as advised by your physician. Serious harm (damage) may result if treatment is delayed. Continue to flush eyes while awaiting medical attention
Skin Contact:	Wash with soap and water. Remove contaminated clothing, launder immediately, and discard contaminated leather goods. Get medical attention immediately.
Ingestion:	Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS. Never give anything by mouth to an unconscious person

5. FIRE- FIGHTING MEASURES

Extinguishing Media:	Use alcohol resistant foam, carbon dioxide, or dry chemical when fighting fires. Water or foam may cause frothing if liquid is burning but it still may be a useful extinguishing agent if carefully applied to the surface of the fire. Do Not direct a stream of water into the hot burning liquid. Use methods suitable to fight surrounding fire.
Fire and/or Explosion Hazards:	No data.
Fire Fighting Methods and Protection:	Use methods for the surrounding fire.
Hazardous Combustion Products:	Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment:	Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.
Methods for Clean-up:	Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions:	Toxic or severely irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. As with all chemicals, good industrial hygiene practices should be followed when handling this material.
Storage Technical Measures and Conditions:	Store in a cool dry place. Isolate from incompatible materials. Keep container closed when not in use

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
Dichloromethane	75-09-2	2300 ppm IDLH	None Known	50 ppm TWA	25 ppm TWA; 125 ppm STEL (15 min. TWA)
indeno (1,2,3-c,d) pyrene	193-39-5	Not established	None Known	Not established	No data available

Personal Protection:

Engineering Measures:	Local exhaust ventilation or other engineering controls are normally required when handling or using this product to avoid overexposure.
Respiratory Protection:	Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to

	eliminate symptoms.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Wear additional eye protection such as chemical splash goggles and/or face shield when the possibility exists for eye contact with splashing or spraying liquid, or airborne material. Do not wear contact lenses. Have an eye wash station available.
Skin Protection:	Avoid skin contact by wearing chemically resistant gloves, an apron and other protective equipment depending upon conditions of use. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work.
Medical Conditions Aggravated By Exposure:	Eye disease Skin disease including eczema and sensitization Respiratory disease including asthma and bronchitis

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	Colorless
Odor:	Strong
Physical State:	No data available
pH:	Not applicable
Vapor Pressure:	No data available
Vapor Density:	2.93 (air = 1)
Boiling Point (°C):	530 °C
Melting Point (°C):	-96.7 °C
Flash Point (°F):	No data available
Upper Flammable/Explosive Limit, % in air:	No data available
Lower Flammable/Explosive Limit, % in air:	No data available
Autoignition Temperature (°C):	556 deg C
Decomposition Temperature (°C):	No data available
Specific Gravity:	1.3254 - 1.3258 g/cm3 at 20 °C
Evaporation Rate:	No data available
Odor Threshold:	ND
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available
VOC % by weight:	0
Molecular Weight:	No data available

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	None known.Contamination High temperatures
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents Caustics (bases)
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation Absorption Ingestion Skin contact Eye contact
Target Organs Potentially Affected By Exposure:	Skin, Cardiovascular System, Eyes, Liver
Chemical Interactions That Change Toxicity:	None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.
Inhalation Toxicity:	Harmful! Can cause systemic damage (see "Target Organs)Inhalation may cause severe central nervous system depression (including unconsciousness).
Skin Contact:	Contact causes severe skin irritation and possible burns.
Skin Absorption:	Harmful if absorbed through the skin. May cause severe irritation and systemic damage.
Eye Contact:	Contact with the eyes may cause moderate to severe eye injury. Eye contact may result in tearing and reddening, but not likely to permanently injure eye tissue. Temporary vision impairment (cloudy or blurred vision) is possible.
Ingestion Irritation:	Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.
Ingestion Toxicity:	Harmful if swallowed. May cause systemic poisoning.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components

present at greater than 0.1% may cause birth defects.

Inhalation: Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic damage upon prolonged and/or repeated exposure (see "Target Organs)

Skin Absorption: Upon prolonged or repeated exposure, harmful if absorbed through the skin. May cause severe irritation and systemic damage

Component Toxicological Data:
NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methane, dichloro-	75-09-2	Inhalation LC50 Rat 53 mg/L 6 h

Component Carcinogenic Data:
OSHA:

Chemical Name	CAS No.	
Indeno[1,2,3-cd]pyrene	193-39-5	Present
Methylene chloride	75-09-2	25 ppm TWA (8 hr.); 125 ppm STEL (15 min.); 12.5 ppm Action Level (see 29 CFR 1910.1051); effective date for respiratory protection for certain employers to acheive the 8-hour TWA PEL is August 31, 1998; the start up date to install engineering controls is December 10, 1998.; {OSHA - 29 CFR 1910 Specifically Regulate

ACGIH:

Chemical Name	CAS No.	
Dichloromethane	75-09-2	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH:

Chemical Name	CAS No.	
Methylene chloride	75-09-2	potential occupational carcinogen

NTP:

Chemical Name	CAS No.
No data available	

IARC:

Chemical Name	CAS No.	Group No.
Monograph 110 [in preparation]; Monograph 71 [1999]	75-09-2	Group 2A
Monograph 92 [2010]; Supplement 7 [1987]; Monograph 32 [1983]	193-39-5	Group 2B

12. ECOLOGICAL INFORMATION

Overview: Moderate ecological hazard. This product may be dangerous to plants and/or wildlife. Keep out of waterways.
Mobility: No data
Persistence: No data
Bioaccumulation: No data
Degradability: No data
Ecological Toxicity Data: No data available

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.Mixing spent or discarded material with other materials may render the mixture hazardous. Perform a hazardous waste determination on mixtures.
Disposal Methods: Incinerate spent or discarded material a permitted hazardous waste facility.
Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial

Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Dichloromethane
UN Number: UN1593
Hazard Class: 6.1
Packing Group: III

International:
IATA Proper Shipping Name: Dichloromethane
UN Number: UN1593
Hazard Class: 6.1
Packing Group: III

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Dichloromethane	75-09-2	X	X	-	X
indeno (1,2,3-c,d) pyrene	193-39-5	X	X	-	X

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Indeno[1,2,3-cd]pyrene	193-39-5	Prop 65 Cancer
Dichloromethane Dichloromethane (Methylene chloride)	75-09-2	Prop 65 Cancer

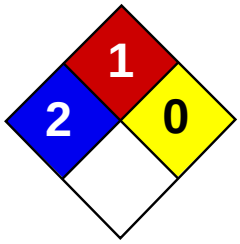
State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Dichloromethane	75-09-2	X	X	X	X
indeno (1,2,3-c,d) pyrene	193-39-5	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 08/03/16
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding products described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.





Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Phenanthrene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Phenanthrene

Catalog Codes: SLP1318

CAS#: 85-01-8

RTECS: SF7175000

TSCA: TSCA 8(b) inventory: Phenanthrene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C14H10

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
Phenanthrene	85-01-8	100

Toxicological Data on Ingredients: Phenanthrene: ORAL (LD50): Acute: 700 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: OPEN CUP: 171°C (339.8°F).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

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.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In

case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:
Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust 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: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 178.22 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 340°C (644°F)

Melting Point: 101°C (213.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.179 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 6.14 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 700 mg/kg [Mouse].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant, sensitizer), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Phenanthrene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
R36/38- Irritating to eyes and skin. R43- May cause sensitization by skin contact.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 11:16 AM

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

Revision Date: 06/14/18
www.restek.com

2 Letter ISO country code/language code: US/EN

1. IDENTIFICATION

Catalog Number / Product Name:	**32201 / 4,4'-DDD Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	7
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:	Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 1 Flammable Liquid Category 2 Acute Toxicity - Dermal Category 3 Acute Toxicity - Oral Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Toxic if swallowed or in contact with skin. Causes damage to organs.
GHS Precautions:	
Safety Precautions:	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/ventilation and lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe dust/fume/gas/mist/vapours/spray. Wash hands and skin thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF SWALLOWED: Immediately call a POISON CENTER/doctor/.... IF ON SKIN: Wash with plenty of soap and water. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF exposed: Call a POISON CENTER or doctor/physician. Call a POISON CENTER or doctor/physician if you feel unwell. Specific treatment see section 4. Rinse mouth. Take off immediately all contaminated clothing and wash it before reuse. In case of fire: Use extinguishing media in section 5 for extinction.
Storage:	Keep container tightly closed.

Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: Specific target organ toxicity - Single exposure - STOT SE 1: H370 Causes damage to organs. (C >= 10 %; No information to prove exclusion of certain routes of exposure); Specific target organ toxicity - Single exposure - STOT SE 2: H371 May cause damage to organs. (3 % <= C <10 %; Concentration limits for acute toxicity cannot be translated into GHS from the DSD especially when minimum classifications are given)

Repeated Exposure Target Organs: No data available

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
methanol	67-56-1	200-659-6	99.9
4,4'-DDD	72-54-8	200-783-0	0.1

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water may be ineffective but water spray can be used extinguish a fire if swept across the base of the flames. Water can absorb heat and keep exposed material from being damaged by fire.

Fire and/or Explosion Hazards: Vapors may be ignited by sparks, flames or other sources of ignition if material is above the flash point giving rise to a fire (Class B). Vapors are heavier than air and may travel to a source of ignition and flash back.

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Toxic or severely irritating material. Avoid contacting and avoid

	breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment
Storage Technical Measures and Conditions:	Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
methanol	67-56-1	6000 ppm IDLH	250 ppm STEL	200 ppm TWA	200 ppm TWA; 260 mg/m3 TWA

Personal Protection:

Engineering Measures:	Local exhaust ventilation is recommended when generating excessive levels of vapours from handling or thermal processing.
Respiratory Protection:	Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.If an exposure limit is exceeded or if an operator is experiencing symptoms of inhalation overexposure as explained in Section 3, provide respiratory protection.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.
Skin Protection:	Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	No data available
Odor:	Mild
Physical State:	No data available
pH:	Not applicable
Vapor Pressure:	No data available
Vapor Density:	1.1 (air = 1)
Boiling Point (°C):	64.7 °C at 760 mmHg (HSDB)
Melting Point (°C):	-98 °C
Flash Point (°F):	52
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	36
Lower Flammable/Explosive Limit, % in air:	6
Autoignition Temperature (°C):	464 deg C
Decomposition Temperature (°C):	No data available
Specific Gravity:	0.791 - 0.792 g/cm3 at 20 °C
Evaporation Rate:	No data available
Odor Threshold:	No data available
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available
VOC % by weight:	0
Molecular Weight:	32.04

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	None known.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure:	Eyes, Central nervous system stimulation, Skin, GI Tract, Respiratory Tract
Chemical Interactions That Change Toxicity:	None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.
Inhalation Toxicity:	Harmful! Can cause systemic damage (see "Target Organs)Methanol can cause central nervous system depression and overexposure can cause damage to the optic nerve resulting in visual impairment or blindness.
Skin Contact:	Can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Eye Contact:	Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.
Ingestion Irritation:	Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.Highly toxic and may be fatal if swallowed.
Ingestion Toxicity:	Toxic if swallowed. May cause target organ failure and/or death.May be fatal if swallowed.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Inhalation:	Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic damage upon prolonged and/or repeated exposure (see "Target Organs)
Skin Contact:	Upon prolonged or repeated contact, can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Ingestion:	Toxic if swallowed. May cause target organ failure and/or death.

Component Toxicological Data:
NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methanol	67-56-1	Inhalation LC50 Rat 22500 ppm 8 h

Component Carcinogenic Data:
OSHA:

Chemical Name	CAS No.
No data available	

ACGIH:

Chemical Name	CAS No.
No data available	

NIOSH:

Chemical Name	CAS No.
No data available	

NTP:

Chemical Name	CAS No.
No data available	

IARC:

Chemical Name	CAS No.	Group No.
Monograph 53 [1991] (listed under DDT and associated compounds)	72-54-8	Group 2B

12. ECOLOGICAL INFORMATION

Overview:	Moderate ecological hazard. This product may be dangerous to plants and/or wildlife.
Mobility:	No data
Persistence:	No data
Bioaccumulation:	No data
Degradability:	Biodegrades slowly.
Ecological Toxicity Data:	No data available

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.Mixing spent or discarded material with other materials may render the mixture hazardous. Perform a hazardous waste determination on mixtures.

Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.

Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:

DOT Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3
Packing Group: II

International:

IATA Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3(6.1)
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
methanol	67-56-1	X	X	-	X

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
DDD	72-54-8	Prop 65 Cancer
Methanol	67-56-1	Prop 65 Devolop Tox

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
methanol	67-56-1	X	X	X	X
4,4'-DDD	72-54-8	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 12/21/16

Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

References: No data available

Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding products described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

Safety Data Sheet

Revision Date: 03/23/18
www.restek.com

2 Letter ISO country code/language code: US/EN

1. IDENTIFICATION

Catalog Number / Product Name:	**32202 / 4,4'-DDE Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	10
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:	Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 1 Flammable Liquid Category 2 Acute Toxicity - Inhalation Dust / Mist Category 3 Acute Toxicity - Dermal Category 3 Acute Toxicity - Oral Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Toxic if swallowed, in contact with skin or if inhaled. Causes damage to organs.
GHS Precautions:	
Safety Precautions:	Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilation and lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe dust/fume/gas/mist/vapours/spray. Wash hands and skin thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF SWALLOWED: Immediately call a POISON CENTER/doctor/.... IF ON SKIN: Wash with plenty of soap and water. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Specific treatment see section 4. Rinse mouth. Take off immediately all contaminated clothing and wash it before reuse. In case of fire: Use extinguishing media in section 5 for extinction.
Storage:	Store in a well-ventilated place. Keep container tightly closed.

Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: Specific target organ toxicity - Single exposure - STOT SE 1: H370 Causes damage to organs. (C >= 10 %; No information to prove exclusion of certain routes of exposure); Specific target organ toxicity - Single exposure - STOT SE 2: H371 May cause damage to organs. (3 % <= C <10 %; Concentration limits for acute toxicity cannot be translated into GHS from the DSD especially when minimum classifications are given)

Repeated Exposure Target Organs: No data available

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
methanol	67-56-1	200-659-6	99.9
4,4'-DDE	72-55-9	200-784-6	0.1

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water may be ineffective but water spray can be used extinguish a fire if swept across the base of the flames. Water can absorb heat and keep exposed material from being damaged by fire.

Fire and/or Explosion Hazards: Vapors may be ignited by sparks, flames or other sources of ignition if material is above the flash point giving rise to a fire (Class B). Vapors are heavier than air and may travel to a source of ignition and flash back.

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Toxic or severely irritating material. Avoid contacting and avoid

	breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment
Storage Technical Measures and Conditions:	Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
methanol	67-56-1	6000 ppm IDLH	250 ppm STEL	200 ppm TWA	200 ppm TWA; 260 mg/m3 TWA

Personal Protection:

Engineering Measures:	Local exhaust ventilation is recommended when generating excessive levels of vapours from handling or thermal processing.
Respiratory Protection:	Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.If an exposure limit is exceeded or if an operator is experiencing symptoms of inhalation overexposure as explained in Section 3, provide respiratory protection.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.
Skin Protection:	Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	No data available
Odor:	Mild
Physical State:	Liquid
pH:	Not applicable
Vapor Pressure:	No data available
Vapor Density:	1.1 (air = 1)
Boiling Point (°C):	64.7 °C at 760 mmHg (HSDB)
Melting Point (°C):	-98 °C
Flash Point (°F):	52
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	36
Lower Flammable/Explosive Limit, % in air:	6
Autoignition Temperature (°C):	464 deg C
Decomposition Temperature (°C):	No data available
Specific Gravity:	0.791 - 0.792 g/cm3 at 20 °C
Evaporation Rate:	No data available
Odor Threshold:	No data available
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available
VOC % by weight:	0
Molecular Weight:	32.04

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	None known.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure:	Eyes, Central nervous system stimulation, Skin, GI Tract, Respiratory Tract
Chemical Interactions That Change Toxicity:	None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.
Inhalation Toxicity:	Harmful! Can cause systemic damage (see "Target Organs)Methanol can cause central nervous system depression and overexposure can cause damage to the optic nerve resulting in visual impairment or blindness.
Skin Contact:	Can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Eye Contact:	Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.
Ingestion Irritation:	Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.Highly toxic and may be fatal if swallowed.
Ingestion Toxicity:	Toxic if swallowed. May cause target organ failure and/or death.May be fatal if swallowed.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	Contains a known human reproductive and/or developmental hazard.
Inhalation:	Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic damage upon prolonged and/or repeated exposure (see "Target Organs)
Skin Contact:	Upon prolonged or repeated contact, can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Ingestion:	Toxic if swallowed. May cause target organ failure and/or death.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methanol	67-56-1	Inhalation LC50 Rat 22500 ppm 8 h

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.
No data available	

ACGIH:

Chemical Name	CAS No.
No data available	

NIOSH:

Chemical Name	CAS No.
No data available	

NTP:

Chemical Name	CAS No.
No data available	

IARC:

Chemical Name	CAS No.	Group No.
Monograph 53 [1991] (listed under DDT and associated compounds)	72-55-9	Group 2B

12. ECOLOGICAL INFORMATION

Overview:	Moderate ecological hazard. This product may be dangerous to plants and/or wildlife.
Mobility:	No data
Persistence:	No data
Bioaccumulation:	No data
Degradability:	Biodegrades slowly.
Ecological Toxicity Data:	No data available

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.Mixing spent or discarded material with other materials may render the mixture hazardous. Perform a hazardous waste determination on mixtures.

Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.

Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:

DOT Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3
Packing Group: II

International:

IATA Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3(6.1)
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
methanol	67-56-1	X	X	-	X

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
DDE	72-55-9	Prop 65 Cancer
1,1-Dichloro-2,2-bis(p-chlorophenyl)ethylene	72-55-9	Prop 65 Devolop Tox
Methanol	67-56-1	Prop 65 Devolop Tox
1,1-Dichloro-2,2-bis(p-chlorophenyl)ethylene	72-55-9	Prop 65 Rep Male

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
methanol	67-56-1	X	X	X	X
4,4'-DDE	72-55-9	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 12/23/16

Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

References: No data available

Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding products described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions,

data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

Safety Data Sheet

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

1. IDENTIFICATION

Catalog Number / Product Name:	**32203 / 4,4'-DDT Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	8
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:	Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 1 Flammable Liquid Category 2 Acute Toxicity - Inhalation Dust / Mist Category 3 Acute Toxicity - Dermal Category 3 Acute Toxicity - Oral Category 3
GHS Signal Word:	Danger
GHS Hazard:	Highly flammable liquid and vapour. Toxic if swallowed, in contact with skin or if inhaled. Causes damage to organs.
GHS Precautions:	
Safety Precautions:	Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilation and lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe dust/fume/gas/mist/vapours/spray. Wash hands and skin thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
First Aid Measures:	IF SWALLOWED: Immediately call a POISON CENTER/doctor/.... IF ON SKIN: Wash with plenty of soap and water. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. IF exposed: Call a POISON CENTER or doctor/physician. Call a POISON CENTER or doctor/physician. Call a POISON CENTER or doctor/physician if you feel unwell. Specific treatment see section 4. Rinse mouth. Take off immediately all contaminated clothing and wash it before reuse. In case of fire: Use extinguishing media in section 5 for extinction.

Storage: Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: No data available.

Repeated Exposure Target Organs: No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
methanol	67-56-1	200-659-6	99.900000
4,4'-DDT	50-29-3	200-024-3	0.100000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water may be ineffective but water spray can be used extinguish a fire if swept across the base of the flames. Water can absorb heat and keep exposed material from being damaged by fire.

Fire and/or Explosion Hazards: Vapors may be ignited by sparks, flames or other sources of ignition if material is above the flash point giving rise to a fire (Class B). Vapors are heavier than air and may travel to a source of ignition and flash back.

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Toxic or severely irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
methanol	67-56-1	6000 ppm IDLH	250 ppm STEL	200 ppm TWA	200 ppm TWA; 260 mg/m3 TWA
4,4'-DDT	50-29-3	500 mg/m3 IDLH		1 mg/m3 TWA	1 mg/m3 TWA (listed under Dichlorodiphenyltric hloroethane)

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.

Respiratory Protection: Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.If an exposure limit is exceeded or if an operator is experiencing symptoms of inhalation overexposure as explained in Section 3, provide respiratory protection.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	No data available.
Odor:	Mild
Physical State:	No data available.
pH:	No data available.
Vapor Pressure:	No data available.
Vapor Density:	1.1 (air = 1)
Boiling Point:	No data available.
Melting Point:	-98 °C
Flash Point:	52
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	36
Lower Flammable/Explosive Limit, % in air:	6
Autoignition Temperature:	464 deg C
Decomposition Temperature:	No data available.
Specific Gravity:	0.791 - 0.792 g/cm3 at 20 °C
Evaporation Rate:	No data available.
Odor Threshold:	No data available.
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available.
VOC % by weight:	99.9
Molecular Weight:	32.04

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	No data available.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation, Skin Contact, Eye Contact, Ingestion
Target Organs Potentially Affected By Exposure:	Eyes, Central nervous system stimulation, Skin, GI Tract, Respiratory Tract
Chemical Interactions That Change Toxicity:	None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.
Inhalation Toxicity:	Harmful! Can cause systemic damage (see "Target Organs)Methanol can cause central nervous system depression and overexposure can cause damage to the optic nerve resulting in visual impairment or blindness.
Skin Contact:	Can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Eye Contact:	Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.
Ingestion Irritation:	Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.Highly toxic and may be fatal if swallowed.
Ingestion Toxicity:	Toxic if swallowed. May cause target organ failure and/or death.May be fatal if swallowed.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	Contains a probable or known human carcinogen.
Reproductive and Developmental Toxicity:	Contains a known human reproductive and/or developmental hazard.
Inhalation:	Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic damage upon prolonged and/or repeated exposure (see "Target Organs)
Skin Contact:	Upon prolonged or repeated contact, can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Ingestion:	Toxic if swallowed. May cause target organ failure and/or death.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methanol	67-56-1	Inhalation LC50 Rat 22500 ppm 8 h
DDT	50-29-3	Dermal LD50 Rabbit 300 - 2820 mg/kg

Component Carcinogenic Data:

OSHA:

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

ACGIH:

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

NIOSH:

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

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
DDT	50-29-3	Group 2A
No data.		Group 2B

12. ECOLOGICAL INFORMATION

Overview:	Moderate ecological hazard. This product may be dangerous

to plants and/or wildlife.

Mobility: No data
Persistence: No data
Bioaccumulation: No data
Degradability: Biodegrades slowly.
Ecological Toxicity Data: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.
Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3(6.1)
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
methanol	67-56-1	X	X	-	X
4,4'-DDT	50-29-3	X	-	-	X

The following chemicals are listed on CA Prop 65:

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

State Right To Know Listing:

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

16. OTHER INFORMATION

Prior Version Date: 09/30/14
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose

prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.

Safety Data Sheet

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

1. IDENTIFICATION

Catalog Number / Product Name:	**32218 / Dieldrin Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	6
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:
Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 1
Flammable Liquid Category 2
Acute Toxicity - Inhalation Dust / Mist Category 3
Acute Toxicity - Dermal Category 3
Acute Toxicity - Oral Category 3

GHS Signal Word:
Danger

GHS Hazard:
Highly flammable liquid and vapour.
Toxic if swallowed, in contact with skin or if inhaled.
Causes damage to organs.

GHS Precautions:

Safety Precautions:
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilation and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/fume/gas/mist/vapours/spray.
Wash hands and skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

First Aid Measures:
IF SWALLOWED: Immediately call a POISON CENTER/doctor/....
IF ON SKIN: Wash with plenty of soap and water.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF exposed: Call a POISON CENTER or doctor/physician.
Call a POISON CENTER or doctor/physician.
Call a POISON CENTER or doctor/physician if you feel unwell.
Specific treatment see section 4.
Rinse mouth.
Take off immediately all contaminated clothing and wash it before reuse.
In case of fire: Use extinguishing media in section 5 for extinction.

Storage: Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: No data available.

Repeated Exposure Target Organs: No data available.

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
methanol	67-56-1	200-659-6	99.900000
dieldrin	60-57-1	200-484-5	0.100000

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water may be ineffective but water spray can be used extinguish a fire if swept across the base of the flames. Water can absorb heat and keep exposed material from being damaged by fire.

Fire and/or Explosion Hazards: Vapors may be ignited by sparks, flames or other sources of ignition if material is above the flash point giving rise to a fire (Class B). Vapors are heavier than air and may travel to a source of ignition and flash back.

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be severely irritating or toxic. Follow personal protective equipment recommendations found in Section 8 of this SDS. Personal protective equipment needs must be evaluated based on information provided on this sheet and the special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred, and the expertise of employees in the area responding to the spill. Never exceed any occupational exposure limits.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions: Toxic or severely irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment

Storage Technical Measures and Conditions: Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
methanol	67-56-1	6000 ppm IDLH	250 ppm STEL	200 ppm TWA	200 ppm TWA; 260 mg/m3 TWA
dieldrin	60-57-1	ND		0.1 mg/m3 TWA (inhalable fraction and vapor)	0.25 mg/m3 TWA

Personal Protection:

Engineering Measures: Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.

Respiratory Protection: Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.If an exposure limit is exceeded or if an operator is experiencing symptoms of inhalation overexposure as explained in Section 3, provide respiratory protection.

Eye Protection: Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.

Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	No data available.
Odor:	Mild
Physical State:	No data available.
pH:	No data available.
Vapor Pressure:	No data available.
Vapor Density:	1.1 (air = 1)
Boiling Point:	No data available.
Melting Point:	-98 °C
Flash Point:	52
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	36
Lower Flammable/Explosive Limit, % in air:	6
Autoignition Temperature:	464 deg C
Decomposition Temperature:	No data available.
Specific Gravity:	0.791 - 0.792 g/cm3 at 20 °C
Evaporation Rate:	No data available.
Odor Threshold:	No data available.
Solubility:	Moderate; 50-99%
Partition Coefficient: n-octanol in water:	No data available.
VOC % by weight:	99.9
Molecular Weight:	32.04

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	No data available.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents
Hazardous Decomposition Products:	Carbon dioxide Carbon monoxide

11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Skin Contact, Eye Contact, Ingestion

Target Organs Potentially Affected By Exposure: Eyes, Central nervous system stimulation, Skin, GI Tract, Respiratory Tract

Chemical Interactions That Change Toxicity: None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation: Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.

Inhalation Toxicity: Harmful! Can cause systemic damage (see "Target Organs)Methanol can cause central nervous system depression and overexposure can cause damage to the optic nerve resulting in visual impairment or blindness.

Skin Contact: Can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.

Eye Contact: Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.

Ingestion Irritation: Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.Highly toxic and may be fatal if swallowed.

Ingestion Toxicity: Toxic if swallowed. May cause target organ failure and/or death.May be fatal if swallowed.

Long-Term (Chronic) Health Effects:

Carcinogenicity: Contains a probable or known human carcinogen.

Reproductive and Developmental Toxicity: Contains a known human reproductive and/or developmental hazard.

Inhalation: Upon prolonged and/or repeated exposure, can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.Harmful! Can cause systemic damage upon prolonged and/or repeated exposure (see "Target Organs)

Skin Contact: Upon prolonged or repeated contact, can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.

Ingestion: Toxic if swallowed. May cause target organ failure and/or death.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Methanol	67-56-1	Inhalation LC50 Rat 22500 ppm 8 h

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.
No data available.	

ACGIH:

Chemical Name	CAS No.
No data available.	

NIOSH:

Chemical Name	CAS No.
No data available.	

NTP:

Chemical Name	CAS No.
No data available.	

IARC:

Chemical Name	CAS No.	Group No.
No data.		Group 1
No data.		Group 2A
No data.		Group 2B

12. ECOLOGICAL INFORMATION

Overview: Moderate ecological hazard. This product may be dangerous to plants and/or wildlife.

Mobility: No data

Persistence: No data

Bioaccumulation: No data
Degradability: Biodegrades slowly.
Ecological Toxicity Data: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.
Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.
Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:
DOT Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3
Packing Group: II

International:
IATA Proper Shipping Name: Methanol
UN Number: UN1230
Hazard Class: 3(6.1)
Packing Group: II

Marine Pollutant: No

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
No data available.			

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
methanol	67-56-1	X	X	-	X
dieldrin	60-57-1	X	-	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Dieldrin	60-57-1	Prop 65 Cancer
Methanol	67-56-1	Prop 65 Devolop Tox

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
methanol	67-56-1	X	X	X	X
dieldrin	60-57-1	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 04/28/14
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available.
Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding prodcuts described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given

and accepted at your risk.

Safety Data Sheet

Revision Date: 03/05/18
www.restek.com

2 Letter ISO country code/language code: US/EN

1. IDENTIFICATION

Catalog Number / Product Name:	**32011 / Aroclor® 1254 Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	12
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:



GHS Classification:
Flammable Liquid Category 2
Skin Corrosion/Irritation Category 2
Specific Target Organ Systemic Toxicity (STOT) - Repeated Exposure Category 2
Hazardous to the aquatic environment - Chronic Category 2
Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 3

GHS Signal Word:
Danger

GHS Hazard:
Highly flammable liquid and vapour.
Causes skin irritation.
May cause drowsiness or dizziness.
May cause damage to organs through prolonged or repeated exposure.
Toxic to aquatic life with long lasting effects.

GHS Precautions:

Safety Precautions:
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilation and lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/fume/gas/mist/vapours/spray.
Wash hands and skin thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Avoid release to the environment.
Wear protective gloves/protective clothing/eye protection/face protection.

First Aid Measures:
IF ON SKIN: Wash with plenty of soap and water.
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Call a POISON CENTER or doctor/physician if you feel unwell.
Specific treatment see section 4.
If skin irritation occurs: Get medical advice/attention.
Take off contaminated clothing and wash it before reuse.
In case of fire: Use extinguishing media in section 5 for extinction.

Collect spillage.

Storage: Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal: Dispose of contents/container according to section 13 of the SDS.

Single Exposure Target Organs: Specific target organ toxicity - Single exposure - STOT SE 3: H336 May cause drowsiness or dizziness.

Repeated Exposure Target Organs: Specific target organ toxicity - Repeated exposure - STOT RE 2: H373 May cause damage to organs through prolonged or repeated exposure. (C >= 5 %; Minimum classification, No information to prove exclusion of certain routes of exposure)

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
hexane	110-54-3	203-777-6	99.9
aroclor® 1254	11097-69-1		0.1

4. FIRST-AID MEASURES

Inhalation: Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen.

Eyes: Flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention.

Skin Contact: Wash with soap and water. Remove contaminated clothing and launder. Get medical attention if irritation develops or persists.

Ingestion: Do not induce vomiting and seek medical attention immediately. Drink two glasses of water or milk to dilute. Provide medical care provider with this SDS.

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water spray or fog may also be effective for extinguishing if swept across the base of the fire. Water can also be used to absorb heat and keep exposed material from being damaged by fire.

Fire and/or Explosion Hazards: Vapors may be ignited by heat, sparks, flames or other sources of ignition at or above the low flash point giving rise to a Class B fire. Vapors are heavier than air and may travel to a source of ignition and flash back

Fire Fighting Methods and Protection: Do not enter fire area without proper protection including self-contained toxic breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products. Flammable component(s) of this material may be lighter than water and burn while floating on the surface. Use water spray/fog for cooling. Flammable component(s) of this material may be lighter than water and burn while floating on the surface.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions and Equipment: Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section 8 of this SDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.

Methods for Clean-up: Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Handling Technical Measures and Precautions:	Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area. Use spark-proof tools and explosion-proof equipment
Storage Technical Measures and Conditions:	Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

United States:

Chemical Name	CAS No.	IDLH	ACGIH STEL	ACGIH TLV-TWA	OSHA Exposure Limit
hexane	110-54-3	1100 ppm IDLH (10% LEL)	1000 ppm	50 ppm TWA	500 ppm TWA; 1800 mg/m3 TWA
aroclor® 1254	11097-69-1	5 mg/m3 IDLH	None Known	0.5 mg/m3 TWA	0.5 mg/m3 TWA

Personal Protection:

Engineering Measures:	Local exhaust ventilation is recommended when generating excessive levels of vapours from handling or thermal processing.
Respiratory Protection:	Respiratory protection may be required to avoid overexposure when handling this product. General or local exhaust ventilation is the preferred means of protection. Use a respirator if general room ventilation is not available or sufficient to eliminate symptoms.
Eye Protection:	Wear chemically resistant safety glasses with side shields when handling this product. Do not wear contact lenses.
Skin Protection:	Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, color:	No data available
Odor:	Mild
Physical State:	Liquid
pH:	Not applicable
Vapor Pressure:	No data available
Vapor Density:	2.97 (air = 1)
Boiling Point (°C):	68.73 °C (HSDB)
Melting Point (°C):	-95 °C Melting Point
Flash Point (°F):	-8
Flammability:	Highly Flammable Extremely Flammable
Upper Flammable/Explosive Limit, % in air:	No data available
Lower Flammable/Explosive Limit, % in air:	No data available
Autoignition Temperature (°C):	No data available deg C
Decomposition Temperature (°C):	No data available
Specific Gravity:	0.672 g/cm3 at 15 °C
Evaporation Rate:	No data available
Odor Threshold:	No data available
Solubility:	Negligible; 0-1%
Partition Coefficient: n-octanol in water:	No data available
VOC % by weight:	0
Molecular Weight:	No data available

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	None known.
Materials to Avoid / Chemical Incompatiability:	Strong oxidizing agents
Hazardous Decomposition Products:	No data available

11. TOXICOLOGICAL INFORMATION

Routes of Entry:	Inhalation Contact Absorption Ingestion
Target Organs Potentially Affected By Exposure:	Eyes, Central nervous system stimulation,

	Respiratory Tract, Skin, Peripheral Nervous System
Chemical Interactions That Change Toxicity:	None Known

Immediate (Acute) Health Effects by Route of Exposure:

Inhalation Irritation:	Can cause severe respiratory irritation, dizziness, weakness, fatigue, nausea, headache and possible unconsciousness.
Skin Contact:	Can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Skin Absorption:	May cause irritation and minor systemic damage.Harmful if absorbed through the skin.
Eye Contact:	Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.
Ingestion Irritation:	Irritating to mouth, throat, and stomach. Can cause abdominal discomfort, nausea, vomiting and diarrhea.Harmful if swallowed.
Ingestion Toxicity:	Toxic if swallowed. May cause target organ failure and/or death.

Long-Term (Chronic) Health Effects:

Carcinogenicity:	No data.
Reproductive and Developmental Toxicity:	No data available to indicate product or any components present at greater than 0.1% may cause birth defects.
Inhalation:	Upon prolonged and/or repeated exposure, can cause severe respiratory irritation, dizziness, weakness, fatigue, nausea, headache and possible unconsciousness.
Skin Contact:	Upon prolonged or repeated contact, can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
Skin Absorption:	Upon prolonged or repeated exposure, harmful if absorbed through the skin. May cause minor systemic damage.

Component Toxicological Data:

NIOSH:

Chemical Name	CAS No.	LD50/LC50
Aroclor 1254	11097-69-1	Oral LD50 Rat 1010 mg/kg
n-Hexane	110-54-3	Dermal LD50 Rabbit 3000 mg/kg; Inhalation LC50 Rat 48000 ppm 4 h; Oral LD50 Rat 25 g/kg

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.	
Aroclor 1254	11097-69-1	Present

ACGIH:

Chemical Name	CAS No.	
Chlorodiphenyl (54% chlorine)	11097-69-1	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

NIOSH:

Chemical Name	CAS No.	
Chlorodiphenyl (54% chlorine)	11097-69-1	potential occupational carcinogen

NTP:

Chemical Name	CAS No.
No data available	

IARC:

Chemical Name	CAS No.	Group No.

12. ECOLOGICAL INFORMATION

Overview:	Moderate ecological hazard. This product may be dangerous to plants and/or wildlife.
Mobility:	No data
Persistence:	No data
Bioaccumulation:	No data
Degradability:	No data
Ecological Toxicity Data:	No data available

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.Mixing spent or discarded material with other materials may render the mixture hazardous. Perform a hazardous waste determination on mixtures.

Disposal Methods: Dispose of by incineration following Federal, State, Local, or Provincial regulations.

Waste Disposal of Packaging: Comply with all Local, State, Federal, and Provincial Environmental Regulations.

14. TRANSPORTATION INFORMATION

United States:

DOT Proper Shipping Name: Hexanes
UN Number: UN1208
Hazard Class: 3
Packing Group: II

International:

IATA Proper Shipping Name: Hexanes
UN Number: UN1208
Hazard Class: 3
Packing Group: II

Marine Pollutant: Yes

Chemical Name	CAS#	Marine Pollutant	Severe Marine Pollutant
hexane	110-54-3	Y	N

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
hexane	110-54-3	X	X	-	X
aroclor® 1254	11097-69-1	X	-	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
hexane	110-54-3	X	X	X	-
aroclor® 1254	11097-69-1	-	X	X	X

16. OTHER INFORMATION

Prior Version Date: 09/20/16

Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

References: No data available

Disclaimer: Restek Corporation provides the descriptions, data and information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. It is provided for your guidance only. Because many factors may affect processing or application/use, Restek Corporation recommends you perform an assessment to determine the suitability of a product for your particular purpose prior to use. No warranties of any kind, either expressed or implied, including fitness for a particular purpose, are made regarding products described, data or information set forth. In no case shall the descriptions, information, or data provided be considered a part of our terms and conditions of sale. Further, the descriptions, data and information furnished hereunder are given gratis. No obligation or liability for the description, data and information given are assumed. All such being given and accepted at your risk.







Material Safety Data Sheet
Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

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
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. 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. Get medical attention if irritation occurs.

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. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

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.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:
Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. 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 locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. 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, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust 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: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R22- Harmful if swallowed. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

Created: 10/09/2005 04:16 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 6.1
Revision Date 05/28/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Barium
Product Number	:	403334
Brand	:	Aldrich
CAS-No.	:	7440-39-3

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses	:	Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company	:	Sigma-Aldrich Inc. 3050 Spruce Street ST. LOUIS MO 63103 UNITED STATES
Telephone	:	+1 314 771-5765
Fax	:	+1 800 325-5052

1.4 Emergency telephone number

Emergency Phone #	:	+1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Substances and mixtures, which in contact with water, emit flammable gases (Category 2), H261

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word: Danger

Hazard statement(s)

H261	In contact with water releases flammable gases.

Precautionary statement(s)

P223	Do not allow contact with water.
P231 + P232	Handle under inert gas. Protect from moisture.
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.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Ba
Molecular weight	:	137.33 g/mol
CAS-No.	:	7440-39-3
EC-No.	:	231-149-1

Hazardous components

Component	Classification	Concentration
Barium		
	Water-react. 2; H261	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Barium oxide

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Store under inert gas.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Barium	7440-39-3	TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye, skin, & Gastrointestinal irritation Muscular stimulation Not classifiable as a human carcinogen		
		TWA	0.500000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.500000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Eye irritation Muscular stimulation Skin irritation Gastrointestinal irritation Not classifiable as a human carcinogen		
		TWA	0.500000 mg/m3	USA. NIOSH Recommended Exposure Limits
		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)
		Eye irritation Muscular stimulation Skin irritation Gastrointestinal irritation Not classifiable as a human carcinogen		

		TWA	0.5 mg/m3	USA. NIOSH Recommended Exposure Limits

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Pieces Colour: grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 725 °C (1337 °F) - lit.
f)	Initial boiling point and boiling range	1,640 °C (2,984 °F) - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available

i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	3.6 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Exposure to moisture

10.5 Incompatible materials
Oxidizing agents, Water, acids, Oxygen, Chlorinated solvents, Carbon dioxide (CO2), Halogens, Halogenated hydrocarbon, Alcohols, Sulphur compounds, Hydrogen sulfide gas

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Barium oxide
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data availableBarium
Inhalation: No data available(Barium)
Dermal: No data available(Barium)
No data available(Barium)

Skin corrosion/irritation
No data available(Barium)

Serious eye damage/eye irritation
No data available(Barium)

Respiratory or skin sensitisation
No data available(Barium)

Germ cell mutagenicity

No data available(Barium)

Carcinogenicity
This product is or contains a component that is not classifiable as to its classification.(Barium)
(Barium)
(Barium)

Reproductive toxicity
No data available(Barium)

No data available(Barium)

Specific target organ toxicity - single exposure
No data available(Barium)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available(Barium)

Additional Information
RTECS: CQ8370000

Stomach/intestinal disorders, Nausea, Vomiting, Drowsiness, Dizziness, Gastrointestinal disturbance, Weakness, Tremors, Seizures.(Barium)
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Barium)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 500 mg/l - 96 h(Barium)
	LC50 - Cyprinodon variegatus (sheepshead minnow) - > 500 mg/l - 96 h(Barium)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Barium)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium
Reportable Quantity (RQ) : 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1400 Class: 4.3 Packing group: II EMS-No: F-G, S-O
Proper shipping name: BARIUM

IATA
UN number: 1400 Class: 4.3 Packing group: II
Proper shipping name: Barium

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

SARA 311/312 Hazards
Reactivity Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Barium	7440-39-3	2007-07-01

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H261 In contact with water releases flammable gases.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	
Flammability:	3
Physical Hazard	1

NFPA Rating

Health hazard:	0
Fire Hazard:	3
Reactivity Hazard:	1
Special hazard.I:	W

Further information

Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 05/28/2017 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 05/28/2017
Print Date 08/02/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Beryllium

Product Number : 265063
Brand : Aldrich

CAS-No. : 7440-41-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 2), H330
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 1B), H350
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Specific target organ toxicity - repeated exposure (Category 1), H372

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 Toxic if swallowed.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.

H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H350	May cause cancer.
H372	Causes damage to organs through prolonged or repeated exposure.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284	Wear respiratory protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/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.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Be
Molecular weight	:	9.01 g/mol
CAS-No.	:	7440-41-7
EC-No.	:	231-150-7

Hazardous components

Component	Classification	Concentration
Berylium foil		
	Acute Tox. 3; Acute Tox. 2; Skin Irrit. 2; Eye Irrit. 2A; Skin Sens. 1; Carc. 1B; STOT SE 3; STOT RE 1; H301, H315, H317, H319, H330, H335, H350, H372	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Beryllium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Berylium foil	7440-41-7	TWA	2.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		CEIL	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Peak	25.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
	Remarks	Z27.29-1970		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Beryllium sensitization Chronic beryllium disease (berylliosis) Confirmed human carcinogen Danger of cutaneous absorption Sensitizer		
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	2.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5.000000microg ram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25.000000micro gram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		TWA	0.000050 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Beryllium sensitization		

		Chronic beryllium disease (berylliosis) Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Confirmed human carcinogen Danger of cutaneous absorption Sensitizer		
		C	0.000500 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		
		See Table Z-2		
		TWA	2microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		CEIL	5microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		Peak	25microgram per cubic meter	USA. Occupational Exposure Limits (OSHA) - Table Z-2
		Z27.29-1970		
		C	0.0005 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A		

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria 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 (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Chunks Colour: grey
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,278 °C (2,332 °F) - lit.
f)	Initial boiling point and boiling range	2,970 °C (5,378 °F) - lit.
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	1.85 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Alkali metals

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Beryllium oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data availableBerylium foil
Inhalation: No data available(Berylium foil)
Dermal: No data available(Berylium foil)
LD50 Intravenous - Rat - 0.496 mg/kg(Berylium foil)
Remarks: Liver:Hepatitis (hepatocellular necrosis), zonal.

Skin corrosion/irritation
No data available(Berylium foil)

Serious eye damage/eye irritation
No data available(Berylium foil)

Respiratory or skin sensitisation
No data available(Berylium foil)

Germ cell mutagenicity

Hamster(Berylium foil)
Lungs
Result: negative

Carcinogenicity
Possible human carcinogen(Berylium foil)
(Berylium foil)

IARC:	1 - Group 1: Carcinogenic to humans (Berylium foil)
NTP:	Known to be human carcinogen (Berylium foil)
	Known to be human carcinogenThe reference note has been added by TD based on the background information of the NTP. (Berylium foil)
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available(Berylium foil)

No data available(Berylium foil)

Specific target organ toxicity - single exposure
No data available(Berylium foil)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available(Berylium foil)

Additional Information
RTECS: DS1750000

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Berylium foil)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chem scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1567 Class: 6.1 (4.1) Packing group: II
Proper shipping name: Beryllium, powder
Reportable Quantity (RQ) : 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1567 Class: 6.1 (4.1) Packing group: II EMS-No: F-G, S-G
Proper shipping name: BERYLLIUM POWDER

IATA
UN number: 1567 Class: 6.1 (4.1) Packing group: II
Proper shipping name: Beryllium powder

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Berylium foil	7440-41-7	1993-04-24

California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer. Berylium foil	7440-41-7	2008-10-10

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H301	Toxic if swallowed.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H350	May cause cancer.
H372	Causes damage to organs through prolonged or repeated exposure.

HMIS Rating

Health hazard:	4
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	4
Fire Hazard:	3
Reactivity Hazard:	3

Further information
Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 05/28/2017 Print Date: 08/02/2019

SAFETY DATA SHEET

Version 6.3
Revision Date 04/05/2019
Print Date 06/28/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Chromium

Product Number : 374849
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

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

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

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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Chromium		
		<= 100 %

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

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

Chromium 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

Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions

No special environmental precautions required.

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
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
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Chromium	7440-47-3	PEL	0.5 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
	Remarks	see Sections 1532.2, 5206 & 8359		
		TWA	1 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)
		Upper Respiratory Tract irritation Skin irritation Adopted values or notations enclosed are those for which changes are proposed in the NIC See Notice of Intended Changes (NIC) Not classifiable as a human carcinogen varies		

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: chips Colour: light grey
b)	Odour	odourless
c)	Odour 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: 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)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	7.14 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong acids, Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Chromium oxides
Other decomposition products - No data available
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
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

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

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

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. ()
Reportable Quantity (RQ): 5000 lbs
Reportable Quantity (RQ): 10 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 3077 Class: 9 Packing group: III EMS-No: F-A, S-F
Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. ()
Marine pollutant : yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. ()
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

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Chromium	7440-47-3	2007-07-01

SARA 311/312 Hazards

Chronic Health Hazard

Reportable Quantity : D007 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Chromium	7440-47-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Chromium	7440-47-3	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Further information

Copyright 2018 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: 04/05/2019 Print Date: 06/28/2019

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

SAFETY DATA SHEET

Version 6.1
Revision Date 03/12/2019
Print Date 06/22/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Copper

Product Number : 31284
Brand : Aldrich
CAS-No. : 7440-50-8

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

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

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula : Cu
Molecular weight : 63.55 g/mol
CAS-No. : 7440-50-8
EC-No. : 231-159-6

Component	Classification	Concentration

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Copper,		
		<= 100 %

SECTION 4: First aid measures

4.1 Description of first aid measures

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration.

In case of skin contact
Wash off with soap and plenty of water.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

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
Copper 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
Avoid dust formation. Avoid breathing vapours, mist or gas.
For personal protection see section 8.

6.2 Environmental precautions
No special environmental precautions required.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Keep in suitable, closed containers for disposal.

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
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store under inert gas. Air sensitive.
Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Copper,	7440-50-8	TWA	1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Irritation Gastrointestinal metal fume fever		
		TWA	0.2 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Irritation Gastrointestinal metal fume fever		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		PEL	0.1 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
General industrial hygiene practice.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
No special environmental precautions required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: Wire Colour: light red
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,083.4 °C (1,982.1 °F)
f)	Initial boiling point and boiling range	2,567 °C 4,653 °F
g)	Flash point	()No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	8.940 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

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 acids, Strong oxidizing agents, Acid chlorides, Halogens

10.6 Hazardous decomposition products
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Copper oxides
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
No data available
Inhalation: No data available
Dermal: No data available
LD50 Intraperitoneal - Mouse - 3.5 mg/kg

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available
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

Additional Information
RTECS: GL5325000

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
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 Other adverse effects

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

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
No SARA Hazards

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

Copper,	CAS-No. 7440-50-8	Revision Date 1993-02-16

Copper,	CAS-No. 7440-50-8	Revision Date 1993-02-16

New Jersey Right To Know Components

Copper,	CAS-No. 7440-50-8	Revision Date 1993-02-16

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

Further information
Copyright 2018 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: 6.1 Revision Date: 03/12/2019 Print Date: 06/22/2019

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 6.0 Revision Date 10.11.2016
Print Date 02.08.2019
GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Iron Metal Clinical

Product Number : NIST937
Brand : Sigma-Aldrich
REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

2.2 Label elements

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

SECTION 4: First aid measures

4.1 Description of first aid measures

No data available

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
No data available

5.2 Special hazards arising from the substance or mixture
No data available

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

8.2 Exposure controls
No data available

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	No data available
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available

j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
No data available

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Skin corrosion/irritation

Serious eye damage/eye irritation

Respiratory or skin sensitisation

Germ cell mutagenicity

Carcinogenicity

Reproductive toxicity

Specific target organ toxicity - single exposure

Specific target organ toxicity - repeated exposure

Aspiration hazard

Additional Information
RTECS: Not available

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

SECTION 13: Disposal considerations

13.1 Waste treatment methods
No data available

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

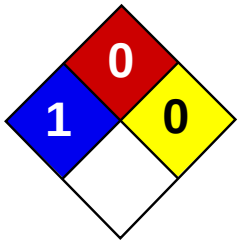
SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information





Health	1
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Lead MSDS

Section 1: Chemical Product and Company Identification

Product Name: Lead

Catalog Codes: SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

CAS#: 7439-92-1

RTECS: OF7525000

TSCA: TSCA 8(b) inventory: Lead

CI#: Not available.

Synonym: Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

Chemical Name: Lead

Chemical Formula: Pb

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
Lead	7439-92-1	100

Toxicological Data on Ingredients: Lead LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, 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. Get medical attention if irritation occurs.

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: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, 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.

Fire Fighting Media and Instructions:
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: When heated to decomposition it emits highly toxic fumes of lead.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. 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 locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust 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: 0.05 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m3) from OSHA (PEL) [United States] TWA: 0.03 (mg/m3) from NIOSH [United States] TWA: 0.05 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Metal solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

pH (1% soln/water): Not applicable.

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungsby mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually abssorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, deliriuim, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead cholic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: 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: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

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 D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:21 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 6.1
Revision Date 05/28/2017
Print Date 06/22/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name	:	Magnesium
Product Number	:	254118
Brand	:	Aldrich
Index-No.	:	012-001-00-3
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 Street ST. LOUIS MO 63103 UNITED STATES
Telephone	:	+1 314 771-5765
Fax	:	+1 800 325-5052

1.4 Emergency telephone number

Emergency Phone #	:	+1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Pyrophoric solids (Category 1), H250
Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260

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)

H250	Catches fire spontaneously if exposed to air.
H260	In contact with water releases flammable gases which may ignite spontaneously.

Precautionary statement(s)

P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P222	Do not allow contact with air.
P223	Do not allow contact with water.

P231 + P232	Handle under inert gas. Protect from moisture.
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.
P422	Store contents under inert gas.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Combustible dust

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Mg
Molecular weight	:	24.31 g/mol
CAS-No.	:	7439-95-4
EC-No.	:	231-104-6
Index-No.	:	012-001-00-3

Hazardous components

Component	Classification	Concentration
Magnesium		
	Pyr. Sol. 1; Water-react. 1; H250, H260	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Flush eyes with water as a precaution.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

Dry powder

5.2 Special hazards arising from the substance or mixture
Magnesium oxide

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal. Contain spillage, pick up with an electrically protected vacuum cleaner or by wet-brushing and transfer to a container for disposal according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Air and moisture sensitive. Store under inert gas.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters
Contains no substances with occupational exposure limit values.
Hazardous components without workplace control parameters

8.2 Exposure controls
Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
Personal protective equipment
Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Protective gloves against thermal risks

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: chips
b)	Odour	No data available
c)	Odour 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)	Vapour pressure	1 hPa at 621 °C (1150 °F)
l)	Vapour density	No data available
m)	Relative density	1.74 g/cm3 at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	The substance or mixture is pyrophoric with the category 1.

q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Exposure to moisture

10.5 Incompatible materials
Strong oxidizing agents, acids, Acid chlorides, Halogens

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Magnesium oxide
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data availableMagnesium
Inhalation: No data available(Magnesium)
Dermal: No data available(Magnesium)
No data available(Magnesium)

Skin corrosion/irritation
No data available(Magnesium)

Serious eye damage/eye irritation
No data available(Magnesium)

Respiratory or skin sensitisation
No data available(Magnesium)

Germ cell mutagenicity

No data available(Magnesium)

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available(Magnesium)

No data available(Magnesium)

Specific target organ toxicity - single exposure
No data available(Magnesium)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available(Magnesium)

Additional Information
RTECS: OM2100000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Magnesium)

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence(Magnesium)

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(Magnesium)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)

UN number: 1869 Class: 4.1 Packing group: III
Proper shipping name: Magnesium
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

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

	CAS-No.	Revision Date
Magnesium	7439-95-4	1993-04-24

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Magnesium	7439-95-4	1993-04-24

New Jersey Right To Know Components

	CAS-No.	Revision Date
Magnesium	7439-95-4	1993-04-24

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H250	Catches fire spontaneously if exposed to air.
H260	In contact with water releases flammable gases which may ignite spontaneously.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	2

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	2

Further information

Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 05/28/2017 Print Date: 06/22/2019

SAFETY DATA SHEET

Version 6.3
Revision Date 04/15/2019
Print Date 06/28/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : Manganese

Product Number : 266167
Brand : Aldrich
CAS-No. : 7439-96-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Short-term (acute) aquatic hazard (Category 2), H401

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram: none

Signal word: none

Hazard statement(s)
H401: Toxic to aquatic life.

Precautionary statement(s)
P273: Avoid release to the environment.
P501: Dispose of contents/ container to an approved waste disposal plant.

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 - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	Mn
Molecular weight	:	54.94 g/mol
CAS-No.	:	7439-96-5
EC-No.	:	231-105-1

Component	Classification	Concentration
Manganese		
	Aquatic Acute 2; H401	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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
Manganese/manganese 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
Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Moisture sensitive. Handle and store under inert gas.
Storage class (TRGS 510): 13: Non Combustible Solids

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Manganese	7439-96-5	C	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Remarks	Ceiling limit is to be determined from breathing-zone air		

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

		samples.		
		TWA	1 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	3 mg/m3	USA. NIOSH Recommended Exposure Limits
		C	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Ceiling limit is to be determined from breathing-zone air samples.		
		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	3 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	0.1 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Not classifiable as a human carcinogen varies		
		TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Central Nervous System impairment Not classifiable as a human carcinogen varies		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection
Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

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: chips Colour: grey, brown, silver
b)	Odour	odourless
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 1,244 °C (2,271 °F) - lit.
f)	Initial boiling point and boiling range	1,962 °C 3,564 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	7.3 g/mL at 25 °C (77 °F)
n)	Water solubility	0.0007 g/l at 20 °C (68 °F)
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Avoid moisture.

10.5 Incompatible materials
acids, Halogens, Bases, Phosphorus, Sulphur oxides, Hydrogen peroxide, Oxidizing agents, Nitric acid, Sodium Hydroxide, Carbon dioxide (CO2), Nitryl Flouride, Steam

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Manganese/manganese oxides
Other decomposition products - No data available
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - female - > 2,000 mg/kg
(OECD Test Guideline 420)
LC50 Inhalation - Rat - male and female - 4 h - > 5.14 mg/l
(OECD Test Guideline 403)
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - Rabbit
Result: No skin irritation
(OECD Test Guideline 404)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: No eye irritation - 72 h
(OECD Test Guideline 405)

Respiratory or skin sensitisation
- Mouse
Result: Does not cause skin sensitisation.
(OECD Test Guideline 429)

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

Reproductive toxicity
Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

Men exposed to manganese dusts showed a decrease in fertility. Chronic manganese poisoning primarily involves the central nervous system. Early symptoms include languor, sleepiness and weakness in the legs. A stolid mask-like appearance of the face, emotional disturbances such as uncontrollable laughter and a spastic gait with tendency to fall in walking are findings in more advanced cases. High incidence of pneumonia has been found in workers exposed to the dust or fume of some manganese compounds., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	semi-static test NOEC - Oncorhynchus mykiss (rainbow trout) - 3.6 mg/l - 96 h (OECD Test Guideline 203) Remarks: No toxicity at the limit of solubility
Toxicity to daphnia and other aquatic invertebrates	Immobilization NOEC - Daphnia magna (Water flea) - 1.6 mg/l - 48 h (OECD Test Guideline 202) Remarks: No toxicity at the limit of solubility
Toxicity to algae	Growth inhibition EC50 - Desmodesmus subspicatus (green algae) - 4.5 mg/l - 72 h (OECD Test Guideline 201)
Toxicity to bacteria	Respiration inhibition EC50 - Sludge Treatment - 1,000 mg/l - 3 h (OECD Test Guideline 209)

12.2 Persistence and degradability
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 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging
Dispose of as unused product.

SECTION 14: Transport information

DOT (US)
Not dangerous goods

IMDG
Not dangerous goods

IATA
Not dangerous goods

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
Manganese	7439-96-5	2007-07-01

SARA 311/312 Hazards
Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Manganese	7439-96-5	2007-07-01

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

SECTION 16: Other information

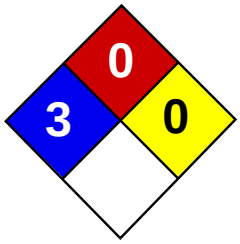
Further information
Copyright 2018 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the 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: 04/15/2019 Print Date: 06/28/2019

The life science business of Merck KGaA, Darmstadt, Germany
operates as MilliporeSigma in the US and Canada







Material Safety Data Sheet
Mercury MSDS

Section 1: Chemical Product and Company Identification

Product Name: Mercury

Catalog Codes: SLM3505, SLM1363

CAS#: 7439-97-6

RTECS: OV4550000

TSCA: TSCA 8(b) inventory: Mercury

CI#: Not applicable.

Synonym: Quick Silver; Colloidal Mercury; Metallic Mercury; Liquid Silver; Hydragyrum

Chemical Name: Mercury

Chemical Formula: Hg

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
Mercury	7439-97-6	100

Toxicological Data on Ingredients: Mercury LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation.

Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

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 immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

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 immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

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.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
When thrown into mercury vapor, boron phosphodiiodide ignites at once. Flame forms with chlorine jet over mercury surface at 200 deg to 300 deg C. Mercury undergoes hazardous reactions in the presence of heat and sparks or ignition.

Special Remarks on Explosion Hazards:
A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. CHLORINE DIOXIDE & LIQUID HG, WHEN MIXED, EXPLODE VIOLENTLY. Mercury and Ammonia can produce an

explosive compound. A mixture of the dry carbonyl and oxygen will explode on vigorous shaking with mercury. Methyl azide in the presence of mercury was shown to be potentially explosive.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. 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 locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 25°C (77°F).

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:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

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: 0.025 from ACGIH (TLV) [United States] SKIN TWA: 0.05 CEIL: 0.1 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 0.025 (mg/m3) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Heavy liquid)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 200.59 g/mole

Color: Silver-white

pH (1% soln/water): Not available.

Boiling Point: 356.73°C (674.1°F)

Melting Point: -38.87°C (-38°F)

Critical Temperature: 1462°C (2663.6°F)

Specific Gravity: 13.55 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 6.93 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Ground mixtures of sodium carbide and mercury, aluminum, lead, or iron can react vigorously. A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. Incompatible with boron diiodophosphide; ethylene oxide; metal oxides, metals(aluminum, potassium, lithium, sodium, rubidium); methyl azide; methylsilane, oxygen; oxidants(bromine, peroxyformic acid, chlorine dioxide, nitric acid, tetracarbonynickel, nitromethane, silver perchlorate, chlorates, sulfuric acid, nitrates,); tetracarbonylnickel, oxygen, acetylinic compounds, ammonia, ethylene oxide, methylsiliane, calcium,

Special Remarks on Corrosivity:
The high mobility and tendency to dispersion exhibited by mercury, and the ease with which it forms alloys (amalga) with many laboratory and electrical contact metals, can cause severe corrosion problems in laboratories. Special precautions: Mercury can attack copper and copper alloy materials.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS).

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material. May cause cancer based on animal data. Passes through the placental barrier in animal. May cause adverse reproductive effects(paternal effects- spermatogenesis; effects on fertility - fetotoxicity, post-implantation mortality), and birth defects.

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: 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 8: Corrosive material

Identification: : Mercury UNNA: 2809 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Mercury California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Mercury Connecticut hazardous material survey.: Mercury Illinois toxic substances disclosure to employee act: Mercury Illinois chemical safety act: Mercury New York acutely hazardous substances: Mercury Rhode Island RTK hazardous substances: Mercury Pennsylvania RTK: Mercury Minnesota: Mercury Massachusetts RTK: Mercury New Jersey: Mercury New Jersey spill list: Mercury Louisiana spill reporting: Mercury California Director's List of Hazardous Substances.: Mercury TSCA 8(b) inventory: Mercury SARA 313 toxic chemical notification and release reporting: Mercury CERCLA: Hazardous substances.: Mercury: 1 lbs. (0.4536 kg)

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 D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R23- Toxic by inhalation. R33- Danger of cumulative effects. R38- Irritating to skin. R41- Risk of serious damage to eyes. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S2- Keep out of the

reach of children. S7- Keep container tightly closed. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label. 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.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:22 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 4.9
Revision Date 04/24/2018
Print Date 06/22/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Nickel

Product Number : 577995
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

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin sensitisation (Category 1), H317
Carcinogenicity (Category 2), H351
Specific target organ toxicity - repeated exposure, Inhalation (Category 1), H372
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H412	Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.

P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Ni
Molecular weight	:	58.69 g/mol
CAS-No.	:	7440-02-0
EC-No.	:	231-111-4
Index-No.	:	028-002-01-4

Hazardous components

Component	Classification	Concentration
Nickel, powder [particle diameter < 1 mm]		
	Skin Sens. 1; Carc. 2; STOT RE 1; Aquatic Acute 3; Aquatic Chronic 3; H317, H351, H372, H412	90 - 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Handle and store under inert gas. Keep in a dry place.
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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components 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	Dermatitis Pneumoconiosis 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 See Appendix A		

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance — Form: powder
Colour: grey

b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point: 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
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	1 hPa (1 mmHg) at 1,810 °C (3,290 °F)
l)	Vapour density	No data available
m)	Relative density	8.9 g/cm3 at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
acids, Oxidizing agents, Sulphur compounds, Hydrogen gas, Oxygen, Methanol, organic solvents, Aluminium, Fluorine, Ammonia

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Nickel/nickel oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - male and female - > 9,000 mg/kg
(OECD Test Guideline 401)

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 sensitisation

Germ cell mutagenicity

No data available

Carcinogenicity

Limited evidence of carcinogenicity in animal studies

IARC:	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:	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])
NTP:	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

No data available

Specific target organ toxicity - single exposure

No data available

Specific target organ toxicity - repeated exposure

Inhalation - Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard

No data available

Additional Information

Repeated dose toxicity	Rat - male and female - Inhalation - LOAEL : 0.0001 mg/l - OECD Test Guideline 451

RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	semi-static test LC50 - Oncorhynchus mykiss (rainbow trout) - 15.3 mg/l - 96 h

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances.

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.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3089 Class: 4.1 Packing group: II
Proper shipping name: Metal powders, flammable, n.o.s.
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG

IATA
UN number: 3089 Class: 4.1 Packing group: II
Proper shipping name: Metal powder, flammable, n.o.s.

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
Nickel, powder [particle diameter < 1 mm]	7440-02-0	2007-07-01

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Nickel, powder [particle diameter < 1 mm]	7440-02-0	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Nickel, powder [particle diameter < 1 mm]	7440-02-0	2007-07-01

California Prop. 65 Components

, which is/are known to the State of California to cause cancer.	CAS-No.	Revision Date
For more information go to www.P65Warnings.ca.gov.	7440-02-0	2007-09-28
Nickel, powder [particle diameter < 1 mm]		

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure if inhaled.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	0
Chronic Health Hazard:	*
Flammability:	1
Physical Hazard	0

NFPA Rating

Health hazard:	0
Fire Hazard:	1
Reactivity Hazard:	0

Further information

Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.9 Revision Date: 04/24/2018 Print Date: 06/22/2019

SAFETY DATA SHEET

Version 4.10
Revision Date 09/23/2016
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Selenium

Product Number : 209643
Brand : Aldrich
Index-No. : 034-001-00-2

CAS-No. : 7782-49-2

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887 (CHEMTREC)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Specific target organ toxicity - repeated exposure (Category 2), H373
Chronic aquatic toxicity (Category 4), H413

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H301 + H331 Toxic if swallowed or if inhaled
H373 May cause damage to organs through prolonged or repeated exposure.
H413 May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.

P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P314	Get medical advice/ attention if you feel unwell.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Se
Molecular weight	:	78.96 g/mol
CAS-No.	:	7782-49-2
EC-No.	:	231-957-4
Index-No.	:	034-001-00-2

Hazardous components

Component	Classification	Concentration
Selenium		
	Acute Tox. 3; STOT RE 2; Aquatic Chronic 4; H301 + H331, H373, H413	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
No data available

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

Store under inert gas.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Selenium	7782-49-2	TWA	0.2 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Eye & Upper Respiratory Tract irritation		
		TWA	0.200000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Eye & Upper Respiratory Tract irritation		
		TWA	0.200000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.200000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.2 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	0.2 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	0.2 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Eye irritation		

		PEL	0.2 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N99 (US) or type P2 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: pellets Colour: light grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 217 °C (423 °F) - lit.
f)	Initial boiling point and	684.9 °C (1,264.8 °F) - lit.

	boiling range	
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	4.81 g/mL at 25 °C (77 °F)
n)	Water solubility	insoluble
o)	Partition coefficient: n-octanol/water	log Pow: 5
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Strong oxidizing agents, Do not store near acids., Amides, Carbides, Metals, Nickel, Nitric acid, Nitrogen trichloride, Oxygen, Potassium, Zinc

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Selenium/selenium oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 6,700 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity). Lungs, Thorax, or Respiration:Dyspnea. Nutritional and Gross Metabolic:Changes in:Other changes.

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

Carcinogenicity - Mouse - Oral
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors.

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Developmental Toxicity - Mouse - Oral
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
May cause damage to organs through prolonged or repeated exposure.

Aspiration hazard
No data available

Additional Information
RTECS: VS7700000

anemia, Vomiting, Diarrhoea, Cough, Difficulty in breathing, Acute selenium poisoning produces central nervous system effects, which include nervousness, convulsions, and drowsiness. Other signs of intoxication can include skin eruptions, lassitude, gastrointestinal distress, teeth that are discolored or decayed, odorous ("garlic") breath, and partial loss of hair and nails. Chronic exposure by inhalation can produce symptoms that include pallor, coating of the tongue, anemia, irritation of the mucosa, lumbar pain, liver and spleen damage, as well as any of the other previously mentioned symptoms. Chronic contact with selenium compounds may cause garlic odor of breath and sweat, dermatitis, and moderate emotional instability., Dermatitis, garlic-like breath odor, pallor, nervousness, depression

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 2 mg/l - 96.0 h

	mortality LOEC - Oncorhynchus mykiss (rainbow trout) - 7.8 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	LC50 - Daphnia magna (Water flea) - 0.43 mg/l - 48 h
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata - 99 mg/l - 72 h

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential

Bioaccumulation	Lepomis macrochirus - 60 d - 640 µg/l
	Bioconcentration factor (BCF): 7.7

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substances, solid, n.o.s. (Selenium)
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. (Selenium)
Marine pollutant:yes

IATA
UN number: 3077 Class: 9 Packing group: III
Proper shipping name: Environmentally hazardous substance, solid, n.o.s. (Selenium)

Further information
EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
Selenium	7782-49-2	2007-07-01

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Selenium	7782-49-2	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Selenium	7782-49-2	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Selenium	7782-49-2	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Chronic	Chronic aquatic toxicity
H301	Toxic if swallowed.
H301 + H331	Toxic if swallowed or if inhaled
H331	Toxic if inhaled.
H373	May cause damage to organs through prolonged or repeated exposure.
H413	May cause long lasting harmful effects to aquatic life.

HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	2
Fire Hazard:	0
Reactivity Hazard:	0

Further information
Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.10 Revision Date: 09/23/2016 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.2
Revision Date 05/28/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Sodium

Product Number : 483745
Brand : Aldrich

CAS-No. : 7440-23-5

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Substances and mixtures, which in contact with water, emit flammable gases (Category 1), H260
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318
Carcinogenicity (Category 1A), H350

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H260 In contact with water releases flammable gases which may ignite spontaneously.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H350 May cause cancer.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P223	Keep away from any possible contact with water, because of violent reaction and possible flash fire.
P231 + P232	Handle under inert gas. Protect from moisture.
P260	Do not breathe dust or mist.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P281	Use personal protective equipment as required.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P335 + P334	Brush off loose particles from skin. Immerse in cool water/ wrap in wet bandages.
P363	Wash contaminated clothing before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P402 + P404	Store in a dry place. Store in a closed container.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Reacts violently with water.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Formula : Na
Molecular weight : 22.99 g/mol

Hazardous components

Component		Classification	Concentration
Sodium			
CAS-No. EC-No. Index-No.	7440-23-5 231-132-9 011-001-00-0	Water-react. 1; Skin Corr. 1B; Eye Dam. 1; H260, H314	>= 90 - <= 100 %
Paraffin oils			
CAS-No. EC-No.	8012-95-1 232-384-2	Asp. Tox. 1; H304, H304	>= 90 - <= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sodium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Handle and store under inert gas. Air sensitive.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Paraffin oils	8012-95-1	STEL	10.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation 2015 Adoption Not classifiable as a human carcinogen		
		Upper Respiratory Tract irritation 2015 Adoption Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Upper Respiratory Tract irritation Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		
		TWA	5.000000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen		
		TWA	5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Upper Respiratory Tract irritation Exposure by all routes should be carefully controlled to levels as low as possible. Suspected human carcinogen		

		TWA	5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	5 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation Not classifiable as a human carcinogen		
		TWA	5 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	5 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	10 mg/m3	USA. NIOSH Recommended Exposure Limits

Hazardous components without workplace control parameters

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Complete suit protecting against chemicals, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: Pieces

b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 97.8 °C (208.0 °F) - lit.
f)	Initial boiling point and boiling range	883 °C (1621 °F) - lit.
g)	Flash point	82 °C (180 °F)
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	0.97 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Air Do not allow water to enter container.
Exposure to moisture

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sodium oxides
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data available

Inhalation: No data available

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., Aspiration may lead to:, lipid pneumonia, Effects due to ingestion may include:, laxative effect, Gastrointestinal disturbance, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber b highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chem scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1428 Class: 4.3 Packing group: I
Proper shipping name: Sodium
Reportable Quantity (RQ) : 10 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1428 Class: 4.3 Packing group: I EMS-No: F-G, S-N
Proper shipping name: SODIUM

IATA
UN number: 1428 Class: 4.3 Packing group: I
Proper shipping name: Sodium
IATA Passenger: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Sodium	7440-23-5	1993-04-24
Paraffin oils	8012-95-1	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Asp. Tox.	Aspiration hazard
Eye Dam.	Serious eye damage
H260	In contact with water releases flammable gases which may ignite spontaneously.
H304	May be fatal if swallowed and enters airways.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H350	May cause cancer.
Skin Corr.	Skin corrosion
Water-react.	Substances and mixtures, which in contact with water, emit flammable gases

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	4
Physical Hazard	2

NFPA Rating

Health hazard:	3
Fire Hazard:	4
Reactivity Hazard:	2
Special hazard.I:	W

Further information
Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.2 Revision Date: 05/28/2017 Print Date: 06/28/2019

SAFETY DATA SHEET

Version 6.1
Revision Date 05/28/2017
Print Date 06/28/2019

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Thallium

Product Number : 277932
Brand : Aldrich
Index-No. : 081-001-00-3

CAS-No. : 7440-28-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

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, Inhalation (Category 2), H330
Acute aquatic toxicity (Category 3), H402
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)
H300 + H330 Fatal if swallowed or if inhaled
H412 Harmful to aquatic life with long lasting effects.

Precautionary statement(s)
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006
Version 6.0 Revision Date 11.11.2016
Print Date 02.08.2019
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 : Zinc metal

Product Number : NIST683
Brand : Sigma-Aldrich
REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.
3050 Spruce Street
ST. LOUIS MO 63103
UNITED STATES

Telephone : +1 314 771-5765
Fax : +1 800 325-5052

1.4 Emergency telephone number

Emergency Phone # : +1-703-527-3887

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.2 Label elements

Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008.

2.3 Other hazards - none

SECTION 3: Composition/information on ingredients

3.1 Substances

SECTION 4: First aid measures

4.1 Description of first aid measures

No data available

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media
No data available

5.2 Special hazards arising from the substance or mixture
No data available

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

8.2 Exposure controls
No data available

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: solid
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	No data available
h)	Evaporation rate	No data available

i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
No data available

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Skin corrosion/irritation

Serious eye damage/eye irritation

Respiratory or skin sensitisation

Germ cell mutagenicity

Carcinogenicity

Reproductive toxicity

Specific target organ toxicity - single exposure

Specific target organ toxicity - repeated exposure

Aspiration hazard

Additional Information
RTECS: Not available

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

SECTION 13: Disposal considerations

13.1 Waste treatment methods
No data available

SECTION 14: Transport information

14.1 UN number
ADR/RID: - IMDG: - IATA: -

14.2 UN proper shipping name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packaging group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user
No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment
For this product a chemical safety assessment was not carried out

SECTION 16: Other information

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.
P284	Wear respiratory protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Tl
Molecular weight	:	204.38 g/mol
CAS-No.	:	7440-28-0
EC-No.	:	231-138-1
Index-No.	:	081-001-00-3

Hazardous components

Component	Classification	Concentration
Thallium		
	Acute Tox. 2; Aquatic Acute 3; Aquatic Chronic 3; H300 + H330, H412	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Flush eyes with water as a precaution.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
thallium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear respiratory protection. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.Further processing of solid materials may result in the formation of combu formation should be taken into consideration before additional processing
Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Thallium	7440-28-0	TWA	0.100000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Alopecia Adopted values or notations enclosed are those for which changes are proposed in the NIC 2010 Revision or addition to the notice of intended changes See Notice of Intended Changes (NIC) Danger of cutaneous absorption		
		TWA	0.020000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Peripheral neuropathy Gastrointestinal damage 2015 Adoption Danger of cutaneous absorption		
		TWA	0.020000 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Peripheral neuropathy Gastrointestinal damage		

		Danger of cutaneous absorption varies		
		TWA	0.1 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		Skin designation		
		TWA	0.02 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
		Peripheral neuropathy Gastrointestinal damage Danger of cutaneous absorption varies		
		TWA	0.1 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 CE approved gloves. This recommendation is advisory only and must be evaluated by an industria 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 (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Appearance Form: granular

		Colour: light grey
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 303 °C (577 °F) - lit.
f)	Initial boiling point and boiling range	1,457 °C (2,655 °F) - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	No data available
l)	Vapour density	No data available
m)	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
No data available

10.4 Conditions to avoid
Air sensitive.

10.5 Incompatible materials
Strong acids, Strong oxidizing agents

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - thallium oxides
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
No data availableThallium
Dermal: No data available(Thallium)
No data available(Thallium)

Skin corrosion/irritation
No data available(Thallium)

Serious eye damage/eye irritation
No data available(Thallium)

Respiratory or skin sensitisation
No data available(Thallium)

Germ cell mutagenicity

No data available(Thallium)

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
Possible risk of congenital malformation in the fetus.(Thallium)

No data available(Thallium)

Specific target organ toxicity - single exposure
No data available(Thallium)

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available(Thallium)

Additional Information
RTECS: XG3425000

The most characteristic symptom of thallium exposure is alopecia (loss of impairment of nail growth often resulting in the appearance of crescent-s Other symptoms in acute poisoning relate chiefly to the gastrointestinal system. Acute poisoning results in swelling of the feet and legs, arthral the hands and feet, mental confusion, polyneuritis with severe pain in th angina-like pains, nephritis, wasting and weakness, and lymphocytosis and peripheral nervous system abnormalities may persist including ataxia, tre disorders, memory loss, and psychoses may develop., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.(Thallium)

Stomach - Irregularities - Based on Human Evidence
Stomach - Irregularities - Based on Human Evidence(Thallium)

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Cyprinodon variegatus (sheepshead minnow) - 21.0 mg/l - 96.0 h(Thallium)
	mortality NOEC - Cyprinodon variegatus (sheepshead minnow) - 14.0 mg/l - 96.0 h(Thallium)

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available(Thallium)

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
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 chem scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3288 Class: 6.1 Packing group: II
Proper shipping name: Toxic solid, inorganic, n.o.s. (Thallium)
Reportable Quantity (RQ) : 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 3288 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: TOXIC SOLID, INORGANIC, N.O.S. (Thallium)

IATA
UN number: 3288 Class: 6.1 Packing group: II
Proper shipping name: Toxic solid, inorganic, n.o.s. (Thallium)

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
Thallium	7440-28-0	2007-07-01

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

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Thallium	7440-28-0	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Thallium	7440-28-0	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Thallium	7440-28-0	2007-07-01

California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H300	Fatal if swallowed.
H300 + H330	Fatal if swallowed or if inhaled
H330	Fatal if inhaled.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

HMIS Rating

Health hazard:	4
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	4
Fire Hazard:	0
Reactivity Hazard:	0

Further information
Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956
Version: 6.1 Revision Date: 05/28/2017 Print Date: 06/28/2019

APPENDIX B

RELEVANT SECTIONS OF PRIOR INVESTIGATION REPORTS

ENVIRONMENTAL FINDINGS REPORT
CORRIDOR ENVIRONMENTAL SITE ASSESSMENT
NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT
NEW YORK, NEW YORK

MATRIXNEWORLD

Engineering Progress

Prepared for:
AECOM USA, Inc.
605 Third Avenue
New York, NY 10158

On Behalf of:
Battery Park City Authority
200 Liberty Street
New York, NY 10281

Prepared by:
Matrix New World Engineering, Land Surveying
and Landscape Architecture, P.C.
333 West 39th Street, Suite 202
New York, NY 10018

Matrix Project No. 20-1152

February 2022

EXECUTIVE SUMMARY

Subject to the qualifications and limitations stated in Section 1 of this report, Matrix New World Engineering, Land Surveying, and Landscape Architecture, P.C. (Matrix) was retained by AECOM USA, Inc. (AECOM) on behalf of the Battery Park City Authority (BPCA) (also known as "Users" together with AECOM) to perform a Corridor Environmental Site Assessment (ESA) as part of a due diligence evaluation in connection with the proposed project, which will provide risk reduction for Battery Park City and its residents.

The North/West Battery Park City Resiliency Project contemplates the creation of an integrated coastal flood risk management system from First Place, north along the Battery Park City Esplanade, across to the east side of West Street/Route 9A, and terminate above Chambers Street at a high point on Greenwich Street.

The study area for this Corridor ESA crosses through and/or borders the following tax blocks and lots:

- Block 16: Lots 3, 12, 15, 20, 45, 65, 90, 95, 100, 125, 210, 215
- Block 142: Lots 25, 50
- Block 184: Lot 2

To provide more focused discussions of environmental findings along the North and West Alignments, this report has broken down each alignment into the following sections:

- North Alignment:
    - N. Moore Street: located between West Street and Greenwich Street.
    - West Street: located between N Moore Street and the North Esplanade
    - North Esplanade: located between West Street/9A and the intersection of River Terrace and Chambers Street
- West Alignment:
    - Rockefeller Park: located along River Terrace between Chambers Street and Belvedere Plaza.
    - Belvedere Plaza and North Cove: located along the BPC Esplanade from the north side of Belvedere Plaza to the north side of Esplanade Plaza.
    - BPC Esplanade Mid-Section: located on the inland side of the BPC Esplanade from the north side of Esplanade Plaza to 3rd Place.
    - South Cove: Directly adjoining the buildings on the BPC Esplanade between 3rd Place and 1st Place.

A regional location map included as **Figure 1** and a site plan is included as **Figure 2**.

The Corridor ESA described in this report was performed in general accordance with the scope and limitations of the ASTM International (ASTM) E1527-13 *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* (ASTM E1527-13 Phase I Standard). As the Site is irregularly shaped and over 1-mile long, the study area was limited to what falls within a 100-foot radius of the site. Limiting conditions and/or deviations from the ASTM E1527-13 Phase I Standard are described in Sections 1.3, 5.1 and 7.4 of this report, as applicable.

Site Feature	Description
Approximate Site size:	1.38 miles long
Current Site operator:	BPCA
Site use:	Recreational outdoor space; public facilities; and residential, commercial/ office, and mixed-use buildings.
Buildings (stories):	Multi-story buildings adjoin the full alignment including residential, commercial/office, and mixed-use.
Exterior areas:	Public roadways, Hudson River Park, North Esplanade, Rockefeller Park, Belvedere Plaza, North Cove marina, Battery Park City Esplanade, South Cove Park.
On-site roads/rail lines:	N. Moore Street, Route 9A/West Street, River Terrace, North End Avenue, Battery Park City Esplanade, 3rd Place, 1st Place. The BPC Shoreline, and much of the esplanade area, are built upon platforms constructed over the Hudson River instead of directly on land. The Belvedere Plaza and North Cove section, BPC Esplanade Mid-Section, and South Cove section are located on and/or adjoining the platform areas.
Other large equipment:	Barges adjoining South Cove section, appearing to temporarily facilitate construction activities.

As a result of the Corridor ESA, including but not limited to our visual observation of the Site; review of historical information, environmental databases, and information provided by the Users; interviews with current Site representative(s); and Matrix's professional judgment, the following *recognized environmental conditions* (RECs), *controlled recognized environmental conditions* (CRECs), and/or *historical recognized environmental conditions* (HRECs) associated with the Site, as defined by the ASTM E1527-13 Phase I Standard (see Section 1.1 of the report), were identified:

Recognized Environmental Conditions (RECs)

REC No. 1: Historic Fill (site wide)

According to the aerial photographs, topographic maps and Sanborn maps provided by EDR, it is apparent that the entire West Alignment has been filled in between the years 1967 and 1992, as the area was reclaimed coastline, expanded into the Hudson River. Further, the North Alignment was likely also filled at some point in its development, as coastal and low-lying areas of the city were most often filled or graded. Historic fill in New York City typically is characterized by contaminated soil and groundwater including heavy metals, semi-volatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs). The potential exists for contamination to be present on-Site.

REC No. 2: Current and Historical Dry-Cleaning Facilities

2A: Current Dry-Cleaning Facilities

- Liberty Cleaners – 225 South End Avenue
- Four Seasons Dry Cleaning – 21 South End Avenue
- South Cove Cleaner – 2 South End Avenue

2B: Former Dry-Cleaning Facilities

- REDCAP 1 Inc – 22 River Terrace
- Kim Cleaners – 370 Greenwich Street
- Trio Cleaners – 395 Greenwich Street
- Golden Cleaners – 111 Hudson Street
- Independent Plaza Cleaners – 34 Harrison Street
- Greenwich Cleaners – 331 Greenwich Street
- Gateway Cleaners/Ginos Battery Park Cleaners – 325 South End Avenue
- Elite French Cleaners – 245 South End Avenue
- Fresh Cleaners – 300 Rector Place

According to the radius report provided by EDR, several historical and current dry-cleaning facilities were identified either on-Site, adjacent to the Site, or in close proximity and upgradient of the Site. Historical and current dry-cleaning facilities may have released solvents used in the dry-cleaning process into the soil and groundwater. The potential exists for the contamination to be present on-Site due to historical on-Site dry-cleaning facilities as well as migration onto the Site from adjacent and nearby facilities.

Controlled Recognized Environmental Conditions (CRECs)

No known or suspected CRECs in connection with the Site were identified during this Corridor ESA.

Historical Recognized Environmental Conditions (HRECs)

No known or suspected HRECs in connection with the Site were identified during this Corridor ESA.

Pursuant to the ASTM E1527-13 Phase I Standard, a data gap is defined as *a lack of or inability to obtain information required by [the ASTM E1527-13 Phase I Standard] despite good faith efforts by the environmental professional (EP) to gather such information*. Pursuant to the ASTM E1527-13 Phase I Standard, *the report shall identify and comment on significant data gaps that affect the ability of the EP to identify RECs and identify the sources of information that were consulted to address the data gaps. A data gap is only significant if other information and/or professional experience raises reasonable concerns involving the data gap*. The term "significant data gap" does not necessarily imply that the relative liability or potential financial risk of the concern is significant. In addition to the above-listed RECs no *significant* data gaps were noted.

Other Findings:

The term "other finding" is not defined by ASTM; rather, Matrix uses the term to connote areas of contingent risk that are not clearly defined by the ASTM Standard. The following other findings were identified as part of this Corridor ESA.

Historical Auto Repair Garages:

- *Auto Repair Garage at 211 West Street:* Observed on the 1950 Sanborn map adjoining the West Street section with a potential gasoline storage tank. The garage was demolished and replaced with the Borough of Manhattan Community College (BMCC) campus by 1981. No spills or violations are associated with this facility. Based on that extensive redevelopment, this former garage is not considered a REC.
- *Garage with PBS Tanks at 68 North Moore Street:* Observed on the 1950 through 1988 Sanborn maps adjoining the N. Moore Street section. The garage was demolished and a vacant lot through the 1990s, a parking lot through 2004, and was replaced by apartment buildings by 2005. No spills or violations are associated with this facility. Based on the most recent redevelopment, this former garage is not considered a REC.
- *Garage with four PBS tanks 56-62 North Moore Street:* Observed on the 1950 through 2005 Sanborn maps 240 feet east of the N. Moore Street section. The facility is still currently used as a parking facility; however, no other federal, state, or local records indicate the presence of

current or former PBS tanks. No spills or violations are associated with this facility. Because no additional records corroborate the PBS tanks included on the Sanborn maps, this garage is not considered a REC.

This Executive Summary is part of this complete report; any findings, opinions or conclusions in this Executive Summary are made in context with the complete report. Matrix recommends that the Users read the entire report for all supporting information related to findings, opinions, and conclusions.

Legal Notice

This document was prepared by Matrix solely for the benefit of the Users. With regard to third-party recipients of this document, Matrix does not (a) make any warranty, expressed or implied, with respect to the use of any information or methods disclosed in this document; or (b) assume any liability with respect to the use of any information or methods disclosed in this document. Any third-party recipient of this document, by its acceptance or use of this document, releases Matrix from any liability for direct, indirect, economic, incidental, consequential, or special loss or damage whether arising in contract, warranty, express or implied, tort, or otherwise, and irrespective of fault, negligence, and strict liability.

This report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings of this assessment.

FIGURES



Legend

- REC-2A
- REC-2B
- North Alignment
- West Alignment
- 100-ft Buffer

Recognized Environmental Concerns (RECs):

REC-1: Historic Fill - site wide

REC-2A: Current Dry Cleaning Facilities:
- Liberty Cleaners – 225 South End Avenue
- Four Seasons Dry Cleaning – 21 South End Avenue
- South Cove Cleaner – 2 South End Avenue

REC-2B: Former Dry Cleaning Facilities:
- REDCAP 1 Inc – 22 River Terrace
- Kim Cleaners– 370 Greenwich Street
- Trio Cleaners– 395 Greenwich Street
- Golden Cleaners – 111 Hudson Street
- Independent Plaza Cleaners – 34 Harrison Street
- Greenwich Cleaners – 331 Greenwich Street
- Gateway Cleaners/Ginos Battery Park Cleaners – 325 South End Avenue
- Elite French Cleaners – 245 South End Avenue
- Fresh Cleaners – 300 Rector Place

0 300 600 1,200 1,800 Feet

MATRIXNEWORLD
Engineering Progress

Matrix New World Engineering, Land Surveying and Landscape Architecture, P.C.
333 W 39th Street, Suite 202
New York, New York 10018
WBE
Tel: 973-240-1800
Fax: 973-240-1818
www.matrixneworld.com
STATE OF NEW YORK CERTIFICATE OF AUTHORIZATION No. 17-082661

REC PLAN

NORTH/WEST BATTERY PARK CITY
FLOOD RESILIENCY PROJECT
BATTERY PARK CITY AUTHORITY
NEW YORK, NY

JULY 2021 | **FIGURE 3**

SUBSURFACE ENVIRONMENTAL SITE INVESTIGATION REPORT
NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT
NEW YORK, NEW YORK

MATRIXNEWORLD

Engineering Progress

Prepared for:
AECOM
605 Third Avenue, Second Floor
New York, NY 10158

On Behalf of:
Battery Park City Authority
200 Liberty Street
New York, NY 10281

Prepared by:
Matrix New World Engineering, Land Surveying
and Landscape Architecture, P.C.
333 W. 39th Street, Suite 202
New York, NY 10018
973.240.1800 Fax 973.240.1818

Matrix No. 20-1152

August 2022

MATRIXNEWORLD
Engineering Progress

1.0 INTRODUCTION

Matrix New World Engineering, Land Surveying, and Landscape Architecture, P.C. (Matrix) was retained by AECOM USA, Inc. (AECOM) on behalf of the Battery Park City Authority (BPCA) to provide environmental consulting services in connection with the proposed project, which will provide flood risk reduction for Battery Park City (BPC) and its residents. Matrix conducted environmental investigation activities to determine if contaminated or hazardous materials are present within the Project area's subsurface, which may be disturbed or removed during proposed construction/rehabilitation activities.

The North/West Battery Park City Resiliency Project contemplates the creation of an integrated coastal flood risk management system from First Place, north along the Battery Park City Esplanade, across to the east side of West Street/Route 9A, east across North Moore Street and terminates at a high point on Greenwich Street (the Site).

Matrix performed a Corridor Environmental Site Assessment (ESA) in July 2021 as part of a due diligence evaluation to assess potential environmental impacts that may affect the project or the community/construction workers during construction. The results of the ESA identified multiple Recognized Environmental Conditions (RECs) along the proposed alignment, or in the immediate area, which may have impacted subsurface conditions. The Corridor ESA revealed the following RECs in connection with the Site:

REC-ID	Description
1	Historic Fill (site wide)
2	Current and Historical Dry-Cleaning Facilities

This subsurface environmental investigation was performed to investigate the above RECs; characterize soil and groundwater conditions in the project area to ensure proper handling and/or disposal of these materials during construction; and inform the bidding contractor on potential needs for worker health and safety. This investigation was also completed to support the environmental review effort required to prepare an Environmental Impact Statement (EIS) for the proposed project. The investigation was performed in accordance with the approved November 2021 Phase II Environmental Site Investigation Work Plan (ESI WP).

4.0 FINDINGS

4.1 Geophysical Investigation

The geophysical investigation was limited to the areas surrounding the proposed environmental boring locations. Results of the geophysical investigation cleared all proposed boring locations of underground utilities and obstructions. If necessary, soil borings were relocated slightly so as not to encounter potential utilities.

4.2 Soil Lithology

The soil lithology observed during the investigation of the West Alignment typically consisted of apparent fill material from below the impervious cover to 20 ft-bgs. The fill consisted of brown and gray fine to medium-fine sands with trace fine gravel and some silt; varying amounts of brick and wood. Depth to water in the permanent wells ranged from 3.0 to 14.1 ft-bgs in wells SB-26 and SB-17, respectively. Signs of contamination were observed during the concurrent geotechnical investigation, including stains and odors associated with creosote-treated wood at boring BH-05A (from 8-22 ft-bgs) and a tar-like substance at boring BH-08 from 8-10 ft-bgs; with maximum PID readings of 57.7 parts-per-million (ppm) in BH-05A at 8-10 ft-bgs and 1.6 ppm in BH-08 at 8-10 ft-bgs. No other significant PID readings were observed in Site soils, and no other obvious signs of contamination were observed. Organic odors were observed in SB-24 at a depth of 12-20 ft-bgs.

Soil lithology observed during the investigation of the North Alignment typically consisted of apparent fill material from below the surface cover to as deep as 8 ft-bgs. The fill consisted of brown and tan medium-fine to coarse-medium-fine sands with some gravel; varying amounts of brick. Beyond 10 ft-bgs, soil consisted of brown fine to medium-fine sand and silt with little gravel. Depth to water in the temporary well at SB-07 was measured at 9.9 ft-bgs. No odors or obvious signs of staining or soil contamination were observed during field screening, other than anthropogenic fill.

Soil boring logs and temporary well logs are provided in Appendix A.

4.3 Analytical Results

Matrix submitted for analysis 38 grab soil samples, 2 duplicate soil samples, 9 groundwater samples, 2 duplicate groundwater samples, and 14 waste characterization composite samples. Field duplicates for each matrix, a field blank for each matrix, and 3 trip blanks were also submitted to the laboratory for quality assurance/quality control. Soil and groundwater analytical data are presented in Tables 1 through 3 and summary tables and descriptions of exceedances are detailed in the following sections. Quality control and quality assurance sample results are presented in Table 4.

The applicable remediation standards for this Site include:

- Soil – NYSDEC Title 6 New York Code Rules and Regulations (NYCRR) Part 375-6 Residential Soil

Cleanup Objectives (RSCOs), Restricted Residential Soil Cleanup Objectives (RRSCOs), and Protection of Groundwater Soil Cleanup Objectives (PGWSCOs). Results were also compared to the Unrestricted Use SCOs (UUSCOs), the most stringent criteria for the Site.

- Waste Classification – 40CFR Part 261, Table 1: EPA's Maximum Concentration of Contaminants for the Toxicity Characteristic.
- Groundwater – New York Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (NYS AWQS) Class GA criteria

4.3.1 Soil Analytical Results

VOCs

Naphthalene was detected exceeding its RRSCO of 100 mg/kg at a concentration of 610 mg/kg in sample SB-05A (8-10), collected from geotechnical boring BH-05A due to obvious signs of contamination. No other VOCs were detected exceeding the most stringent SCOs except for acetone in sample SB-01 (0-2). However, acetone is a common laboratory contaminant and not expected to be indicative of on-Site conditions.

SVOCs

SVOCs were detected exceeding the UUSCOs, RSCOs, RRSCOs and PGWSCOs in sample COMP SB-08 (0-5), SB17 (1-3.5), and SB-05A (8-10), collected from geotechnical boring BH-05A, and above the RSCOs in samples COMP SB-06 (0-5) and. A summary of SVOC exceedances is shown in the table below. No other samples exhibited SVOC concentrations exceeding the most stringent SCOs.

SVOC Exceedance Summary Table

Sample ID	SB-05A (8-10) [BH-05A]	COMP SB-06 (0-5)	COMP SB-08 (0-5)	SB17 (1-3.5)	UUSCO	RSCO	RRSCO	PGWSCO
Acenaphthene	**52**	0.86J	6.6	0.076J	20	100	100	98
Benzo[a]anthracene	**13**	0.81	**26**	**2.6**	1	1	1	1
Benzo[a]pyrene	**5.9**	0.82	**27**	**2.7**	1	1	1	22
Benzo[b]fluoranthene	**9.1**	0.96	**26**	**3.6**	1	1	1	1.7
Benzo(k)fluoranthene	**2.4**	0.26	**2.8**	**0.92**	0.8	1	3.9	1.7
Chrysene	**8.7**	0.79	**24**	**2.3**	1	1	3.9	1
Dibenzo[a,h]anthracene	**0.45**	0.12	**2.2**	**0.49**	0.33	0.33	0.33	1000
Dibenzofuran	**29**	0.053J	5.1	0.029J	7	14	59	210
Fluorene	**33**	0.084J	7.2	0.072J	30	100	100	386
Indeno[1,2,3-cd]pyrene	**2.4J**	**0.56**	**18**	**2.1**	0.5	0.5	0.5	8.2
Naphthalene	**86**	0.043J	3.8	0.089J	12	100	100	12

Sample ID	SB-05A (8-10) [BH-05A]	COMP SB-06 (0-5)	COMP SB-08 (0-5)	SB17 (1-3.5)	UUSCO	RSCO	RRSCO	PGWSCO
Phenanthrene	**100**	0.98	33E	1.4	100	100	100	1000

Concentrations shown are mg/kg
J – estimated concentration

Concentration exceeds UUSCO	**Concentration exceeds PGWSCO & UUSCO**
Concentration exceeds RSCO & UUSCO	**Concentration exceeds PGWSCO, RSCO & UUSCO**
Concentration exceeds RRSCO, RSCO & UUSCO	**Concentration Exceeds PGWSCO, RRSCO, RSCO & UUSCO**

Chlorinated Herbicides

Chlorinated herbicides were not detected exceeding the most stringent SCOs.

Pesticides

Pesticides were detected exceeding the UUSCOs in samples COMP SB-04 (0-4), COMP SB-06 (0-5), SB23 (1-3), SB-24 (1-4), and SB-25 (1-3). 4,4'-DDE, 4,4'-DDT and dieldrin were detected exceeding their respective USCOs in the samples above. Dieldrin was only detected exceeding its UUSCO of 0.005 mg/kg in sample SB25 (1-3) at a concentration of 0.00669 mg/kg. A summary of pesticide exceedances are shown in the table below. No pesticides were detected above the RSCOs and no other pesticides were detected exceeding the most stringent SCOs other than those listed. The detection limits for pesticides exceeded the UUSCO at COMP SB-04 (0-4), COMP SB-05 (0-5), SB-05A (collected from geotechnical boring BH-05A), COMP SB-08 (0-5), and BH-08, which can occur due to interference from the soil matrix or elevated levels of other compounds and are indicated below.

Pesticides Exceedance Summary Table

Sample ID	COMP SB-04 (0-4)	SB-05A	COMP SB-06 (0-5)	COMP SB-09 (0-5)	UUSCO
4,4'-DDD	***0.017U***	**0.00765P**	0.000588J	0.00216U	**0.0033**
4,4'-DDE	**0.0131JP**	0.00199U	0.00182	**0.00431P**	**0.0033**
4,4'-DDT	***0.0319U***	***0.00373U***	**0.00342**	**0.00494IP**	**0.0033**
Dieldrin	***0.0106U***	0.00124	0.00074J	0.003	**0.005**

Sample ID	COMP SB-10 (0-5)	SOIL DUP [COMP SB-10 (0-5)]	SB23 (1-3)	SB-24 (1-4)	SB25 (1-3)	UUSCO
4,4'-DDD	0.00119J	0.00198	0.000726J	0.00171U	0.0017U	**0.0033**
4,4'-DDE	**0.00435**	**0.00401**	0.0016J	**0.00372**	0.00227	**0.0033**
4,4'-DDT	**0.00372IP**	**0.00422IP**	**0.00664**	**0.00634**	0.00318U	**0.0033**
Dieldrin	0.00114U	0.00112U	0.00107U	0.00138	**0.00669P**	**0.005**

Concentrations shown are mg/kg
J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than MDL. The concentration given is an approximate value.
P = The RPD between the results for the two columns exceeds the method-specified criteria.
U = Not detected at the reported detection limit for the sample.
Reporting Limit Exceeds UUSCO
Concentration Exceeds UUSCO

PCBs

Aroclor 1254 was detected exceeding the RRSCO and UUSCO for total PCBs of 1 mg/kg and 0.1 mg/kg, respectively, with a concentration of 1.74 mg/kg in sample SB28 (1-3). No other PCBs were detected exceeding the most stringent SCOs.

Metals and Cyanide

Several metals, including copper, lead, mercury, nickel, and zinc were detected exceeding their respective UUSCOs in samples COMP SB-03 (0-5), COMP SB-08 (0-5), COMP SB-10 (0-5), SB-23 (1-3), SB-24 (10-12), SB-25 (1-3), SB-26 (1-3), SB28 (1-3), SB29 (1-3), BH-08. No metals were detected in excess of the RSCOs and no other metals, including hexavalent chromium and cyanide, were detected in excess of the UUSCO in any soil sample.

A summary of metals exceedances is shown in the table below.

Metals Exceedance Summary Table

Sample ID	COMP SB-03 (0-5)	SB-05A (8-10)	COMP SB-08 (0-5)	COMP SB-10 (0-5)	SB-23 (1-3)	SB-24 (10-12)	UUSCO
Copper	**63.2**	18.2	20.5	26.3	14.8	**74.2**	**50**
Lead	**300**	11.5	44.1	**128**	44.2	16.2	**63**
Mercury	**0.275**	0.094U	**0.209**	0.114	**0.191**	**0.268**	**0.18**
Nickel	17.7	10.1	12.2	8.64	9.9	7.79	**30**
Zinc	57.7	**146**	72.8	**118**	58.8	20.9	**109**

Sample ID	SB-25 (1-3)	SB-26 (1-3)	SB28 (1-3)	SB29 (1-3)	BH-08	UUSCO
Copper	32.8	21.1	24.4	19.4	**69.8**	**50**
Lead	**113**	59.2	55.8	34.9	**69.5**	**63**
Mercury	**0.199**	**0.212**	**0.276**	**0.181**	**0.268**	**0.18**
Nickel	**86.4**	**38.8**	**99**	**57.8**	**32.3**	**30**
Zinc	96.1	58.6	69.3	44.9	91.4	**109**

Concentrations shown are mg/kg
U = Not detected at the reported detection limit for the sample.
Exceeds UUSCO

4.3.2 Waste Classification Analytical Results

No samples were detected above the EPA Maximum Concentration of Contaminants for TCLP metals standards. Soils did not exhibit hazardous waste characteristics for ignitability or reactivity, as compared to the applicable RCRA thresholds and were negative for paint filter. Additionally, the pH of the samples collected ranged from 7.8 to 11.4.

4.3.3 Groundwater Analytical Results

VOCs

No VOCs were detected exceeding their NY TOGS Class GA Groundwater Standards except for vinyl chloride which was detected at a concentration of 2 ug/L in sample TWP-07 and 2.1 ug/L in the groundwater duplicate sample collected from TWP-07, collected at SB-07.

SVOCs

Various SVOC compounds were detected exceeding NY TOGS Class GA groundwater standards. SVOC exceedances were detected in groundwater samples TWP-07, SB13, SB17, SB20, SB20, SB26DUP, and SB29. All compounds detected were PAHs, including: benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo(k)fluoranthene, chrysene, and indeno[1,2,3-cd]pyrene. A summary of SVOC exceedances is shown in the table below.

SVOC Exceedance Summary Table

Sample ID	TWP-07	SB13	SB17	SB20	SB21	SB26DUP	SB29	NY TOGS Class GA Groundwater Standards
Benzo[a]anthracene	**0.04J**	**0.04J**	*0.1U*	**0.03J**	**0.05J**	*0.1U*	**0.08J**	**0.002**
Benzo[a]pyrene	**0.02J**	**0.02J**	*0.1U*	*0.1U*	**0.03J**	*0.1U*	**0.06J**	**0.002**
Benzo[b]fluoranthene	**0.03J**	**0.02J**	*0.1U*	**0.01J**	**0.04J**	*0.1U*	**0.1**	**0.002**
Benzo(k)fluoranthene	**0.02J**	**0.02J**	*0.1U*	*0.1U*	**0.04J**	*0.1U*	**0.03J**	**0.002**
Chrysene	**0.02J**	**0.03J**	**0.02J**	*0.1U*	**0.04J**	**0.02J**	**0.09J**	**0.002**
Indeno[1,2,3-cd]pyrene	**0.02J**	**0.02J**	*0.1U*	*0.1U*	**0.04J**	*0.1U*	**0.06J**	**0.002**

Concentrations shown are ug/L
J = Estimated concentration below laboratory reporting limit
U = Not detected at the reported detection limit for the sample.
Reporting Limit Exceeds NYS AWQS
Concentration Exceeds NYS AWQS

Chlorinated Herbicides, Pesticides, and PCBs

Chlorinated herbicides, pesticides, and PCBs were not detected exceeding NY TOGS Class GA groundwater standards in any of the groundwater samples collected.

Metals and Cyanide

Both total and dissolved metals were analyzed for each sample. Numerous metals were detected above the NY TOGS Class GA groundwater samples in the unfiltered groundwater samples, but only four dissolved metals were detected in each of the groundwater samples in excess of NY TOGS Class GA groundwater standards. Metals detected in both the total and dissolved metals analysis in excess of the TOGS standards include iron, magnesium, manganese, and sodium. Cyanide was not detected in any groundwater sample. A summary of total metals compounds and dissolved metals exceedances are shown in the table below.

Dissolved Metals Exceedance Summary Table

Sample ID	TWP-07	GW DUP	SB13	SB16	SB17	NY TOGS Class GA Groundwater Standards
Iron	31.6J	24.5J	100U	250U	*500U*	**600**
Magnesium	**110000**	**107000**	**150000**	**490000**	5030	**35,000**
Manganese	**3100**	**2815**	1.63J	2.2J	**499.2**	**300**
Sodium	**1280000**	**1200000**	**1260000**	**4020000**	16300	**20,000**

Sample ID	SB20	SB21	SB24	SB26	SB26 DUP	SB29	NY TOGS Class GA Groundwater Standards
Iron	**1370**	**596**	55	*500U*	*500U*	50U	**600**
Magnesium	7640	7910	18000	**588000**	**534000**	**405000**	**35,000**
Manganese	**1088**	**489.3**	119	60.62	41.72	1.89	**300**
Sodium	14200	18700	**108000**	**4810000**	**4830000**	**3490000**	**20,000**

Concentrations shown are ug/L
Reporting Limit Exceeds NYS AWQS
Concentration Exceeds NYS AWQS
J = Estimated concentration below laboratory reporting limit
U = Not detected at the reported detection limit for the sample.

Total Metals Exceedance Summary Table

Sample ID	TWP-07	GW DUP	SB13	SB16	SB17	NY TOGS Class GA Groundwater Standards
Arsenic	**59.22**	**37.41**	2.21	1.34	2.73J	**25**
Barium	**1772**	**1532**	76.11	18.04	12.03	**1000**
Beryllium	**10.12**	**8.29**	1U	0.5U	*5U*	**3**
Chromium	**259.3**	**187.1**	0.88J	0.19J	3.17J	**50**
Copper	**539.6**	**411.4**		2.03	10U	**200**
Iron	**240000**	**223000**	98.6J	50.3	**1390**	**300**
Lead	**305.2**	**257.7**	2U	10U	10U	**25**
Magnesium	**151000**	**163000**	**147000**	**493000**	5190	**35000**
Manganese	**9196**	**9452**	2.96	0.76J	**496.2**	**300**
Nickel	**515.9**	**387**	4U	0.84J	20U	**100**
Selenium	**70.5**	**48.7**	*10U*	5U	*50U*	**10**
Sodium	**1460000**	**1390000**	**1220000**	**4370000**	16200	**20,000**

Sample ID	TWP-07	GW DUP	SB13	SB16	SB17	NY TOGS Class GA Groundwater Standards
Thallium	**2.84J**	**1.47J**	**2U**	*10U*	*10U*	**0.5**

Sample ID	SB20	SB21	SB24	SB26	SB26 DUP	SB29	NY TOGS Class GA Groundwater Standards
Arsenic	4.25	1.97	1.02	5U	5U	1.91J	**25**
Barium	8.99	13.84	3.68	38.74	38.51	24.29	**1000**
Beryllium	0.5U	0.5U	0.5U	*5U*	*5U*	*5U*	**3**
Chromium	2.25	2.95	0.64J		10U	10U	**50**
Copper	0.89J	1.45	1U	10U	10U	10U	**200**
Iron	**2850**	**2700**	234	*500U*	*500U*	*500*	**300**
Lead	0.97J	0.65J	1U	10U	10U	10U	**25**
Magnesium	7880	7680	18200	**500000**	**513000**	**368000**	**35000**
Manganese	**1050**	**527.5**	125.5	44.1	41.13	10U	**300**
Nickel	1.12J	1.08J	1.76J	12.46J	13.37J	20U	**100**
Selenium	5U	5U	5U	*50U*	*50U*	*50U*	**10**
Sodium	14400	17900	**100000**	**4730000**	**4800000**	**3570000**	**20,000**
Thallium	0.2J	*1U*	*1U*	*10U*	*10U*	*10U*	**0.5**

Concentrations shown are ug/L
Reporting Limit Exceeds NYS AWQS
Concentration Exceeds NYS AWQS
J = Estimated concentration below laboratory reporting limit
U = Not detected at the reported detection limit for the sample.

4.3.4 QA/QC Samples

Matrix collected three trip blanks, two field blanks (one soil and one groundwater), and four duplicate samples (two for soil and two for groundwater). Analytical results are presented in Table 4 and descriptions of results are detailed below.

- Trip blanks – VOCs were not detected in any trip blank.
- Field blank (soil) - VOCs, SVOCs, metals, PCBs, and pesticides were not detected in this field blank except for arsenic and iron at concentrations of 2 and 11 ug/L, respectively.
- Field blank (groundwater) – VOCs, SVOCs, metals, PCBs, and pesticides were not detected in this field blank except for chrysene at a concentration of 0.08 ug/L and barium at a concentration of 0.2 ug/L.
- Duplicate sample (soil) – One soil duplicate sample was collected from the same interval as SB13 (1-3) and a second duplicate sample was collected from the same interval as COMP (SB-10). There were no exceedances above the most stringent SCOs, which matched the base sample for the duplicate sample collected at SB13. The duplicate sample collected from SB-10 had two pesticide exceedances, 4,4'-DDE and 4,4'-DDT, which matched the base sample.
- Duplicate sample (groundwater) - One groundwater duplicate sample was collected from the well that was installed at SB-26 and a second duplicate sample was collected from TWP-07. The only result in the duplicate sample collected from SB-26 that differed from the original sample was chrysene which was detected at a concentration of 0.02 ug/L in the duplicate sample and was not detected in the original sample.

The only results that differed in the duplicate sample collected from TWP-07 were SVOCs, no SVOCs were detected in the duplicate sample whereas several PAHs were detected in the original sample.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The results of Matrix's soil investigation do not indicate evidence of a petroleum spill or other release in the potential construction area. The analytical results do not require spill reporting to the NYSDEC.

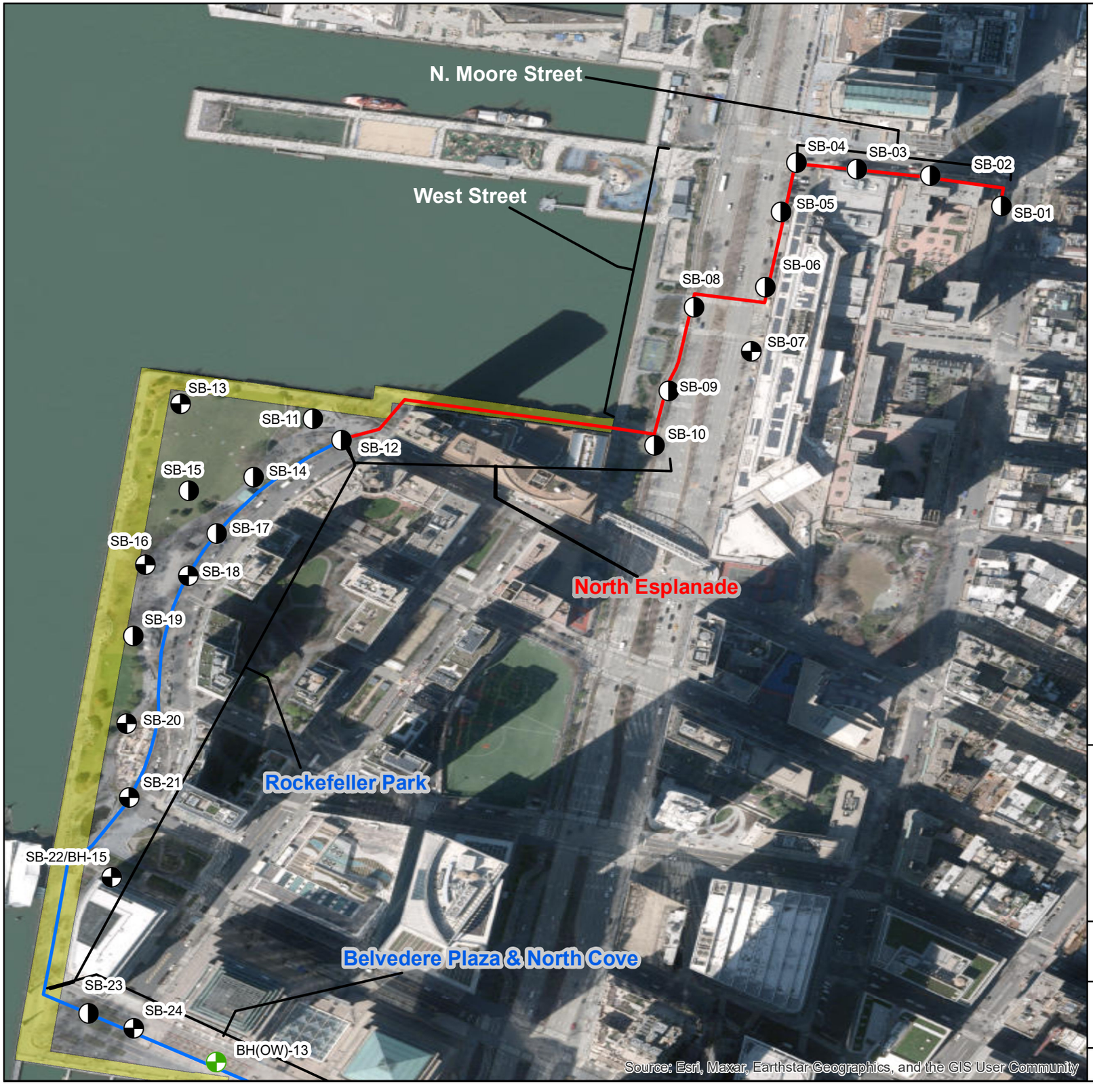
Obvious signs of fill, such as wood fragments, brick fragments, and polystyrene foam were encountered in many soil boring locations throughout both the North and West Alignments. Analytical results also indicate that historic fill is present across the Site with elevated VOCs, SVOCs, and PCBs detected above RRSCOs and UUSCOs, and pesticides and metals above UUSCOs. The concentrations detected were typical of fill soils. Obvious signs of contamination were observed at the location of BH-05A from 8-22 ft-bgs and BH-08 from 8-10 ft-bgs. Soil sampled from BH-05A (designated as sample "SB-05A") contained naphthalene above its UUSCO, which is consistent with contamination from creosote-treated wood. Soil sampled from BH-08 detected metals exceeding UUSCOs and no exceedances of organic compounds, suggesting the tar-like material was a historical release which naturally degraded over time. Similar impacts were not observed elsewhere in the boring column or in other nearby borings.

During construction activities, all excavated soil and fill may be used as backfill for the excavation from which it was removed, or in other areas where surrounding soils have similar characteristics. Per NYCRR 360.13, based on the analytical results, all soils except for those in the area of BH-05A (sampled as "SB-05A"), SB-06, SB-08, SB-17 and SB-28 meet the requirements of General Fill and can be beneficially reused off-site in accordance with the regulations. Depending on ultimate disposal volumes, additional sampling may be necessary to meet frequency requirements required by 360.13. Due to elevated SVOC concentrations at SB-05A (from boring BH-05A), SB-06, SB-08, and SB-17 and PCB concentrations at SB-28, soils in those areas are not eligible for any of the established beneficial reuse classifications.

Excavated soil may be disposed off-site at a facility licensed to accept historic fill and contaminated soil. Based on the results of the waste classification analyses, Site soils would not be considered hazardous for transport and disposal purposes. The data provided in this report may be provided to a disposal facility to facilitate ultimate disposal options and costs, although the accepting facility may require additional analytical data, depending on specific facility requirements and the quantity of soils to be transported off Site. Disposal and transportation methods should comply with all 6 NYCRR part 360 & 364 regulations.

Groundwater analytical results indicated that Site groundwater contains SVOCs and metals exceeding the TOGS groundwater AWQS, which is consistent with groundwater present in areas of regional historic fill. Groundwater sampled from TWP-07 also detected vinyl chloride above its TOGS groundwater AWQS, suggesting contamination may be migrating from an upgradient source. If dewatering is required during construction, additional groundwater samples may need to be taken in order to obtain a NYCDEP sewer discharge permit.

FIGURES



Legend

- North Alignment
- West Alignment
- Approximate Extents of Existing Platform

Environmental Boring Samples

- Completed Soil
- Completed Soil & Groundwater

Geotechnical Boring Samples

- Soil
- Soil & Groundwater

Notes:

1. Displayed geotechnical borings are limited to those from which Matrix has proposed to collect environmental samples.

2. Environmental samples were collected from geotechnical borings where soil with evidence of contamination was encountered within proposed construction depth.

3. Locations and names of geotechnical borings were provided by AECOM.

4. Platform area layout is approximated based on historical drawings and design estimates provided by AECOM.

0 200 400 600 800 Feet

MATRIXNEWORLD
Engineering Progress

Matrix New World Engineering, Land Surveying
and Landscape Architecture, P.C.
333 W 39th Street, Suite 202
New York, New York 10018
WBE
STATE OF NEW YORK CERTIFICATE OF AUTHORIZATION No. 17-082661

Tel: 973-240-1800
Fax: 973-240-1818
www.matrixneworld.com

ENVIRONMENTAL SAMPLES PART 1 OF 2

NORTH/WEST BPC RESILIENCY PROJECT
BATTERY PARK CITY AUTHORITY
NEW YORK, NY

July 2022 | **Figure 2A**



Legend

- North Alignment
- West Alignment
- Approximate Extents of Existing Platform

Environmental Boring Samples

- Completed Soil
- Completed Soil & Groundwater

Geotechnical Boring Samples

- Soil
- Soil & Groundwater

Notes:

1. Displayed geotechnical borings are limited to those from which Matrix has proposed to collect environmental samples.

2. Environmental samples were collected from geotechnical borings where soil with evidence of contamination was encountered within proposed construction depth.

3. Locations and names of geotechnical borings were provided by AECOM.

4. Platform area layout is approximated based on historical drawings and design estimates provided by AECOM.

0 200 400 600 800 Feet

MATRIXNEWORLD
Engineering Progress

Matrix New World Engineering, Land Surveying and Landscape Architecture, P.C.
333 W 39th Street, Suite 202
New York, New York 10018
WBE
Tel: 973-240-1800
Fax: 973-240-1818
www.matrixneworld.com
STATE OF NEW YORK CERTIFICATE OF AUTHORIZATION No. 17-082661

ENVIRONMENTAL SAMPLES PART 2 OF 2

NORTH/WEST BPC RESILIENCY PROJECT
BATTERY PARK CITY AUTHORITY
NEW YORK, NY

July 2022 | **Figure 2B**

MATRIXNEWORLD
Engineering Progress

TABLES

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB-01(0-2)		COMP SB-01(0-4)		SB-02(0-2)		COMP SB-02(0-4.5)		SB-03(0-2)		COMP SB-03(0-5)		SB-04(0-2)	
LAB ID:					L2224285-01		L2224285-02 R1		L2223664-01		L2223664-02		L2223664-03		L2223664-04		L2224019-01	
COLLECTION DATE:					5/9/2022		5/9/2022		5/5/2022		5/5/2022		5/5/2022		5/5/2022		5/6/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
VOLATILE ORGANICS																		
1,1,1,2-Tetrachloroethane	NC	NC	NC	NC	0.00043	U	-	-	0.00036	U	-	-	0.00018	U	-	-	0.00042	U
1,1,1-Trichloroethane	0.68	100	100	NC	0.00043	U	-	-	0.00036	U	-	-	0.00018	U	-	-	0.00042	U
1,1,2,2-Tetrachloroethane	NC	NC	NC	0.68	0.00043	U	-	-	0.00036	U	-	-	0.00018	U	-	-	0.00042	U
1,1,2-Trichloroethane	NC	NC	NC	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
1,1-Dichloroethane	0.27	19	26	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
1,1-Dichloroethene	0.33	100	100	0.27	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
1,1-Dichloropropene	NC	NC	NC	0.33	0.00043	U	-	-	0.00036	U	-	-	0.00018	U	-	-	0.00042	U
1,2,3-Trichlorobenzene	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
1,2,3-Trichloropropane	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
1,2,4,5-Tetramethylbenzene	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.00016	J
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
1,2,4-Trimethylbenzene	3.6	47	52	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
1,2-Dibromo-3-chloropropane	NC	NC	NC	3.6	0.0026	U	-	-	0.0021	U	-	-	0.0011	U	-	-	0.0026	U
1,2-Dibromoethane	NC	NC	NC	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
1,2-Dichlorobenzene	1.1	100	100	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
1,2-Dichloroethane	0.02	2.3	3.1	1.1	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
1,2-Dichloroethene, Total	NC	NC	NC	0.02	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
1,2-Dichloropropane	NC	NC	NC	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
1,3,5-Trimethylbenzene	8.4	47	52	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
1,3-Dichlorobenzene	2.4	17	49	8.4	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
1,3-Dichloropropane	NC	NC	NC	2.4	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
1,3-Dichloropropene, Total	NC	NC	NC	NC	0.00043	U	-	-	0.00036	U	-	-	0.00018	U	-	-	0.00042	U
1,4-Dichlorobenzene	1.8	9.8	13	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
1,4-Dioxane	0.1	9.8	13	1.8	0.07	U	-	-	0.057	U	-	-	0.028	U	-	-	0.068	U
2,2-Dichloropropane	NC	NC	NC	0.1	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
2-Butanone	0.12	100	100	NC	0.005	J	-	-	0.0072	U	-	-	0.0012	J	-	-	0.0085	U
2-Hexanone	NC	NC	NC	0.12	0.0087	U	-	-	0.0072	U	-	-	0.0036	U	-	-	0.0085	U
4-Methyl-2-pentanone	NC	NC	NC	NC	0.0087	U	-	-	0.0072	U	-	-	0.0036	U	-	-	0.0085	U
Acetone	0.05	100	100	NC	0.1		-	-	0.04		-	-	0.017		-	-	0.011	
Acrylonitrile	NC	NC	NC	0.05	0.0035	U	-	-	0.0029	U	-	-	0.0014	U	-	-	0.0034	U
Benzene	0.06	2.9	4.8	NC	0.0005		-	-	0.00036	U	-	-	0.00018	U	-	-	0.001	
Bromobenzene	NC	NC	NC	0.06	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
Bromochloromethane	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
Bromodichloromethane	NC	NC	NC	NC	0.00043	U	-	-	0.00036	U	-	-	0.00018	U	-	-	0.00042	U
Bromoform	NC	NC	NC	NC	0.0035	U	-	-	0.0029	U	-	-	0.0014	U	-	-	0.0034	U
Bromomethane	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
Carbon disulfide	NC	NC	NC	NC	0.0087	U	-	-	0.0072	U	-	-	0.0036	U	-	-	0.0085	U
Carbon tetrachloride	0.76	1.4	2.4	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
Chlorobenzene	1.1	100	100	0.76	0.00043	U	-	-	0.00036	U	-	-	0.00018	U	-	-	0.00042	U
Chloroethane	NC	NC	NC	1.1	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
Chloroform	0.37	10	49	NC	0.0013	U	-	-	0.0011	U	-	-	0.00053	U	-	-	0.0013	U
Chloromethane	NC	NC	NC	0.37	0.0035	U	-	-	0.0029	U	-	-	0.0014	U	-	-	0.0034	U
cis-1,2-Dichloroethene	0.25	59	100	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
cis-1,3-Dichloropropene	NC	NC	NC	0.25	0.00043	U	-	-	0.00036	U	-	-	0.00018	U	-	-	0.00042	U
Dibromochloromethane	NC	NC	NC	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
Dibromomethane	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
Dichlorodifluoromethane	NC	NC	NC	NC	0.0087	U	-	-	0.0072	U	-	-	0.0036	U	-	-	0.0085	U
Ethyl ether	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
Ethylbenzene	1	30	41	NC	0.00034	J	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
Hexachlorobutadiene	NC	NC	NC	1	0.0035	U	-	-	0.0029	U	-	-	0.0014	U	-	-	0.0034	U
Isopropylbenzene	NC	NC	NC	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
Methyl tert butyl ether	0.93	62	100	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
Methylene chloride	0.05	51	100	0.93	0.0043	U	-	-	0.0036	U	-	-	0.0018	U	-	-	0.0042	U
n-Butylbenzene	12	100	100	0.05	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
n-Propylbenzene	3.9	100	100	12	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
Naphthalene	12	100	100	3.9	0.00063	J	-	-	0.0029	U	-	-	0.0014	U	-	-	0.0034	U
o-Chlorotoluene	NC	NC	NC	12	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
o-Xylene	NC	NC	NC	NC	0.00036	J	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
p-Chlorotoluene	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
p-Diethylbenzene	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.00017	J
p-Ethyltoluene	NC	NC	NC	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
p-Isopropyltoluene	NC	NC	NC	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
p/m-Xylene	NC	NC	NC	NC	0.0011	J	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
sec-Butylbenzene	11	100	100	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
Styrene	NC	NC	NC	11	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
tert-Butylbenzene	5.9	100	100	NC	0.0017	U	-	-	0.0014	U	-	-	0.00071	U	-	-	0.0017	U
Tetrachloroethene	1.3	5.5	19	5.9	0.00043	U	-	-	0.00036	U	-	-	0.00018	U	-	-	0.00042	U
Toluene	0.7	100	100	1.3	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
trans-1,2-Dichloroethene	0.19	100	100	0.7	0.0013	U	-	-	0.0011	U	-	-	0.00053	U	-	-	0.0013	U
trans-1,3-Dichloropropene	NC	NC	NC	0.19	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
trans-1,4-Dichloro-2-butene	NC	NC	NC	NC	0.0043	U	-	-	0.0036	U	-	-	0.0018	U	-	-	0.0042	U
Trichloroethene	0.47	10	21	NC	0.00043	U	-	-	0.00036	U	-	-	0.00018	U	-	-	0.00042	U
Trichlorofluoromethane	NC	NC	NC	0.47	0.0035	U	-	-	0.0029	U	-	-	0.0014	U	-	-	0.0034	U
Vinyl acetate	NC	NC	NC	NC	0.0087	U	-	-	0.0072	U	-	-	0.0036	U	-	-	0.0085	U
Vinyl chloride	0.02	0.21	0.9	NC	0.00087	U	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
Xylenes, Total	0.26	100	100	0.02	0.0015	J	-	-	0.00072	U	-	-	0.00036	U	-	-	0.00085	U
Total TIC Compounds	NC	NC	NC	NC	0.00229	J	-	-	0	U	-	-	0.0026	J	-	-	0.0116	J

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than MDL. The concentration given is an approximate value.

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentration is generally reported.

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB-01(0-2)		COMP SB-01(0-4)		SB-02(0-2)		COMP SB-02(0-4.5)		SB-03(0-2)		COMP SB-03(0-5)		SB-04(0-2)	
LAB ID:					L2224285-01		L2224285-02 R1		L2223664-01		L2223664-02		L2223664-03		L2223664-04		L2224019-01	
COLLECTION DATE:					5/9/2022		5/9/2022		5/5/2022		5/5/2022		5/5/2022		5/5/2022		5/6/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
SEMI-VOLATILE ORGANICS																		
1,2,4,5-Tetrachlorobenzene	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
1,2,4-Trichlorobenzene	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
1,2-Dichlorobenzene	1.1	100	100	1.1	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
1,3-Dichlorobenzene	2.4	17	49	2.4	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
1,4-Dichlorobenzene	1.8	9.8	13	1.8	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
1,4-Dioxane	0.1	9.8	13	0.1	-	-	0.026	U	-	-	0.028	U	-	-	0.028	U	-	-
2,4,5-Trichlorophenol	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
2,4,6-Trichlorophenol	NC	NC	NC	NC	-	-	0.1	U	-	-	0.11	U	-	-	0.11	U	-	-
2,4-Dichlorophenol	NC	NC	NC	NC	-	-	0.15	U	-	-	0.17	U	-	-	0.17	U	-	-
2,4-Dimethylphenol	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
2,4-Dinitrophenol	NC	NC	NC	NC	-	-	0.82	U	-	-	0.89	U	-	-	0.89	U	-	-
2,4-Dinitrotoluene	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
2,6-Dinitrotoluene	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
2-Chloronaphthalene	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
2-Chlorophenol	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
2-Methylnaphthalene	NC	NC	NC	NC	-	-	0.21	U	-	-	0.22	U	-	-	0.22	U	-	-
2-Methylphenol	0.33	100	100	0.33	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
2-Nitroaniline	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
2-Nitrophenol	NC	NC	NC	NC	-	-	0.37	U	-	-	0.4	U	-	-	0.4	U	-	-
3,3'-Dichlorobenzidine	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
3-Methylphenol/4-Methylphenol	0.33	34	100	0.33	-	-	0.25	U	-	-	0.27	U	-	-	0.27	U	-	-
3-Nitroaniline	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
4,6-Dinitro-o-cresol	NC	NC	NC	NC	-	-	0.45	U	-	-	0.48	U	-	-	0.48	U	-	-
4-Bromophenyl phenyl ether	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
4-Chloroaniline	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
4-Chlorophenyl phenyl ether	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
4-Nitroaniline	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
4-Nitrophenol	NC	NC	NC	NC	-	-	0.24	U	-	-	0.26	U	-	-	0.26	U	-	-
Acenaphthene	20	100	100	98	-	-	0.062	J	-	-	0.15	U	-	-	0.15	U	-	-
Acenaphthylene	100	100	100	107	-	-	0.14	U	-	-	0.039	J	-	-	0.15	U	-	-
Acetophenone	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Anthracene	100	100	100	1000	-	-	0.14		-	-	0.059	J	-	-	0.061	J	-	-
Benzo(a)anthracene	1	1	1	1	-	-	0.4		-	-	0.4		-	-	0.45		-	-
Benzo(a)pyrene	1	1	1	22	-	-	0.34		-	-	0.46		-	-	0.5		-	-
Benzo(b)fluoranthene	1	1	1	1.7	-	-	0.37		-	-	0.55		-	-	0.54		-	-
Benzo(ghi)perylene	100	100	100	1000	-	-	0.22		-	-	0.31		-	-	0.28		-	-
Benzo(k)fluoranthene	0.8	1	3.9	1.7	-	-	0.16		-	-	0.15		-	-	0.53		-	-
Benzoic Acid	NC	NC	NC	NC	-	-	0.56	U	-	-	0.6	U	-	-	0.6	U	-	-
Benzyl Alcohol	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Biphenyl	NC	NC	NC	NC	-	-	0.39	U	-	-	0.42	U	-	-	0.42	U	-	-
Bis(2-chloroethoxy)methane	NC	NC	NC	NC	-	-	0.18	U	-	-	0.2	U	-	-	0.2	U	-	-
Bis(2-chloroethyl)ether	NC	NC	NC	NC	-	-	0.15	U	-	-	0.17	U	-	-	0.17	U	-	-
Bis(2-chloroisopropyl)ether	NC	NC	NC	NC	-	-	0.21	U	-	-	0.22	U	-	-	0.22	U	-	-
Bis(2-ethylhexyl)phthalate	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Butyl benzyl phthalate	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Carbazole	NC	NC	NC	NC	-	-	0.053	J	-	-	0.019	J	-	-	0.18	U	-	-
Chrysene	1	1	3.9	1	-	-	0.36		-	-	0.37		-	-	0.42		-	-
Di-n-butylphthalate	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Di-n-octylphthalate	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Dibenzo(a,h)anthracene	0.33	0.33	0.33	1000	-	-	0.058	J	-	-	0.075	J	-	-	0.071	J	-	-
Dibenzofuran	7	14	59	210	-	-	0.029	J	-	-	0.18	U	-	-	0.18	U	-	-
Diethyl phthalate	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Dimethyl phthalate	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Fluoranthene	100	100	100	1000	-	-	0.7		-	-	0.59		-	-	0.75		-	-
Fluorene	30	100	100	386	-	-	0.061	J	-	-	0.18	U	-	-	0.18	U	-	-
Hexachlorobenzene	0.33	0.33	1.2	3.2	-	-	0.1	U	-	-	0.11	U	-	-	0.11	U	-	-
Hexachlorobutadiene	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Hexachlorocyclopentadiene	NC	NC	NC	NC	-	-	0.49	U	-	-	0.53	U	-	-	0.53	U	-	-
Hexachloroethane	NC	NC	NC	NC	-	-	0.14	U	-	-	0.15	U	-	-	0.15	U	-	-
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	8.2	-	-	0.25		-	-	0.33		-	-	0.3		-	-
Isophorone	NC	NC	NC	NC	-	-	0.15	U	-	-	0.17	U	-	-	0.17	U	-	-
n-Nitrosodi-n-propylamine	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Naphthalene	12	100	100	12	-	-	0.024	J	-	-	0.022	J	-	-	0.023	J	-	-
NDPA/DPA	NC	NC	NC	NC	-	-	0.14	U	-	-	0.15	U	-	-	0.15	U	-	-
Nitrobenzene	NC	NC	NC	NC	-	-	0.15	U	-	-	0.17	U	-	-	0.17	U	-	-
p-Chloro-m-cresol	NC	NC	NC	NC	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Pentachlorophenol	0.8	2.4	6.7	0.8	-	-	0.14	U	-	-	0.15	U	-	-	0.15	U	-	-
Phenanthrene	100	100	100	1000	-	-	0.55		-	-	0.19		-	-	0.23		-	-
Phenol	0.33	100	100	0.33	-	-	0.17	U	-	-	0.18	U	-	-	0.18	U	-	-
Pyrene	100	100	100	1000	-	-	0.62		-	-	0.6		-	-	0.76		-	-
Total TIC Compounds	NC	NC	NC	NC	-	-	0.555	J	-	-	0	U	-	-	0	U	-	-

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than MDL. The concentration given is an approximate value.

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentration is generally reported.

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

MATRIXNEWORLD
Engineering Progress

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB-01(0-2)		COMP SB-01(0-4)		SB-02(0-2)		COMP SB-02(0-4.5)		SB-03(0-2)		COMP SB-03(0-5)		SB-04(0-2)	
LAB ID:					L2224285-01		L2224285-02 R1		L2223664-01		L2223664-02		L2223664-03		L2223664-04		L2224019-01	
COLLECTION DATE:					5/9/2022		5/9/2022		5/5/2022		5/5/2022		5/5/2022		5/5/2022		5/6/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
CHLORINATED HERBICIDES BY GC																		
2,4,5-T	NC	NC	NC	NC	-	-	0.172	U	-	-	0.187	U	-	-	0.18	U	-	-
2,4,5-TP (Silvex)	3.8	58	100	3.8	-	-	0.172	U	-	-	0.187	U	-	-	0.18	U	-	-
2,4-D	NC	NC	NC	NC	-	-	0.172	U	-	-	0.187	U	-	-	0.18	U	-	-
TOTAL PETROLEUM HYDROCARBONS																		
TPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PESTICIDES																		
4,4'-DDD	0.0033	2.6	13	14	-	-	0.00164	U	-	-	0.00176	U	-	-	0.0017	U	-	-
4,4'-DDE	0.0033	1.8	8.9	17	-	-	0.00164	U	-	-	0.00085	JP	-	-	0.0017	U	-	-
4,4'-DDT	0.0033	1.7	7.9	136	-	-	0.00307	U	-	-	0.00206	JP	-	-	0.00318	U	-	-
Aldrin	0.005	0.019	0.097	0.19	-	-	0.00164	U	-	-	0.00176	U	-	-	0.0017	U	-	-
Alpha-BHC	0.02	0.097	0.48	0.02	-	-	0.000682	U	-	-	0.000736	U	-	-	0.000707	U	-	-
Beta-BHC	0.036	0.072	0.36	0.09	-	-	0.00164	U	-	-	0.00176	U	-	-	0.0017	U	-	-
Chlordane	NC	NC	NC	NC	-	-	0.0136	U	-	-	0.0147	U	-	-	0.0141	U	-	-
cis-Chlordane	0.094	0.91	4.2	2.9	-	-	0.00205	U	-	-	0.00075	J	-	-	0.00212	U	-	-
Delta-BHC	0.04	100	100	0.25	-	-	0.00164	U	-	-	0.00176	U	-	-	0.0017	U	-	-
Dieldrin	0.005	0.039	0.2	0.1	-	-	0.00102	U	-	-	0.0011	U	-	-	0.00106	U	-	-
Endosulfan I	2.4	4.8	24	102	-	-	0.00164	U	-	-	0.00176	U	-	-	0.0017	U	-	-
Endosulfan II	2.4	4.8	24	102	-	-	0.00164	U	-	-	0.00176	U	-	-	0.0017	U	-	-
Endosulfan sulfate	2.4	4.8	24	1000	-	-	0.000682	U	-	-	0.000736	U	-	-	0.000707	U	-	-
Endrin	0.014	2.2	11	0.06	-	-	0.000682	U	-	-	0.000736	U	-	-	0.000707	U	-	-
Endrin aldehyde	NC	NC	NC	NC	-	-	0.00205	U	-	-	0.00221	U	-	-	0.00212	U	-	-
Endrin ketone	NC	NC	NC	NC	-	-	0.00164	U	-	-	0.00176	U	-	-	0.0017	U	-	-
Heptachlor	0.042	0.42	2.1	0.38	-	-	0.000819	U	-	-	0.000883	U	-	-	0.000848	U	-	-
Heptachlor epoxide	NC	NC	NC	NC	-	-	0.00307	U	-	-	0.00331	U	-	-	0.00318	U	-	-
Lindane	0.1	0.28	1.3	0.1	-	-	0.000682	U	-	-	0.000736	U	-	-	0.000707	U	-	-
Methoxychlor	NC	NC	NC	NC	-	-	0.00307	U	-	-	0.00331	U	-	-	0.00318	U	-	-
Toxaphene	NC	NC	NC	NC	-	-	0.0307	U	-	-	0.0331	U	-	-	0.0318	U	-	-
trans-Chlordane	NC	NC	NC	NC	-	-	0.00205	U	-	-	0.00116	JIP	-	-	0.00212	U	-	-
PCBs																		
Aroclor 1016	0.1	1	1	3.2	-	-	0.034	U	-	-	0.0368	U	-	-	0.0357	U	-	-
Aroclor 1221	0.1	1	1	3.2	-	-	0.034	U	-	-	0.0368	U	-	-	0.0357	U	-	-
Aroclor 1232	0.1	1	1	3.2	-	-	0.034	U	-	-	0.0368	U	-	-	0.0357	U	-	-
Aroclor 1242	0.1	1	1	3.2	-	-	0.034	U	-	-	0.0368	U	-	-	0.0357	U	-	-
Aroclor 1248	0.1	1	1	3.2	-	-	0.034	U	-	-	0.0368	U	-	-	0.0357	U	-	-
Aroclor 1254	0.1	1	1	3.2	-	-	0.0348		-	-	0.0368	U	-	-	0.0357	U	-	-
Aroclor 1260	0.1	1	1	3.2	-	-	0.034	U	-	-	0.00917	J	-	-	0.0357	U	-	-
Aroclor 1262	0.1	1	1	3.2	-	-	0.034	U	-	-	0.0368	U	-	-	0.0357	U	-	-
Aroclor 1268	0.1	1	1	3.2	-	-	0.034	U	-	-	0.0368	U	-	-	0.0357	U	-	-
TOTAL METALS																		
Aluminum, Total	NC	NC	NC	NC	-	-	2110		-	-	4350		-	-	3760		-	-
Antimony, Total	NC	NC	NC	NC	-	-	4.12	U	-	-	4.35	U	-	-	0.862	J	-	-
Arsenic, Total	13	16	16	16	-	-	1.66		-	-	3.12		-	-	2.41		-	-
Barium, Total	350	350	400	820	-	-	46.4		-	-	45.1		-	-	58.3		-	-
Beryllium, Total	7.2	14	72	47	-	-	0.124	J	-	-	0.183	J	-	-	0.213	J	-	-
Cadmium, Total	2.5	2.5	4.3	7.5	-	-	0.173	J	-	-	0.348	J	-	-	0.469	J	-	-
Calcium, Total	NC	NC	NC	NC	-	-	9930		-	-	24400		-	-	11900		-	-
Chromium, Total	NC	NC	NC	NC	-	-	6.8		-	-	14.7		-	-	12.8		-	-
Cobalt, Total	NC	NC	NC	NC	-	-	2.42		-	-	4.43		-	-	4.73		-	-
Copper, Total	50	270	270	1720	-	-	12.2		-	-	16.1		-	-	**63.2**		-	-
Iron, Total	NC	NC	NC	NC	-	-	5310		-	-	8850		-	-	12400		-	-
Lead, Total	63	400	400	450	-	-	49.1		-	-	56.4		-	-	**300**		-	-
Magnesium, Total	NC	NC	NC	NC	-	-	2830		-	-	4700		-	-	1710		-	-
Manganese, Total	1600	2000	2000	2000	-	-	84.3		-	-	318		-	-	372		-	-
Mercury, Total	0.18	0.81	0.81	0.73	-	-	0.102		-	-	0.178		-	-	**0.275**		-	-
Nickel, Total	30	140	310	130	-	-	7.65		-	-	14.1		-	-	17.7		-	-
Potassium, Total	NC	NC	NC	NC	-	-	634		-	-	830		-	-	694		-	-
Selenium, Total	3.9	36	180	4	-	-	1.65	U	-	-	1.74	U	-	-	1.71	U	-	-
Silver, Total	2	36	180	8.3	-	-	0.824	U	-	-	0.635	J	-	-	0.853	U	-	-
Sodium, Total	NC	NC	NC	NC	-	-	72.9	J	-	-	217		-	-	88.7	J	-	-
Thallium, Total	NC	NC	NC	NC	-	-	1.65	U	-	-	1.74	U	-	-	1.71	U	-	-
Vanadium, Total	NC	NC	NC	NC	-	-	9.43		-	-	14.4		-	-	12.8		-	-
Zinc, Total	109	2200	10000	2480	-	-	51.4		-	-	39.2		-	-	57.7		-	-
GENERAL CHEMISTRY																		
Chromium, Hexavalent	1	22	110	19	-	-	0.222	J	-	-	0.788	J	-	-	0.89	U	-	-
Cyanide, Total	27	27	27	40	-	-	1	U	-	-	1.1	U	-	-	1.1	U	-	-
Solids, Total	NC	NC	NC	NC	96.7		94.5		91.2		88.8		95.1		87.5		90.9	

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than MDL. The concentration given is an approximate value.

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentration is generally reported.

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	COMP SB-04(0-4)		SB-05(0-2)		COMP SB-05(0-5)		SB-05A(8-10) (Collected from BH-05A)		SB-06(0-2)		COMP SB-06(0-5)		SB-07(0-2)		SB-07(8-10)	
LAB ID:					L2224019-02		L2224019-03		L2224019-04		L2216294-01		L2224285-10		L2224285-11 R1		L2224285-04		L2224285-05	
COLLECTION DATE:					5/6/2022		5/6/2022		5/6/2022		3/30/2022		5/9/2022		5/9/2022		5/9/2022		5/9/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
VOLATILE ORGANICS																				
1,1,1,2-Tetrachloroethane	NC	NC	NC	NC	-	-	0.00024	U	-	-	0.62	U	0.00032	U	-	-	0.00034	U	0.00033	U
1,1,1-Trichloroethane	0.68	100	100	NC	-	-	0.00024	U	-	-	0.62	U	0.00032	U	-	-	0.00034	U	0.00033	U
1,1,2,2-Tetrachloroethane	NC	NC	NC	0.68	-	-	0.00024	U	-	-	0.62	U	0.00032	U	-	-	0.00034	U	0.00033	U
1,1,2-Trichloroethane	NC	NC	NC	NC	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
1,1-Dichloroethane	0.27	19	26	NC	-	-	0.00048	U	-	-	***1.2***	***U***	0.00063	U	-	-	0.00067	U	0.00066	U
1,1-Dichloroethene	0.33	100	100	0.27	-	-	0.00048	U	-	-	***1.2***	***U***	0.00063	U	-	-	0.00067	U	0.00066	U
1,1-Dichloropropene	NC	NC	NC	0.33	-	-	0.00024	U	-	-	0.62	U	0.00032	U	-	-	0.00034	U	0.00033	U
1,2,3-Trichlorobenzene	NC	NC	NC	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
1,2,3-Trichloropropane	NC	NC	NC	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
1,2,4,5-Tetramethylbenzene	NC	NC	NC	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
1,2,4-Trimethylbenzene	3.6	47	52	NC	-	-	0.00096	U	-	-	1	J	0.0013	U	-	-	0.0013	U	0.0013	U
1,2-Dibromo-3-chloropropane	NC	NC	NC	3.6	-	-	0.0014	U	-	-	3.7	U	0.0019	U	-	-	0.002	U	0.002	U
1,2-Dibromoethane	NC	NC	NC	NC	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
1,2-Dichlorobenzene	1.1	100	100	NC	-	-	0.00096	U	-	-	***2.5***	***U***	0.0013	U	-	-	0.0013	U	0.0013	U
1,2-Dichloroethane	0.02	2.3	3.1	1.1	-	-	0.00048	U	-	-	***1.2***	***U***	0.00063	U	-	-	0.00067	U	0.00066	U
1,2-Dichloroethene, Total	NC	NC	NC	0.02	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
1,2-Dichloropropane	NC	NC	NC	NC	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
1,3,5-Trimethylbenzene	8.4	47	52	NC	-	-	0.00096	U	-	-	0.48	J	0.0013	U	-	-	0.0013	U	0.0013	U
1,3-Dichlorobenzene	2.4	17	49	8.4	-	-	0.00096	U	-	-	***2.5***	***U***	0.0013	U	-	-	0.0013	U	0.0013	U
1,3-Dichloropropane	NC	NC	NC	2.4	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
1,3-Dichloropropene, Total	NC	NC	NC	NC	-	-	0.00024	U	-	-	0.62	U	0.00032	U	-	-	0.00034	U	0.00033	U
1,4-Dichlorobenzene	1.8	9.8	13	NC	-	-	0.00096	U	-	-	***2.5***	***U***	0.0013	U	-	-	0.0013	U	0.0013	U
1,4-Dioxane	0.1	9.8	13	1.8	-	-	0.038	U	-	-	***100***	***U***	0.05	U	-	-	0.054	U	0.053	U
2,2-Dichloropropane	NC	NC	NC	0.1	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
2-Butanone	0.12	100	100	NC	-	-	0.0048	U	-	-	***12***	***U***	0.0063	U	-	-	0.0067	U	0.0066	U
2-Hexanone	NC	NC	NC	0.12	-	-	0.0048	U	-	-	12	U	0.0063	U	-	-	0.0067	U	0.0066	U
4-Methyl-2-pentanone	NC	NC	NC	NC	-	-	0.0048	U	-	-	12	U	0.0063	U	-	-	0.0067	U	0.0066	U
Acetone	0.05	100	100	NC	-	-	0.0026	J	-	-	***12***	***U***	0.038		-	-	0.0067	U	0.0074	
Acrylonitrile	NC	NC	NC	0.05	-	-	0.0019	U	-	-	5	U	0.0025	U	-	-	0.0027	U	0.0026	U
Benzene	0.06	2.9	4.8	NC	-	-	0.00024	U	-	-	***0.62***	***U***	0.00087		-	-	0.00011	J	0.00033	U
Bromobenzene	NC	NC	NC	0.06	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
Bromochloromethane	NC	NC	NC	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
Bromodichloromethane	NC	NC	NC	NC	-	-	0.00024	U	-	-	0.62	U	0.00032	U	-	-	0.00034	U	0.00033	U
Bromoform	NC	NC	NC	NC	-	-	0.0019	U	-	-	5	U	0.0025	U	-	-	0.0027	U	0.0026	U
Bromomethane	NC	NC	NC	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
Carbon disulfide	NC	NC	NC	NC	-	-	0.0048	U	-	-	12	U	0.0063	U	-	-	0.0067	U	0.0066	U
Carbon tetrachloride	0.76	1.4	2.4	NC	-	-	0.00048	U	-	-	***1.2***	***U***	0.00063	U	-	-	0.00067	U	0.00066	U
Chlorobenzene	1.1	100	100	0.76	-	-	0.00024	U	-	-	0.62	U	0.00032	U	-	-	0.00034	U	0.00033	U
Chloroethane	NC	NC	NC	1.1	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
Chloroform	0.37	10	49	NC	-	-	0.00072	U	-	-	***1.9***	***U***	0.00095	U	-	-	0.001	U	0.00099	U
Chloromethane	NC	NC	NC	0.37	-	-	0.0019	U	-	-	5	U	0.0025	U	-	-	0.0027	U	0.0026	U
cis-1,2-Dichloroethene	0.25	59	100	NC	-	-	0.00048	U	-	-	***1.2***	***U***	0.00063	U	-	-	0.00067	U	0.00066	U
cis-1,3-Dichloropropene	NC	NC	NC	0.25	-	-	0.00024	U	-	-	0.62	U	0.00032	U	-	-	0.00034	U	0.00033	U
Dibromochloromethane	NC	NC	NC	NC	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
Dibromomethane	NC	NC	NC	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
Dichlorodifluoromethane	NC	NC	NC	NC	-	-	0.0048	U	-	-	12	U	0.0063	U	-	-	0.0067	U	0.0066	U
Ethyl ether	NC	NC	NC	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
Ethylbenzene	1	30	41	NC	-	-	0.00048	U	-	-	0.35	J	0.00063	U	-	-	0.00083		0.00066	U
Hexachlorobutadiene	NC	NC	NC	1	-	-	0.0019	U	-	-	5	U	0.0025	U	-	-	0.0027	U	0.0026	U
Isopropylbenzene	NC	NC	NC	NC	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
Methyl tert butyl ether	0.93	62	100	NC	-	-	0.00096	U	-	-	***2.5***	***U***	0.0013	U	-	-	0.0013	U	0.0013	U
Methylene chloride	0.05	51	100	0.93	-	-	0.0024	U	-	-	***6.2***	***U***	0.0032	U	-	-	0.0034	U	0.0033	U
n-Butylbenzene	12	100	100	0.05	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
n-Propylbenzene	3.9	100	100	12	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
Naphthalene	12	100	100	3.9	-	-	0.0019	U	-	-	**610**	**E**	0.0025	U	-	-	0.0027	U	0.0026	U
o-Chlorotoluene	NC	NC	NC	12	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
o-Xylene	NC	NC	NC	NC	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.0011		0.00066	U
p-Chlorotoluene	NC	NC	NC	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
p-Diethylbenzene	NC	NC	NC	NC	-	-	0.00096	U	-	-	0.55	J	0.0013	U	-	-	0.0013	U	0.0013	U
p-Ethyltoluene	NC	NC	NC	NC	-	-	0.00096	U	-	-	0.58	J	0.0013	U	-	-	0.0013	U	0.0013	U
p-Isopropyltoluene	NC	NC	NC	NC	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
p/m-Xylene	NC	NC	NC	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0035		0.0013	U
sec-Butylbenzene	11	100	100	NC	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
Styrene	NC	NC	NC	11	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
tert-Butylbenzene	5.9	100	100	NC	-	-	0.00096	U	-	-	2.5	U	0.0013	U	-	-	0.0013	U	0.0013	U
Tetrachloroethene	1.3	5.5	19	5.9	-	-	0.00011	J	-	-	0.62	U	0.00032	U	-	-	0.00034	U	0.00033	U
Toluene	0.7	100	100	1.3	-	-	0.00048	U	-	-	***1.2***	***U***	0.00063	U	-	-	0.00067	U	0.00066	U
trans-1,2-Dichloroethene	0.19	100	100	0.7	-	-	0.00072	U	-	-	***1.9***	***U***	0.00095	U	-	-	0.001	U	0.00099	U
trans-1,3-Dichloropropene	NC	NC	NC	0.19	-	-	0.00048	U	-	-	1.2	U	0.00063	U	-	-	0.00067	U	0.00066	U
trans-1,4-Dichloro-2-butene	NC	NC	NC	NC	-	-	0.0024	U	-	-	6.2	U	0.0032	U	-	-	0.0034	U	0.0033	U
Trichloroethene	0.47	10	21	NC	-	-	0.00024	U	-	-	***0.62***	***U***	0.00032	U	-	-	0.00034	U	0.00033	U
Trichlorofluoromethane	NC	NC	NC	0.47	-	-	0.0019	U	-	-	5	U	0.0025	U	-	-	0.0027	U	0.0026	U
Vinyl acetate	NC	NC	NC	NC	-	-	0.0048	U	-	-	12	U	0.0063	U	-	-	0.0067	U	0.0066	U
Vinyl chloride	0.02	0.21	0.9	NC	-	-	0.00048	U	-	-	***1.2***	***U***	0.00063	U	-	-	0.00067	U	0.00066	U
Xylenes, Total	0.26	100	100	0.02	-	-	0.00048	U	-	-	***1.2***	***U***	0.00063	U	-	-	0.0046		0.00066	U
Total TIC Compounds	NC	NC	NC	NC	-	-	-	U	-	-	-	-	0	U	-	-	0	U	0	U

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	COMP SB-04(0-4)		SB-05(0-2)		COMP SB-05(0-5)		SB-05A(8-10) (Collected from BH-05A)		SB-06(0-2)		COMP SB-06(0-5)		SB-07(0-2)		SB-07(8-10)	
LAB ID:					L2224019-02		L2224019-03		L2224019-04		L2216294-01		L2224285-10		L2224285-11 R1		L2224285-04		L2224285-05	
COLLECTION DATE:					5/6/2022		5/6/2022		5/6/2022		3/30/2022		5/9/2022		5/9/2022		5/9/2022		5/9/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
SEMI-VOLATILE ORGANICS																				
1,2,4,5-Tetrachlorobenzene	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
1,2-Dichlorobenzene	1.1	100	100	1.1	0.18	U	-	-	0.18	U	***3.9***	***U***	-	-	0.18	U	-	-	-	-
1,3-Dichlorobenzene	2.4	17	49	2.4	0.18	U	-	-	0.18	U	***3.9***	***U***	-	-	0.18	U	-	-	-	-
1,4-Dichlorobenzene	1.8	9.8	13	1.8	0.18	U	-	-	0.18	U	***3.9***	***U***	-	-	0.18	U	-	-	-	-
1,4-Dioxane	0.1	9.8	13	0.1	0.027	U	-	-	0.027	U	***0.59***	***U***	-	-	0.027	U	-	-	-	-
2,4,5-Trichlorophenol	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
2,4,6-Trichlorophenol	NC	NC	NC	NC	0.11	U	-	-	0.11	U	2.4	U	-	-	0.11	U	-	-	-	-
2,4-Dichlorophenol	NC	NC	NC	NC	0.16	U	-	-	0.16	U	3.5	U	-	-	0.16	U	-	-	-	-
2,4-Dimethylphenol	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
2,4-Dinitrophenol	NC	NC	NC	NC	0.87	U	-	-	0.86	U	19	U	-	-	0.86	U	-	-	-	-
2,4-Dinitrotoluene	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
2,6-Dinitrotoluene	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
2-Chloronaphthalene	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
2-Chlorophenol	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
2-Methylnaphthalene	NC	NC	NC	NC	0.031	J	-	-	0.026	J	39		-	-	0.027	J	-	-	-	-
2-Methylphenol	0.33	100	100	0.33	0.18	U	-	-	0.18	U	***3.9***	***U***	-	-	0.18	U	-	-	-	-
2-Nitroaniline	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
2-Nitrophenol	NC	NC	NC	NC	0.39	U	-	-	0.39	U	8.5	U	-	-	0.39	U	-	-	-	-
3,3'-Dichlorobenzidine	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
3-Methylphenol/4-Methylphenol	0.33	34	100	0.33	0.26	U	-	-	0.26	U	***5.7***	***U***	-	-	0.26	U	-	-	-	-
3-Nitroaniline	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
4,6-Dinitro-o-cresol	NC	NC	NC	NC	0.47	U	-	-	0.47	U	10	U	-	-	0.47	U	-	-	-	-
4-Bromophenyl phenyl ether	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
4-Chloroaniline	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
4-Chlorophenyl phenyl ether	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
4-Nitroaniline	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
4-Nitrophenol	NC	NC	NC	NC	0.25	U	-	-	0.25	U	5.5	U	-	-	0.25	U	-	-	-	-
Acenaphthene	20	100	100	98	0.023	J	-	-	0.052	J	52		-	-	0.086	J	-	-	-	-
Acenaphthylene	100	100	100	107	0.04	J	-	-	0.051	J	1.4	J	-	-	0.079	J	-	-	-	-
Acetophenone	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Anthracene	100	100	100	1000	0.1	J	-	-	0.17		12		-	-	0.27		-	-	-	-
Benzo(a)anthracene	1	1	1	1	0.51		-	-	0.67		13		-	-	0.81		-	-	-	-
Benzo(a)pyrene	1	1	1	22	0.46		-	-	0.65		5.9		-	-	0.82		-	-	-	-
Benzo(b)fluoranthene	1	1	1	1.7	0.56		-	-	0.74		9.1		-	-	0.96		-	-	-	-
Benzo(ghi)perylene	100	100	100	1000	0.24		-	-	0.41		1.8	J	-	-	0.5		-	-	-	-
Benzo(k)fluoranthene	0.8	1	3.9	1.7	0.19		-	-	0.23		2.4		-	-	0.26		-	-	-	-
Benzoic Acid	NC	NC	NC	NC	0.59	U	-	-	0.58	U	13	U	-	-	0.58	U	-	-	-	-
Benzyl Alcohol	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Biphenyl	NC	NC	NC	NC	0.41	U	-	-	0.41	U	9.3		-	-	0.41	U	-	-	-	-
Bis(2-chloroethoxy)methane	NC	NC	NC	NC	0.2	U	-	-	0.19	U	4.2	U	-	-	0.19	U	-	-	-	-
Bis(2-chloroethyl)ether	NC	NC	NC	NC	0.16	U	-	-	0.16	U	3.5	U	-	-	0.16	U	-	-	-	-
Bis(2-chloroisopropyl)ether	NC	NC	NC	NC	0.22	U	-	-	0.22	U	4.7	U	-	-	0.22	U	-	-	-	-
Bis(2-ethylhexyl)phthalate	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Butyl benzyl phthalate	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Carbazole	NC	NC	NC	NC	0.022	J	-	-	0.05	J	5.2		-	-	0.063	J	-	-	-	-
Chrysene	1	1	3.9	1	0.43		-	-	0.66		8.7		-	-	0.79		-	-	-	-
Di-n-butylphthalate	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Di-n-octylphthalate	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Dibenzo(a,h)anthracene	0.33	0.33	0.33	1000	0.049	J	-	-	0.096	J	**0.45**	**J**	-	-	0.12		-	-	-	-
Dibenzofuran	7	14	59	210	0.028	J	-	-	0.04	J	29		-	-	0.053	J	-	-	-	-
Diethyl phthalate	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Dimethyl phthalate	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Fluoranthene	100	100	100	1000	0.87		-	-	1		61		-	-	1.5		-	-	-	-
Fluorene	30	100	100	386	0.025	J	-	-	0.053	J	33		-	-	0.084	J	-	-	-	-
Hexachlorobenzene	0.33	0.33	1.2	3.2	0.11	U	-	-	0.11	U	***2.4***	***U***	-	-	0.11	U	-	-	-	-
Hexachlorobutadiene	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Hexachlorocyclopentadiene	NC	NC	NC	NC	0.52	U	-	-	0.51	U	11	U	-	-	0.51	U	-	-	-	-
Hexachloroethane	NC	NC	NC	NC	0.14	U	-	-	0.14	U	3.1	U	-	-	0.14	U	-	-	-	-
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	8.2	0.26		-	-	0.45		**2.4**	**J**	-	-	**0.56**		-	-	-	-
Isophorone	NC	NC	NC	NC	0.16	U	-	-	0.16	U	3.5	U	-	-	0.16	U	-	-	-	-
n-Nitrosodi-n-propylamine	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Naphthalene	12	100	100	12	0.054	J	-	-	0.064	J	86		-	-	0.043	J	-	-	-	-
NDPA/DPA	NC	NC	NC	NC	0.14	U	-	-	0.14	U	3.1	U	-	-	0.14	U	-	-	-	-
Nitrobenzene	NC	NC	NC	NC	0.16	U	-	-	0.16	U	3.5	U	-	-	0.16	U	-	-	-	-
p-Chloro-m-cresol	NC	NC	NC	NC	0.18	U	-	-	0.18	U	3.9	U	-	-	0.18	U	-	-	-	-
Pentachlorophenol	0.8	2.4	6.7	0.8	0.14	U	-	-	0.14	U	***3.1***	***U***	-	-	0.14	U	-	-	-	-
Phenanthrene	100	100	100	1000	0.38		-	-	0.6		**100**		-	-	0.98		-	-	-	-
Phenol	0.33	100	100	0.33	0.18	U	-	-	0.18	U	***3.9***	***U***	-	-	0.18	U	-	-	-	-
Pyrene	100	100	100	1000	0.82		-	-	1		43		-	-	1.5		-	-	-	-
Total TIC Compounds	NC	NC	NC	NC	0.298	J	-	-	1.09	J	80	J	-	-	2	J	-	-	-	-

All analyitcal results for soil in milligrams per kilogram (mg/kg).
Q: Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been assigned.
U = Not detected at the reported detection limit for the sample.
R1 =reanalyzed
NC = No criteria established for this contaminant
E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t
I - The lower value for the two columns has been reported due to obvious interference.
P - The RPD between the results for the two columns exceeds the method-specified criteria.
d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio
"-" = Analyte not analyzed
UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).
RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)
RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)
PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)
Reporting Limit Exceeds UUSCO

Concentration exceeds UUSCO
Concentration exceeds RSCO & UUSCO
Concentration exceeds RRSCO, RSCO & UUSCO
Concentration exceeds PGWSCO & UUSCO
Concentration exceeds PGWSCO, RSCO & UUSCO
Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	COMP SB-04(0-4)		SB-05(0-2)		COMP SB-05(0-5)		SB-05A(8-10) (Collected from BH-05A)		SB-06(0-2)		COMP SB-06(0-5)		SB-07(0-2)		SB-07(8-10)	
LAB ID:					L2224019-02		L2224019-03		L2224019-04		L2216294-01		L2224285-10		L2224285-11 R1		L2224285-04		L2224285-05	
COLLECTION DATE:					5/6/2022		5/6/2022		5/6/2022		3/30/2022		5/9/2022		5/9/2022		5/9/2022		5/9/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
CHLORINATED HERBICIDES BY GC																				
2,4,5-T	NC	NC	NC	NC	0.182	U	-	-	0.179	U	-	-	-	-	0.178	U	-	-	-	-
2,4,5-TP (Silvex)	3.8	58	100	3.8	0.182	U	-	-	0.179	U	-	-	-	-	0.178	U	-	-	-	-
2,4-D	NC	NC	NC	NC	0.182	U	-	-	0.179	U	-	-	-	-	0.178	U	-	-	-	-
TOTAL PETROLEUM HYDROCARBONS																				
TPH	-	-	-	-	-	-	-	-	-	-	6830		-	-	-	-	-	-	-	-
PESTICIDES																				
4,4'-DDD	0.0033	2.6	13	14	***0.017***	***U***	-	-	***0.017***	***U***	**0.00765**	**P**	-	-	0.000588	J	-	-	-	-
4,4'-DDE	0.0033	1.8	8.9	17	**0.0131**	**JP**	-	-	***0.017***	***U***	0.00199	U	-	-	0.00182		-	-	-	-
4,4'-DDT	0.0033	1.7	7.9	136	***0.0319***	***U***	-	-	***0.0318***	***U***	***0.00373***	***U***	-	-	**0.00342**	**IP**	-	-	-	-
Aldrin	0.005	0.019	0.097	0.19	***0.017***	***U***	-	-	***0.017***	***U***	0.00199	U	-	-	0.00163	U	-	-	-	-
Alpha-BHC	0.02	0.097	0.48	0.02	0.00708	U	-	-	0.00707	U	0.00083	U	-	-	0.000681	U	-	-	-	-
Beta-BHC	0.036	0.072	0.36	0.09	0.017	U	-	-	0.017	U	0.00199	U	-	-	0.00163	U	-	-	-	-
Chlordane	NC	NC	NC	NC	0.142	U	-	-	0.141	U	0.0166	U	-	-	0.0311		-	-	-	-
cis-Chlordane	0.094	0.91	4.2	2.9	0.0212	U	-	-	0.0212	U	0.00249	U	-	-	0.00279		-	-	-	-
Delta-BHC	0.04	100	100	0.25	0.017	U	-	-	0.017	U	0.00199	U	-	-	0.00163	U	-	-	-	-
Dieldrin	0.005	0.039	0.2	0.1	***0.0106***	***U***	-	-	***0.0106***	***U***	0.00124	U	-	-	0.00074	J	-	-	-	-
Endosulfan I	2.4	4.8	24	102	0.017	U	-	-	0.017	U	0.00199	U	-	-	0.00163	U	-	-	-	-
Endosulfan II	2.4	4.8	24	102	0.017	U	-	-	0.017	U	0.00199	U	-	-	0.00163	U	-	-	-	-
Endosulfan sulfate	2.4	4.8	24	1000	0.00708	U	-	-	0.00707	U	0.00083	U	-	-	0.000681	U	-	-	-	-
Endrin	0.014	2.2	11	0.06	0.00708	U	-	-	0.00707	U	0.00083	U	-	-	0.000681	U	-	-	-	-
Endrin aldehyde	NC	NC	NC	NC	0.0212	U	-	-	0.0212	U	0.00249	U	-	-	0.00204	U	-	-	-	-
Endrin ketone	NC	NC	NC	NC	0.017	U	-	-	0.017	U	0.00199	U	-	-	0.00163	U	-	-	-	-
Heptachlor	0.042	0.42	2.1	0.38	0.0085	U	-	-	0.00848	U	0.000996	U	-	-	0.000817	U	-	-	-	-
Heptachlor epoxide	NC	NC	NC	NC	0.0319	U	-	-	0.0318	U	0.00373	U	-	-	0.00306	U	-	-	-	-
Lindane	0.1	0.28	1.3	0.1	0.00708	U	-	-	0.00707	U	0.00083	U	-	-	0.000681	U	-	-	-	-
Methoxychlor	NC	NC	NC	NC	0.0319	U	-	-	0.0318	U	0.00373	U	-	-	0.00306	U	-	-	-	-
Toxaphene	NC	NC	NC	NC	0.319	U	-	-	0.318	U	0.0373	U	-	-	0.0306	U	-	-	-	-
trans-Chlordane	NC	NC	NC	NC	0.0212	U	-	-	0.0109	JP	0.00249	U	-	-	0.00353	IP	-	-	-	-
PCBs																				
Aroclor 1016	0.1	1	1	3.2	0.0524	U	-	-	0.0355	U	0.0408	U	-	-	0.0348	U	-	-	-	-
Aroclor 1221	0.1	1	1	3.2	0.0524	U	-	-	0.0355	U	0.0408	U	-	-	0.0348	U	-	-	-	-
Aroclor 1232	0.1	1	1	3.2	0.0524	U	-	-	0.0355	U	0.0408	U	-	-	0.0348	U	-	-	-	-
Aroclor 1242	0.1	1	1	3.2	0.0524	U	-	-	0.0355	U	0.0408	U	-	-	0.0348	U	-	-	-	-
Aroclor 1248	0.1	1	1	3.2	0.0524	U	-	-	0.0355	U	0.0408	U	-	-	0.0348	U	-	-	-	-
Aroclor 1254	0.1	1	1	3.2	0.0524	U	-	-	0.0355	U	0.0408	U	-	-	0.0348	U	-	-	-	-
Aroclor 1260	0.1	1	1	3.2	0.0524	U	-	-	0.00936	J	0.0408	U	-	-	0.00829	J	-	-	-	-
Aroclor 1262	0.1	1	1	3.2	0.0524	U	-	-	0.0355	U	0.0408	U	-	-	0.0348	U	-	-	-	-
Aroclor 1268	0.1	1	1	3.2	0.0524	U	-	-	0.0355	U	0.0408	U	-	-	0.0348	U	-	-	-	-
TOTAL METALS																				
Aluminum, Total	NC	NC	NC	NC	4560		-	-	3850		10100		-	-	3200		-	-	-	-
Antimony, Total	NC	NC	NC	NC	1.35	J	-	-	1.62	J	5	U	-	-	4.21	U	-	-	-	-
Arsenic, Total	13	16	16	16	2.87		-	-	2.54		5.16		-	-	3.22		-	-	-	-
Barium, Total	350	350	400	820	60.5		-	-	46.4		52.9		-	-	39.5		-	-	-	-
Beryllium, Total	7.2	14	72	47	0.403	J	-	-	0.42	J	0.3	J	-	-	0.16	J	-	-	-	-
Cadmium, Total	2.5	2.5	4.3	7.5	0.352	J	-	-	0.42	J	1	U	-	-	0.227	J	-	-	-	-
Calcium, Total	NC	NC	NC	NC	42800		-	-	11000		213000		-	-	26200		-	-	-	-
Chromium, Total	NC	NC	NC	NC	12.4		-	-	11.1		13.9		-	-	8.36		-	-	-	-
Cobalt, Total	NC	NC	NC	NC	6.21		-	-	6.1		4.73		-	-	2.78		-	-	-	-
Copper, Total	50	270	270	1720	19.8		-	-	21.6		18.2		-	-	13.8		-	-	-	-
Iron, Total	NC	NC	NC	NC	8600		-	-	8810		9060		-	-	6910		-	-	-	-
Lead, Total	63	400	400	450	36.1		-	-	56.1		11.5		-	-	53.8		-	-	-	-
Magnesium, Total	NC	NC	NC	NC	12400		-	-	2880		6060		-	-	7210		-	-	-	-
Manganese, Total	1600	2000	2000	2000	144		-	-	158		304		-	-	126		-	-	-	-
Mercury, Total	0.18	0.81	0.81	0.73	0.083		-	-	0.176		0.094	U	-	-	0.115		-	-	-	-
Nickel, Total	30	140	310	130	10.6		-	-	11.7		10.1		-	-	7.07		-	-	-	-
Potassium, Total	NC	NC	NC	NC	1930		-	-	1180		810		-	-	878		-	-	-	-
Selenium, Total	3.9	36	180	4	0.881	J	-	-	0.54	J	2	U	-	-	1.68	U	-	-	-	-
Silver, Total	2	36	180	8.3	0.369	J	-	-	0.334	J	1	U	-	-	0.842	U	-	-	-	-
Sodium, Total	NC	NC	NC	NC	346		-	-	134	J	433		-	-	403		-	-	-	-
Thallium, Total	NC	NC	NC	NC	1.68	U	-	-	1.71	U	2	U	-	-	1.68	U	-	-	-	-
Vanadium, Total	NC	NC	NC	NC	19.3		-	-	15.9		14.8		-	-	11.2		-	-	-	-
Zinc, Total	109	2200	10000	2480	38.8		-	-	58.5		**146**		-	-	41.3		-	-	-	-
GENERAL CHEMISTRY																				
Chromium, Hexavalent	1	22	110	19	0.352	J	-	-	0.881	U	***1.02***	***U***	-	-	0.866	U	-	-	-	-
Cyanide, Total	27	27	27	40	0.29	J	-	-	1	U	1.2	U	-	-	1	U	-	-	-	-
Solids, Total	NC	NC	NC	NC	91.6		90.8		81.9		78.3		91.8		92.4		93		82.1	

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceeds UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

MATRIXNEWORLD
Engineering Progress

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB-08(0-2)		COMP SB-08(0-5)		SB-09(0-2)		COMP SB-09(0-5)		SB-10(0-2)		COMP SB-10(0-5)		SOIL DUP	
LAB ID:					L2224019-06		L2224019-07 R1		L2224463-01 R1		L2224463-02		L2224463-03 R1		L2224463-04		L2224463-06 R1	
COLLECTION DATE:					5/6/2022		5/6/2022		5/10/2022		5/10/2022		5/10/2022		5/10/2022		5/10/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
VOLATILE ORGANICS																		
1,1,1,2-Tetrachloroethane	NC	NC	NC	NC	0.00049	U	-	-	0.00067	U	-	-	0.00054	U	-	-	0.00046	U
1,1,1-Trichloroethane	0.68	100	100	NC	0.00049	U	-	-	0.00067	U	-	-	0.00054	U	-	-	0.00046	U
1,1,2,2-Tetrachloroethane	NC	NC	NC	0.68	0.00049	U	-	-	0.00067	U	-	-	0.00054	U	-	-	0.00046	U
1,1,2-Trichloroethane	NC	NC	NC	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
1,1-Dichloroethane	0.27	19	26	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
1,1-Dichloroethene	0.33	100	100	0.27	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
1,1-Dichloropropene	NC	NC	NC	0.33	0.00049	U	-	-	0.00067	U	-	-	0.00054	U	-	-	0.00046	U
1,2,3-Trichlorobenzene	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
1,2,3-Trichloropropane	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
1,2,4,5-Tetramethylbenzene	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
1,2,4-Trimethylbenzene	3.6	47	52	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
1,2-Dibromo-3-chloropropane	NC	NC	NC	3.6	0.0029	U	-	-	0.004	U	-	-	0.0032	U	-	-	0.0028	U
1,2-Dibromoethane	NC	NC	NC	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
1,2-Dichlorobenzene	1.1	100	100	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
1,2-Dichloroethane	0.02	2.3	3.1	1.1	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
1,2-Dichloroethene, Total	NC	NC	NC	0.02	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
1,2-Dichloropropane	NC	NC	NC	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
1,3,5-Trimethylbenzene	8.4	47	52	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
1,3-Dichlorobenzene	2.4	17	49	8.4	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
1,3-Dichloropropane	NC	NC	NC	2.4	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
1,3-Dichloropropene, Total	NC	NC	NC	NC	0.00049	U	-	-	0.00067	U	-	-	0.00054	U	-	-	0.00046	U
1,4-Dichlorobenzene	1.8	9.8	13	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
1,4-Dioxane	0.1	9.8	13	1.8	0.078	U	-	-	0.11	U	-	-	0.086	U	-	-	0.074	U
2,2-Dichloropropane	NC	NC	NC	0.1	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
2-Butanone	0.12	100	100	NC	0.0098	U	-	-	0.013	U	-	-	0.011	U	-	-	0.0092	U
2-Hexanone	NC	NC	NC	0.12	0.0098	U	-	-	0.013	U	-	-	0.011	U	-	-	0.0092	U
4-Methyl-2-pentanone	NC	NC	NC	NC	0.0098	U	-	-	0.013	U	-	-	0.011	U	-	-	0.0092	U
Acetone	0.05	100	100	NC	0.0098	U	-	-	0.013	U	-	-	0.011	U	-	-	0.0092	U
Acrylonitrile	NC	NC	NC	0.05	0.0039	U	-	-	0.0053	U	-	-	0.0043	U	-	-	0.0037	U
Benzene	0.06	2.9	4.8	NC	0.00049	U	-	-	0.00067	U	-	-	0.00054	U	-	-	0.00046	U
Bromobenzene	NC	NC	NC	0.06	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
Bromochloromethane	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
Bromodichloromethane	NC	NC	NC	NC	0.00049	U	-	-	0.00067	U	-	-	0.00054	U	-	-	0.00046	U
Bromoform	NC	NC	NC	NC	0.0039	U	-	-	0.0053	U	-	-	0.0043	U	-	-	0.0037	U
Bromomethane	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
Carbon disulfide	NC	NC	NC	NC	0.0098	U	-	-	0.013	U	-	-	0.011	U	-	-	0.0092	U
Carbon tetrachloride	0.76	1.4	2.4	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
Chlorobenzene	1.1	100	100	0.76	0.00049	U	-	-	0.00067	U	-	-	0.00054	U	-	-	0.00046	U
Chloroethane	NC	NC	NC	1.1	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
Chloroform	0.37	10	49	NC	0.0015	U	-	-	0.002	U	-	-	0.0016	U	-	-	0.0014	U
Chloromethane	NC	NC	NC	0.37	0.0039	U	-	-	0.0053	U	-	-	0.0043	U	-	-	0.0037	U
cis-1,2-Dichloroethene	0.25	59	100	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
cis-1,3-Dichloropropene	NC	NC	NC	0.25	0.00049	U	-	-	0.00067	U	-	-	0.00054	U	-	-	0.00046	U
Dibromochloromethane	NC	NC	NC	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
Dibromomethane	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
Dichlorodifluoromethane	NC	NC	NC	NC	0.0098	U	-	-	0.013	U	-	-	0.011	U	-	-	0.0092	U
Ethyl ether	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
Ethylbenzene	1	30	41	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
Hexachlorobutadiene	NC	NC	NC	1	0.0039	U	-	-	0.0053	U	-	-	0.0043	U	-	-	0.0037	U
Isopropylbenzene	NC	NC	NC	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
Methyl tert butyl ether	0.93	62	100	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
Methylene chloride	0.05	51	100	0.93	0.0049	U	-	-	0.0067	U	-	-	0.0054	U	-	-	0.0046	U
n-Butylbenzene	12	100	100	0.05	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
n-Propylbenzene	3.9	100	100	12	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
Naphthalene	12	100	100	3.9	0.0027	J	-	-	0.0053	U	-	-	0.0043	U	-	-	0.0037	U
o-Chlorotoluene	NC	NC	NC	12	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
o-Xylene	NC	NC	NC	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
p-Chlorotoluene	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
p-Diethylbenzene	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
p-Ethyltoluene	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
p-Isopropyltoluene	NC	NC	NC	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
p/m-Xylene	NC	NC	NC	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
sec-Butylbenzene	11	100	100	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
Styrene	NC	NC	NC	11	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
tert-Butylbenzene	5.9	100	100	NC	0.002	U	-	-	0.0027	U	-	-	0.0021	U	-	-	0.0018	U
Tetrachloroethene	1.3	5.5	19	5.9	0.00049	U	-	-	0.0004	J	-	-	0.00054	U	-	-	0.00046	U
Toluene	0.7	100	100	1.3	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
trans-1,2-Dichloroethene	0.19	100	100	0.7	0.0015	U	-	-	0.002	U	-	-	0.0016	U	-	-	0.0014	U
trans-1,3-Dichloropropene	NC	NC	NC	0.19	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
trans-1,4-Dichloro-2-butene	NC	NC	NC	NC	0.0049	U	-	-	0.0067	U	-	-	0.0054	U	-	-	0.0046	U
Trichloroethene	0.47	10	21	NC	0.00049	U	-	-	0.00067	U	-	-	0.00054	U	-	-	0.00046	U
Trichlorofluoromethane	NC	NC	NC	0.47	0.0039	U	-	-	0.0053	U	-	-	0.0043	U	-	-	0.0037	U
Vinyl acetate	NC	NC	NC	NC	0.0098	U	-	-	0.013	U	-	-	0.011	U	-	-	0.0092	U
Vinyl chloride	0.02	0.21	0.9	NC	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
Xylenes, Total	0.26	100	100	0.02	0.00098	U	-	-	0.0013	U	-	-	0.0011	U	-	-	0.00092	U
Total TIC Compounds	NC	NC	NC	NC	0.0067	J	-	-	0.0184	J	-	-	0.00976	J	-	-	0.00675	J

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratior

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB-08(0-2)		COMP SB-08(0-5)		SB-09(0-2)		COMP SB-09(0-5)		SB-10(0-2)		COMP SB-10(0-5)		SOIL DUP	
LAB ID:					L2224019-06		L2224019-07 R1		L2224463-01 R1		L2224463-02		L2224463-03 R1		L2224463-04		L2224463-06 R1	
COLLECTION DATE:					5/6/2022		5/6/2022		5/10/2022		5/10/2022		5/10/2022		5/10/2022		5/10/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
SEMI-VOLATILE ORGANICS																		
1,2,4,5-Tetrachlorobenzene	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
1,2-Dichlorobenzene	1.1	100	100	1.1	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
1,3-Dichlorobenzene	2.4	17	49	2.4	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
1,4-Dichlorobenzene	1.8	9.8	13	1.8	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
1,4-Dioxane	0.1	9.8	13	0.1	-	-	0.029	U	-	-	0.034	U	-	-	0.029	U	0.029	U
2,4,5-Trichlorophenol	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
2,4,6-Trichlorophenol	NC	NC	NC	NC	-	-	0.12	U	-	-	0.14	U	-	-	0.12	U	0.12	U
2,4-Dichlorophenol	NC	NC	NC	NC	-	-	0.17	U	-	-	0.21	U	-	-	0.18	U	0.17	U
2,4-Dimethylphenol	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
2,4-Dinitrophenol	NC	NC	NC	NC	-	-	0.92	U	-	-	1.1	U	-	-	0.94	U	0.92	U
2,4-Dinitrotoluene	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
2,6-Dinitrotoluene	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
2-Chloronaphthalene	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
2-Chlorophenol	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
2-Methylnaphthalene	NC	NC	NC	NC	-	-	1.7		-	-	0.28	U	-	-	0.24	U	0.23	U
2-Methylphenol	0.33	100	100	0.33	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
2-Nitroaniline	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
2-Nitrophenol	NC	NC	NC	NC	-	-	0.42	U	-	-	0.5	U	-	-	0.42	U	0.42	U
3,3'-Dichlorobenzidine	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
3-Methylphenol/4-Methylphenol	0.33	34	100	0.33	-	-	0.074	J	-	-	***0.33***	***U***	-	-	0.28	U	0.28	U
3-Nitroaniline	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
4,6-Dinitro-o-cresol	NC	NC	NC	NC	-	-	0.5	U	-	-	0.6	U	-	-	0.51	U	0.5	U
4-Bromophenyl phenyl ether	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
4-Chloroaniline	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
4-Chlorophenyl phenyl ether	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
4-Nitroaniline	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
4-Nitrophenol	NC	NC	NC	NC	-	-	0.27	U	-	-	0.32	U	-	-	0.27	U	0.27	U
Acenaphthene	20	100	100	98	-	-	6.6		-	-	0.034	J	-	-	0.16	U	0.038	J
Acenaphthylene	100	100	100	107	-	-	0.13	J	-	-	0.18	U	-	-	0.16	U	0.06	J
Acetophenone	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
Anthracene	100	100	100	1000	-	-	18		-	-	0.11	J	-	-	0.062	J	0.13	
Benzo(a)anthracene	1	1	1	1	-	-	**26**		-	-	0.35		-	-	0.24		0.44	
Benzo(a)pyrene	1	1	1	22	-	-	**27**		-	-	0.39		-	-	0.27		0.46	
Benzo(b)fluoranthene	1	1	1	1.7	-	-	**26**		-	-	0.46		-	-	0.32		0.6	
Benzo(ghi)perylene	100	100	100	1000	-	-	7.4		-	-	0.26		-	-	0.18		0.31	
Benzo(k)fluoranthene	0.8	1	3.9	1.7	-	-	**2.8**		-	-	0.16		-	-	0.12		0.17	
Benzoic Acid	NC	NC	NC	NC	-	-	0.62	U	-	-	0.74	U	-	-	0.64	U	0.62	U
Benzyl Alcohol	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
Biphenyl	NC	NC	NC	NC	-	-	0.69		-	-	0.52	U	-	-	0.45	U	0.44	U
Bis(2-chloroethoxy)methane	NC	NC	NC	NC	-	-	0.21	U	-	-	0.25	U	-	-	0.21	U	0.21	U
Bis(2-chloroethyl)ether	NC	NC	NC	NC	-	-	0.17	U	-	-	0.21	U	-	-	0.18	U	0.17	U
Bis(2-chloroisopropyl)ether	NC	NC	NC	NC	-	-	0.23	U	-	-	0.28	U	-	-	0.24	U	0.23	U
Bis(2-ethylhexyl)phthalate	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	5.2	
Butyl benzyl phthalate	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
Carbazole	NC	NC	NC	NC	-	-	3.9		-	-	0.038	J	-	-	0.024	J	0.048	J
Chrysene	1	1	3.9	1	-	-	**24**		-	-	0.34		-	-	0.24		0.43	
Di-n-butylphthalate	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
Di-n-octylphthalate	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
Dibenzo(a,h)anthracene	0.33	0.33	0.33	1000	-	-	**2.2**		-	-	0.064	J	-	-	0.045	J	0.078	J
Dibenzofuran	7	14	59	210	-	-	5.1		-	-	0.026	J	-	-	0.2	U	0.028	J
Diethyl phthalate	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
Dimethyl phthalate	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
Fluoranthene	100	100	100	1000	-	-	51		-	-	0.64		-	-	0.42		0.82	
Fluorene	30	100	100	386	-	-	7.2		-	-	0.042	J	-	-	0.02	J	0.043	J
Hexachlorobenzene	0.33	0.33	1.2	3.2	-	-	0.12	U	-	-	0.14	U	-	-	0.12	U	0.12	U
Hexachlorobutadiene	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
Hexachlorocyclopentadiene	NC	NC	NC	NC	-	-	0.55	U	-	-	0.66	U	-	-	0.56	U	0.55	U
Hexachloroethane	NC	NC	NC	NC	-	-	0.15	U	-	-	0.18	U	-	-	0.16	U	0.15	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	8.2	-	-	**18**		-	-	0.3		-	-	0.21		0.36	
Isophorone	NC	NC	NC	NC	-	-	0.17	U	-	-	0.21	U	-	-	0.18	U	0.17	U
n-Nitrosodi-n-propylamine	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
Naphthalene	12	100	100	12	-	-	3.8		-	-	0.048	J	-	-	0.2	U	0.034	J
NDPA/DPA	NC	NC	NC	NC	-	-	0.15	U	-	-	0.18	U	-	-	0.16	U	0.15	U
Nitrobenzene	NC	NC	NC	NC	-	-	0.17	U	-	-	0.21	U	-	-	0.18	U	0.17	U
p-Chloro-m-cresol	NC	NC	NC	NC	-	-	0.19	U	-	-	0.23	U	-	-	0.2	U	0.19	U
Pentachlorophenol	0.8	2.4	6.7	0.8	-	-	0.15	U	-	-	0.18	U	-	-	0.16	U	0.15	U
Phenanthrene	100	100	100	1000	-	-	33	E	-	-	0.36		-	-	0.2		0.48	
Phenol	0.33	100	100	0.33	-	-	0.04	J	-	-	0.23	U	-	-	0.2	U	0.19	U
Pyrene	100	100	100	1000	-	-	30	E	-	-	0.57		-	-	0.38		0.73	
Total TIC Compounds	NC	NC	NC	NC	-	-	14.5	J	-	-	1.83	J	-	-	0.49	J	1.58	J

All analytical results for soil in milligrams per kilogram (mg/kg).
Q: Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been assigned.
U = Not detected at the reported detection limit for the sample.
R1 =reanalyzed
NC = No criteria established for this contaminant
E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t
I - The lower value for the two columns has been reported due to obvious interference.
P - The RPD between the results for the two columns exceeds the method-specified criteria.
d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratior
"-" = Analyte not analyzed
UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).
RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)
RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)
PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)
Reporting Limit Exceedes UUSCO
Concentration exceeds UUSCO
Concentration exceeds RSCO & UUSCO
Concentration exceeds RRSCO, RSCO & UUSCO
Concentration exceeds PGWSCO & UUSCO
Concentration exceeds PGWSCO, RSCO & UUSCO
Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB-08(0-2)		COMP SB-08(0-5)		SB-09(0-2)		COMP SB-09(0-5)		SB-10(0-2)		COMP SB-10(0-5)		SOIL DUP	
LAB ID:					L2224019-06		L2224019-07 R1		L2224463-01 R1		L2224463-02		L2224463-03 R1		L2224463-04		L2224463-06 R1	
COLLECTION DATE:					5/6/2022		5/6/2022		5/10/2022		5/10/2022		5/10/2022		5/10/2022		5/10/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
CHLORINATED HERBICIDES BY GC																		
2,4,5-T	NC	NC	NC	NC	-	-	0.188	U	-	-	0.229	U	-	-	0.194	U	0.192	U
2,4,5-TP (Silvex)	3.8	58	100	3.8	-	-	0.188	U	-	-	0.229	U	-	-	0.194	U	0.192	U
2,4-D	NC	NC	NC	NC	-	-	0.188	U	-	-	0.229	U	-	-	0.194	U	0.192	U
TOTAL PETROLEUM HYDROCARBONS																		
TPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PESTICIDES																		
4,4'-DDD	0.0033	2.6	13	14	-	-	***0.0179***	***U***	-	-	0.00216	U	-	-	0.00119	J	0.00198	
4,4'-DDE	0.0033	1.8	8.9	17	-	-	***0.0179***	***U***	-	-	**0.00431**	**P**	-	-	**0.00435**		**0.00401**	
4,4'-DDT	0.0033	1.7	7.9	136	-	-	***0.0336***	***U***	-	-	**0.00494**	**IP**	-	-	**0.00372**	**IP**	**0.00422**	**IP**
Aldrin	0.005	0.019	0.097	0.19	-	-	***0.0179***	***U***	-	-	0.00216	U	-	-	0.00183	U	0.00179	U
Alpha-BHC	0.02	0.097	0.48	0.02	-	-	0.00747	U	-	-	0.000901	U	-	-	0.000763	U	0.000747	U
Beta-BHC	0.036	0.072	0.36	0.09	-	-	0.0179	U	-	-	0.00216	U	-	-	0.00183	U	0.00179	U
Chlordane	NC	NC	NC	NC	-	-	0.149	U	-	-	0.018	U	-	-	0.0409		0.041	
cis-Chlordane	0.094	0.91	4.2	2.9	-	-	0.0224	U	-	-	0.0094	P	-	-	0.00602	IP	0.00578	IP
Delta-BHC	0.04	100	100	0.25	-	-	0.0179	U	-	-	0.00216	U	-	-	0.00183	U	0.00179	U
Dieldrin	0.005	0.039	0.2	0.1	-	-	***0.0112***	***U***	-	-	0.003		-	-	0.00114	U	0.00112	U
Endosulfan I	2.4	4.8	24	102	-	-	0.0179	U	-	-	0.00216	U	-	-	0.00183	U	0.00179	U
Endosulfan II	2.4	4.8	24	102	-	-	0.0179	U	-	-	0.00216	U	-	-	0.00183	U	0.00179	U
Endosulfan sulfate	2.4	4.8	24	1000	-	-	0.00747	U	-	-	0.000901	U	-	-	0.000763	U	0.000747	U
Endrin	0.014	2.2	11	0.06	-	-	0.00747	U	-	-	0.000901	U	-	-	0.000763	U	0.000747	U
Endrin aldehyde	NC	NC	NC	NC	-	-	0.0224	U	-	-	0.0027	U	-	-	0.00229	U	0.00224	U
Endrin ketone	NC	NC	NC	NC	-	-	0.0179	U	-	-	0.00216	U	-	-	0.00183	U	0.00179	U
Heptachlor	0.042	0.42	2.1	0.38	-	-	0.00896	U	-	-	0.00116	IP	-	-	0.000915	U	0.000896	U
Heptachlor epoxide	NC	NC	NC	NC	-	-	0.0336	U	-	-	0.00405	U	-	-	0.00343	U	0.00336	U
Lindane	0.1	0.28	1.3	0.1	-	-	0.00747	U	-	-	0.000901	U	-	-	0.000763	U	0.000747	U
Methoxychlor	NC	NC	NC	NC	-	-	0.0336	U	-	-	0.00405	U	-	-	0.00343	U	0.00336	U
Toxaphene	NC	NC	NC	NC	-	-	0.336	U	-	-	0.0405	U	-	-	0.0343	U	0.0336	U
trans-Chlordane	NC	NC	NC	NC	-	-	0.0224	U	-	-	0.00594		-	-	0.00557		0.0064	
PCBs																		
Aroclor 1016	0.1	1	1	3.2	-	-	0.0373	U	-	-	0.0449	U	-	-	0.0383	U	0.0378	U
Aroclor 1221	0.1	1	1	3.2	-	-	0.0373	U	-	-	0.0449	U	-	-	0.0383	U	0.0378	U
Aroclor 1232	0.1	1	1	3.2	-	-	0.0373	U	-	-	0.0449	U	-	-	0.0383	U	0.0378	U
Aroclor 1242	0.1	1	1	3.2	-	-	0.0373	U	-	-	0.0449	U	-	-	0.0383	U	0.0378	U
Aroclor 1248	0.1	1	1	3.2	-	-	0.0373	U	-	-	0.0449	U	-	-	0.0383	U	0.0378	U
Aroclor 1254	0.1	1	1	3.2	-	-	0.0373	U	-	-	0.0449	U	-	-	0.0383	U	0.0378	U
Aroclor 1260	0.1	1	1	3.2	-	-	0.0373	U	-	-	0.018	J	-	-	0.0185	J	0.0223	J
Aroclor 1262	0.1	1	1	3.2	-	-	0.0373	U	-	-	0.0449	U	-	-	0.0383	U	0.0378	U
Aroclor 1268	0.1	1	1	3.2	-	-	0.0373	U	-	-	0.0054	J	-	-	0.0383	U	0.0378	U
TOTAL METALS																		
Aluminum, Total	NC	NC	NC	NC	-	-	3980		-	-	2510		-	-	3190		2930	
Antimony, Total	NC	NC	NC	NC	-	-	2.34	J	-	-	5.56	U	-	-	4.53	U	4.64	U
Arsenic, Total	13	16	16	16	-	-	5.5		-	-	6.08		-	-	7.16		4.41	
Barium, Total	350	350	400	820	-	-	56.1		-	-	36.6		-	-	67.7		57.4	
Beryllium, Total	7.2	14	72	47	-	-	0.416	J	-	-	0.133	J	-	-	0.199	J	0.176	J
Cadmium, Total	2.5	2.5	4.3	7.5	-	-	0.513	J	-	-	0.278	J	-	-	0.353	J	0.306	J
Calcium, Total	NC	NC	NC	NC	-	-	11200		-	-	15200		-	-	7560		5740	
Chromium, Total	NC	NC	NC	NC	-	-	14.6		-	-	22		-	-	13		12.6	
Cobalt, Total	NC	NC	NC	NC	-	-	6.17		-	-	2.37		-	-	4.01		3.88	
Copper, Total	50	270	270	1720	-	-	20.5		-	-	21.2		-	-	26.3		21.2	
Iron, Total	NC	NC	NC	NC	-	-	8610		-	-	5770		-	-	9920		8760	
Lead, Total	63	400	400	450	-	-	44.1		-	-	37.7		-	-	**128**		59	
Magnesium, Total	NC	NC	NC	NC	-	-	2220		-	-	2290		-	-	1900		1760	
Manganese, Total	1600	2000	2000	2000	-	-	142		-	-	129		-	-	160		148	
Mercury, Total	0.18	0.81	0.81	0.73	-	-	**0.209**		-	-	0.101		-	-	0.114		0.131	
Nickel, Total	30	140	310	130	-	-	12.2		-	-	11		-	-	8.64		7.73	
Potassium, Total	NC	NC	NC	NC	-	-	1080		-	-	666		-	-	1270		1120	
Selenium, Total	3.9	36	180	4	-	-	0.796	J	-	-	2.22	U	-	-	0.371	J	1.86	U
Silver, Total	2	36	180	8.3	-	-	0.327	J	-	-	1.11	U	-	-	0.906	U	0.928	U
Sodium, Total	NC	NC	NC	NC	-	-	459		-	-	381		-	-	621		567	
Thallium, Total	NC	NC	NC	NC	-	-	1.77	U	-	-	2.22	U	-	-	1.81	U	1.86	U
Vanadium, Total	NC	NC	NC	NC	-	-	18		-	-	8.96		-	-	12.9		12.3	
Zinc, Total	109	2200	10000	2480	-	-	72.8		-	-	96.4		-	-	**118**		82.9	
GENERAL CHEMISTRY																		
Chromium, Hexavalent	1	22	110	19	-	-	0.244	J	-		***1.12***	***U***	-		0.958	U	0.938	U
Cyanide, Total	27	27	27	40	-	-	1.1	U	-		1.3	U	-		1.1	U	1.1	U
Solids, Total	NC	NC	NC	NC	86.2		-		84.3		71.2		89		83.5		85.3	

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratior

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB11 (1-3)		SB12 (1-3)		SB13 (1-3)		SB13 (1-3) DUP		SB13 (5.5-7.5)	
LAB ID:					L2168050-01		L2168372-04		L2168050-02		L2168050-03		L2168050-04	
COLLECTION DATE:					12/10/2021		12/13/2021		12/10/2021		12/10/2021		12/10/2021	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
VOLATILE ORGANICS														
1,1,1,2-Tetrachloroethane	NC	NC	NC	NC	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
1,1,1-Trichloroethane	0.68	100	100	NC	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
1,1,2,2-Tetrachloroethane	NC	NC	NC	0.68	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
1,1,2-Trichloroethane	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
1,1-Dichloroethane	0.27	19	26	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
1,1-Dichloroethene	0.33	100	100	0.27	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
1,1-Dichloropropene	NC	NC	NC	0.33	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
1,2,3-Trichlorobenzene	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
1,2,3-Trichloropropane	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
1,2,4,5-Tetramethylbenzene	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
1,2,4-Trimethylbenzene	3.6	47	52	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
1,2-Dibromo-3-chloropropane	NC	NC	NC	3.6	0.0035	U	0.0034	U	0.003	U	0.0034	U	0.0035	U
1,2-Dibromoethane	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
1,2-Dichlorobenzene	1.1	100	100	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
1,2-Dichloroethane	0.02	2.3	3.1	1.1	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
1,2-Dichloroethene, Total	NC	NC	NC	0.02	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
1,2-Dichloropropane	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
1,3,5-Trimethylbenzene	8.4	47	52	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
1,3-Dichlorobenzene	2.4	17	49	8.4	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
1,3-Dichloropropane	NC	NC	NC	2.4	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
1,3-Dichloropropene, Total	NC	NC	NC	NC	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
1,4-Dichlorobenzene	1.8	9.8	13	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
1,4-Dioxane	0.1	9.8	13	1.8	0.093	U	0.09	U	0.081	U	0.091	U	0.094	U
2,2-Dichloropropane	NC	NC	NC	0.1	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
2-Butanone	0.12	100	100	NC	0.012	U	0.011	U	0.01	U	0.011	U	0.012	U
2-Hexanone	NC	NC	NC	0.12	0.012	U	0.011	U	0.01	U	0.011	U	0.012	U
4-Methyl-2-pentanone	NC	NC	NC	NC	0.012	U	0.011	U	0.01	U	0.011	U	0.012	U
Acetone	0.05	100	100	NC	0.012	U	0.011	U	0.01	U	0.011	U	0.012	U
Acrylonitrile	NC	NC	NC	0.05	0.0046	U	0.0045	U	0.004	U	0.0045	U	0.0047	U
Benzene	0.06	2.9	4.8	NC	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
Bromobenzene	NC	NC	NC	0.06	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
Bromochloromethane	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
Bromodichloromethane	NC	NC	NC	NC	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
Bromoform	NC	NC	NC	NC	0.0046	U	0.0045	U	0.004	U	0.0045	U	0.0047	U
Bromomethane	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
Carbon disulfide	NC	NC	NC	NC	0.012	U	0.011	U	0.01	U	0.011	U	0.012	U
Carbon tetrachloride	0.76	1.4	2.4	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
Chlorobenzene	1.1	100	100	0.76	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
Chloroethane	NC	NC	NC	1.1	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
Chloroform	0.37	10	49	NC	0.00016	J	0.0017	U	0.0015	U	0.0017	U	0.00016	U
Chloromethane	NC	NC	NC	0.37	0.0046	U	0.0045	U	0.004	U	0.0045	U	0.0047	U
cis-1,2-Dichloroethene	0.25	59	100	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
cis-1,3-Dichloropropene	NC	NC	NC	0.25	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
Dibromochloromethane	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
Dibromomethane	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
Dichlorodifluoromethane	NC	NC	NC	NC	0.012	U	0.011	U	0.01	U	0.011	U	0.012	U
Ethyl ether	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
Ethylbenzene	1	30	41	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
Hexachlorobutadiene	NC	NC	NC	1	0.0046	U	0.0045	U	0.004	U	0.0045	U	0.0047	U
Isopropylbenzene	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
Methyl tert butyl ether	0.93	62	100	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
Methylene chloride	0.05	51	100	0.93	0.0058	U	0.0056	U	0.0051	U	0.0057	U	0.0059	U
n-Butylbenzene	12	100	100	0.05	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
n-Propylbenzene	3.9	100	100	12	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
Naphthalene	12	100	100	3.9	0.0046	U	0.0045	U	0.004	U	0.0045	U	0.0047	U
o-Chlorotoluene	NC	NC	NC	12	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
o-Xylene	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
p-Chlorotoluene	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
p-Diethylbenzene	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
p-Ethyltoluene	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
p-Isopropyltoluene	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
p/m-Xylene	NC	NC	NC	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
sec-Butylbenzene	11	100	100	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
Styrene	NC	NC	NC	11	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
tert-Butylbenzene	5.9	100	100	NC	0.0023	U	0.0022	U	0.002	U	0.0023	U	0.0024	U
Tetrachloroethene	1.3	5.5	19	5.9	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
Toluene	0.7	100	100	1.3	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
trans-1,2-Dichloroethene	0.19	100	100	0.7	0.0017	U	0.0017	U	0.0015	U	0.0017	U	0.0018	U
trans-1,3-Dichloropropene	NC	NC	NC	0.19	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
trans-1,4-Dichloro-2-butene	NC	NC	NC	NC	0.0058	U	0.0056	U	0.0051	U	0.0057	U	0.0059	U
Trichloroethene	0.47	10	21	NC	0.00058	U	0.00056	U	0.00051	U	0.00057	U	0.00059	U
Trichlorofluoromethane	NC	NC	NC	0.47	0.0046	U	0.0045	U	0.004	U	0.0045	U	0.0047	U
Vinyl acetate	NC	NC	NC	NC	0.012	U	0.011	U	0.01	U	0.011	U	0.012	U
Vinyl chloride	0.02	0.21	0.9	NC	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
Xylenes, Total	0.26	100	100	0.02	0.0012	U	0.0011	U	0.001	U	0.0011	U	0.0012	U
Total TIC Compounds	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB11 (1-3)		SB12 (1-3)		SB13 (1-3)		SB13 (1-3) DUP		SB13 (5.5-7.5)	
LAB ID:					L2168050-01		L2168372-04		L2168050-02		L2168050-03		L2168050-04	
COLLECTION DATE:					12/10/2021		12/13/2021		12/10/2021		12/10/2021		12/10/2021	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
SEMI-VOLATILE ORGANICS														
1,2,4,5-Tetrachlorobenzene	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
1,2-Dichlorobenzene	1.1	100	100	1.1	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
1,3-Dichlorobenzene	2.4	17	49	2.4	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
1,4-Dichlorobenzene	1.8	9.8	13	1.8	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
1,4-Dioxane	0.1	9.8	13	0.1	0.025	U	0.026	U	0.026	U	0.026	U	0.026	U
2,4,5-Trichlorophenol	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
2,4,6-Trichlorophenol	NC	NC	NC	NC	0.099	U	0.1	U	0.1	U	0.1	U	0.1	U
2,4-Dichlorophenol	NC	NC	NC	NC	0.15	U	0.16	U	0.15	U	0.15	U	0.16	U
2,4-Dimethylphenol	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
2,4-Dinitrophenol	NC	NC	NC	NC	0.8	U	0.83	U	0.83	U	0.82	U	0.83	U
2,4-Dinitrotoluene	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
2,6-Dinitrotoluene	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
2-Chloronaphthalene	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
2-Chlorophenol	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
2-Methylnaphthalene	NC	NC	NC	NC	0.2	U	0.21	U	0.21	U	0.2	U	0.21	U
2-Methylphenol	0.33	100	100	0.33	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
2-Nitroaniline	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
2-Nitrophenol	NC	NC	NC	NC	0.36	U	0.38	U	0.37	U	0.37	U	0.37	U
3,3'-Dichlorobenzidine	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
3-Methylphenol/4-Methylphenol	0.33	34	100	0.33	0.24	U	0.25	U	0.25	U	0.24	U	0.25	U
3-Nitroaniline	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
4,6-Dinitro-o-cresol	NC	NC	NC	NC	0.43	U	0.45	U	0.45	U	0.44	U	0.45	U
4-Bromophenyl phenyl ether	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
4-Chloroaniline	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
4-Chlorophenyl phenyl ether	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
4-Nitroaniline	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
4-Nitrophenol	NC	NC	NC	NC	0.23	U	0.24	U	0.24	U	0.24	U	0.24	U
Acenaphthene	20	100	100	98	0.13	U	0.14	U	0.14	U	0.14	U	0.14	U
Acenaphthylene	100	100	100	107	0.13	U	0.14	U	0.14	U	0.14	U	0.14	U
Acetophenone	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Anthracene	100	100	100	1000	0.099	U	0.1	U	0.1	U	0.1	U	0.1	U
Benzo(a)anthracene	1	1	1	1	0.099	U	0.04	J	0.1	U	0.1	U	0.064	J
Benzo(a)pyrene	1	1	1	22	0.13	U	0.14	U	0.14	U	0.14	U	0.065	J
Benzo(b)fluoranthene	1	1	1	1.7	0.099	U	0.053	J	0.1	U	0.1	U	0.098	J
Benzo(ghi)perylene	100	100	100	1000	0.13	U	0.027	J	0.14	U	0.14	U	0.04	J
Benzo(k)fluoranthene	0.8	1	3.9	1.7	0.099	U	0.1	U	0.1	U	0.1	U	0.033	J
Benzoic Acid	NC	NC	NC	NC	0.54	U	0.56	U	0.56	U	0.55	U	0.56	U
Benzyl Alcohol	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Biphenyl	NC	NC	NC	NC	0.38	U	0.4	U	0.39	U	0.39	U	0.39	U
Bis(2-chloroethoxy)methane	NC	NC	NC	NC	0.18	U	0.19	U	0.18	U	0.18	U	0.19	U
Bis(2-chloroethyl)ether	NC	NC	NC	NC	0.15	U	0.16	U	0.15	U	0.15	U	0.16	U
Bis(2-chloroisopropyl)ether	NC	NC	NC	NC	0.2	U	0.21	U	0.21	U	0.2	U	0.21	U
Bis(2-ethylhexyl)phthalate	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Butyl benzyl phthalate	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Carbazole	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.02	J
Chrysene	1	1	3.9	1	0.099	U	0.04	J	0.1	U	0.1	U	0.075	J
Di-n-butylphthalate	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.18		0.17	U
Di-n-octylphthalate	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Dibenzo(a,h)anthracene	0.33	0.33	0.33	1000	0.099	U	0.1	U	0.1	U	0.1	U	0.1	U
Dibenzofuran	7	14	59	210	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Diethyl phthalate	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Dimethyl phthalate	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Fluoranthene	100	100	100	1000	0.024	J	0.064	J	0.1	U	0.1	U	0.18	
Fluorene	30	100	100	386	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Hexachlorobenzene	0.33	0.33	1.2	3.2	0.099	U	0.1	U	0.1	U	0.1	U	0.1	U
Hexachlorobutadiene	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Hexachlorocyclopentadiene	NC	NC	NC	NC	0.47	U	0.5	U	0.49	U	0.49	U	0.49	U
Hexachloroethane	NC	NC	NC	NC	0.13	U	0.14	U	0.14	U	0.14	U	0.14	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	8.2	0.13	U	0.028	J	0.14	U	0.14	U	0.05	J
Isophorone	NC	NC	NC	NC	0.15	U	0.16	U	0.15	U	0.15	U	0.16	U
n-Nitrosodi-n-propylamine	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Naphthalene	12	100	100	12	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
NDPA/DPA	NC	NC	NC	NC	0.13	U	0.14	U	0.14	U	0.14	U	0.14	U
Nitrobenzene	NC	NC	NC	NC	0.15	U	0.16	U	0.15	U	0.15	U	0.16	U
p-Chloro-m-cresol	NC	NC	NC	NC	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Pentachlorophenol	0.8	2.4	6.7	0.8	0.13	U	0.14	U	0.14	U	0.14	U	0.14	U
Phenanthrene	100	100	100	1000	0.099	U	0.034	J	0.1	U	0.1	U	0.14	
Phenol	0.33	100	100	0.33	0.16	U	0.17	U	0.17	U	0.17	U	0.17	U
Pyrene	100	100	100	1000	0.023	J	0.061	J	0.1	U	0.1	U	0.15	
Total TIC Compounds	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceeds UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

MATRIXNEWORLD
Engineering Progress

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB11 (1-3)		SB12 (1-3)		SB13 (1-3)		SB13 (1-3) DUP		SB13 (5.5-7.5)	
LAB ID:					L2168050-01		L2168372-04		L2168050-02		L2168050-03		L2168050-04	
COLLECTION DATE:					12/10/2021		12/13/2021		12/10/2021		12/10/2021		12/10/2021	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
CHLORINATED HERBICIDES BY GC														
2,4,5-T	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	3.8	58	100	3.8	-	-	-	-	-	-	-	-	-	-
2,4-D	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-
TOTAL PETROLEUM HYDROCARBONS														
TPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PESTICIDES														
4,4'-DDD	0.0033	2.6	13	14	0.00158	U	0.00164	U	0.00158	U	0.00164	U	0.0017	U
4,4'-DDE	0.0033	1.8	8.9	17	0.00158	U	0.00164	U	0.0029		0.000951	J	0.0017	U
4,4'-DDT	0.0033	1.7	7.9	136	0.00295	U	0.00308	U	0.00244	J	0.00307	U	0.00318	U
Aldrin	0.005	0.019	0.097	0.19	0.00158	U	0.00164	U	0.00158	U	0.00164	U	0.0017	U
Alpha-BHC	0.02	0.097	0.48	0.02	0.000657	U	0.000686	U	0.000657	U	0.000682	U	0.000707	U
Beta-BHC	0.036	0.072	0.36	0.09	0.00158	U	0.00164	U	0.00158	U	0.00164	U	0.0017	U
Chlordane	NC	NC	NC	NC	0.0131	U	0.0137	U	0.0131	U	0.0136	U	0.0141	U
cis-Chlordane	0.094	0.91	4.2	2.9	0.00197	U	0.00206	U	0.00197	U	0.00205	U	0.00212	U
Delta-BHC	0.04	100	100	0.25	0.00158	U	0.00164	U	0.00158	U	0.00164	U	0.0017	U
Dieldrin	0.005	0.039	0.2	0.1	0.000985	U	0.00103	U	0.000986	U	0.00102	U	0.00106	U
Endosulfan I	2.4	4.8	24	102	0.00158	U	0.00164	U	0.00158	U	0.00164	U	0.0017	U
Endosulfan II	2.4	4.8	24	102	0.00158	U	0.00164	U	0.00158	U	0.00164	U	0.0017	U
Endosulfan sulfate	2.4	4.8	24	1000	0.000657	U	0.000686	U	0.000657	U	0.000682	U	0.000707	U
Endrin	0.014	2.2	11	0.06	0.000657	U	0.000686	U	0.000657	U	0.000682	U	0.000707	U
Endrin aldehyde	NC	NC	NC	NC	0.00197	U	0.00206	U	0.00197	U	0.00205	U	0.00212	U
Endrin ketone	NC	NC	NC	NC	0.00158	U	0.00164	U	0.00158	U	0.00164	U	0.0017	U
Heptachlor	0.042	0.42	2.1	0.38	0.000788	U	0.000823	U	0.000789	U	0.000818	U	0.000848	U
Heptachlor epoxide	NC	NC	NC	NC	0.00295	U	0.00308	U	0.00296	U	0.00307	U	0.00318	U
Lindane	0.1	0.28	1.3	0.1	0.000657	U	0.000686	U	0.000657	U	0.000682	U	0.000707	U
Methoxychlor	NC	NC	NC	NC	0.00295	U	0.00308	U	0.00296	U	0.00307	U	0.00318	U
Toxaphene	NC	NC	NC	NC	0.0295	U	0.0308	U	0.0296	U	0.0307	U	0.0318	U
trans-Chlordane	NC	NC	NC	NC	0.00197	U	0.00206	U	0.00197	U	0.00205	U	0.00212	U
PCBs														
Aroclor 1016	0.1	1	1	3.2	0.0322	U	0.0329	U	0.0342	U	0.0339	U	0.0353	U
Aroclor 1221	0.1	1	1	3.2	0.0322	U	0.0329	U	0.0342	U	0.0339	U	0.0353	U
Aroclor 1232	0.1	1	1	3.2	0.0322	U	0.0329	U	0.0342	U	0.0339	U	0.0353	U
Aroclor 1242	0.1	1	1	3.2	0.0322	U	0.0329	U	0.0342	U	0.0339	U	0.0353	U
Aroclor 1248	0.1	1	1	3.2	0.0322	U	0.0329	U	0.0342	U	0.0339	U	0.0353	U
Aroclor 1254	0.1	1	1	3.2	0.0322	U	0.0329	U	0.0342	U	0.0339	U	0.0353	U
Aroclor 1260	0.1	1	1	3.2	0.0322	U	0.0329	U	0.0342	U	0.0339	U	0.0353	U
Aroclor 1262	0.1	1	1	3.2	0.0322	U	0.0329	U	0.0342	U	0.0339	U	0.0353	U
Aroclor 1268	0.1	1	1	3.2	0.0322	U	0.0329	U	0.0342	U	0.0339	U	0.0353	U
TOTAL METALS														
Aluminum, Total	NC	NC	NC	NC	983		1730		1500		676		1030	
Antimony, Total	NC	NC	NC	NC	4.03	U	4.03	U	4.04	U	4.07	U	4.25	U
Arsenic, Total	13	16	16	16	1.52		1.82		1.63		0.529	J	1.84	
Barium, Total	350	350	400	820	3.19		11.1		19.5		4.13		8.4	
Beryllium, Total	7.2	14	72	47	0.065	J	0.081	J	0.057	J	0.407	U	0.06	J
Cadmium, Total	2.5	2.5	4.3	7.5	0.807	U	0.805	U	0.807	U	0.814	U	0.85	U
Calcium, Total	NC	NC	NC	NC	300		2070		4530		600		3610	
Chromium, Total	NC	NC	NC	NC	3.23		5.75		4.17		1.6		3.72	
Cobalt, Total	NC	NC	NC	NC	1.58	J	1.99		1.94		0.773	J	1.47	J
Copper, Total	50	270	270	1720	2.36		6.29		6.22		4.25		3.16	
Iron, Total	NC	NC	NC	NC	2810		3850		3330		1610		2940	
Lead, Total	63	400	400	450	5.32		12.8		5.39		2.25	J	4.96	
Magnesium, Total	NC	NC	NC	NC	618		1140		2980		404		793	
Manganese, Total	1600	2000	2000	2000	59.7		68.6		392		27.8		75.8	
Mercury, Total	0.18	0.81	0.81	0.73	0.077	U	0.136		0.073	U	0.076	U	0.071	U
Nickel, Total	30	140	310	130	3.85		5.07		3.67		1.31	J	3.88	
Potassium, Total	NC	NC	NC	NC	234		324		293		149	J	240	
Selenium, Total	3.9	36	180	4	1.61	U	1.61	U	1.61	U	1.63	U	1.7	U
Silver, Total	2	36	180	8.3	0.807	U	0.805	U	0.807	U	0.814	U	0.85	U
Sodium, Total	NC	NC	NC	NC	75.1	J	133	J	24.9	J	13.1	J	75	J
Thallium, Total	NC	NC	NC	NC	1.61	U	1.61	U	1.61	U	1.63	U	1.7	U
Vanadium, Total	NC	NC	NC	NC	3.51		4.9		5.72		2.34		3.3	
Zinc, Total	109	2200	10000	2480	9.95		21.8		14.2		5.68		12.6	
GENERAL CHEMISTRY														
Chromium, Hexavalent	1	22	110	19	0.816	U	0.838	U	0.833	U	0.836	U	0.853	U
Cyanide, Total	27	27	27	40	1	U	1	U	0.98	U	0.99	U	0.99	U
Solids, Total	NC	NC	NC	NC	98		95.5		96		95.7		93.8	

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB14 (2-4)		SB15 (1-3)		SB-16 (1.5-4.5)		SB16 (6.5-8.5)		SB17 (1-3.5)		SB18 (1-4)		SB18 (11-13)	
LAB ID:					L2168050-05		L2168372-03		L2168372-01		L2168372-02		L2167681-04		L2167681-02		L2167681-03	
COLLECTION DATE:					12/10/2021		12/13/2021		12/13/2021		12/13/2021		12/9/2021		12/9/2021		12/9/2021	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
VOLATILE ORGANICS																		
1,1,1,2-Tetrachloroethane	NC	NC	NC	NC	0.00062	U	0.00054	U	0.00052	U	0.00047	U	0.00062	U	0.00056	U	0.00056	U
1,1,1-Trichloroethane	0.68	100	100	NC	0.00062	U	0.00054	U	0.00052	U	0.00047	U	0.00062	U	0.00056	U	0.00056	U
1,1,2,2-Tetrachloroethane	NC	NC	NC	0.68	0.00062	U	0.00054	U	0.00052	U	0.00047	U	0.00062	U	0.00056	U	0.00056	U
1,1,2-Trichloroethane	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
1,1-Dichloroethane	0.27	19	26	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
1,1-Dichloroethene	0.33	100	100	0.27	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
1,1-Dichloropropene	NC	NC	NC	0.33	0.00062	U	0.00054	U	0.00052	U	0.00047	U	0.00062	U	0.00056	U	0.00056	U
1,2,3-Trichlorobenzene	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
1,2,3-Trichloropropane	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
1,2,4,5-Tetramethylbenzene	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
1,2,4-Trimethylbenzene	3.6	47	52	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
1,2-Dibromo-3-chloropropane	NC	NC	NC	3.6	0.0037	U	0.0032	U	0.0031	U	0.0028	U	0.0037	U	0.0034	U	0.0034	U
1,2-Dibromoethane	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
1,2-Dichlorobenzene	1.1	100	100	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
1,2-Dichloroethane	0.02	2.3	3.1	1.1	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
1,2-Dichloroethene, Total	NC	NC	NC	0.02	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
1,2-Dichloropropane	NC	NC	NC	NC	0.0012	U	*	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
1,3,5-Trimethylbenzene	8.4	47	52	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
1,3-Dichlorobenzene	2.4	17	49	8.4	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
1,3-Dichloropropane	NC	NC	NC	2.4	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
1,3-Dichloropropene, Total	NC	NC	NC	NC	0.00062	U	0.00054	U	0.00052	U	0.00047	U	0.00062	U	0.00056	U	0.00056	U
1,4-Dichlorobenzene	1.8	9.8	13	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
1,4-Dioxane	0.1	9.8	13	1.8	0.099	U	0.086	U	0.084	U	0.075	U	0.098	U	0.09	U	0.09	U
2,2-Dichloropropane	NC	NC	NC	0.1	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
2-Butanone	0.12	100	100	NC	0.012	U	0.011	U	0.01	U	0.0094	U	0.012	U	0.011	U	0.011	U
2-Hexanone	NC	NC	NC	0.12	0.012	U	0.011	U	0.01	U	0.0094	U	0.012	U	0.011	U	0.011	U
4-Methyl-2-pentanone	NC	NC	NC	NC	0.012	U	0.011	U	0.01	U	0.0094	U	0.012	U	0.011	U	0.011	U
Acetone	0.05	100	100	NC	0.012	U	0.011	U	0.01	U	0.0094	U	0.012	U	0.011	U	0.011	U
Acrylonitrile	NC	NC	NC	0.05	0.0049	U	0.0043	U	0.0042	U	0.0037	U	0.0049	U	0.0045	U	0.0045	U
Benzene	0.06	2.9	4.8	NC	0.00062	U	0.00054	U	0.00021	J	0.00047	U	0.00062	U	0.00056	U	0.00056	U
Bromobenzene	NC	NC	NC	0.06	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
Bromochloromethane	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
Bromodichloromethane	NC	NC	NC	NC	0.00062	U	0.00054	U	0.00052	U	0.00047	U	0.00062	U	0.00056	U	0.00056	U
Bromoform	NC	NC	NC	NC	0.0049	U	0.0043	U	0.0042	U	0.0037	U	0.0049	U	0.0045	U	0.0045	U
Bromomethane	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
Carbon disulfide	NC	NC	NC	NC	0.012	U	0.011	U	0.01	U	0.0094	U	0.012	U	0.011	U	0.011	U
Carbon tetrachloride	0.76	1.4	2.4	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
Chlorobenzene	1.1	100	100	0.76	0.00062	U	0.00054	U	0.00052	U	0.00047	U	0.00062	U	0.00056	U	0.00056	U
Chloroethane	NC	NC	NC	1.1	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
Chloroform	0.37	10	49	NC	0.0018	U	0.0016	U	0.0016	U	0.0014	U	0.0018	U	0.0017	U	0.0017	U
Chloromethane	NC	NC	NC	0.37	0.0049	U	0.0043	U	0.0042	U	0.0037	U	0.0049	U	0.0045	U	0.0045	U
cis-1,2-Dichloroethene	0.25	59	100	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
cis-1,3-Dichloropropene	NC	NC	NC	0.25	0.00062	U	0.00054	U	0.00052	U	0.00047	U	0.00062	U	0.00056	U	0.00056	U
Dibromochloromethane	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
Dibromomethane	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
Dichlorodifluoromethane	NC	NC	NC	NC	0.012	U	0.011	U	0.01	U	0.0094	U	0.012	U	0.011	U	0.011	U
Ethyl ether	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
Ethylbenzene	1	30	41	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
Hexachlorobutadiene	NC	NC	NC	1	0.0049	U	0.0043	U	0.0042	U	0.0037	U	0.0049	U	0.0045	U	0.0045	U
Isopropylbenzene	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
Methyl tert butyl ether	0.93	62	100	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
Methylene chloride	0.05	51	100	0.93	0.0062	U	0.0054	U	0.0052	U	0.0047	U	0.0062	U	0.0056	U	0.0056	U
n-Butylbenzene	12	100	100	0.05	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
n-Propylbenzene	3.9	100	100	12	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
Naphthalene	12	100	100	3.9	0.0049	U	0.0043	U	0.0042	U	0.0037	U	0.0049	U	0.0045	U	0.0045	U
o-Chlorotoluene	NC	NC	NC	12	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
o-Xylene	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
p-Chlorotoluene	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
p-Diethylbenzene	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
p-Ethyltoluene	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
p-Isopropyltoluene	NC	NC	NC	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
p/m-Xylene	NC	NC	NC	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
sec-Butylbenzene	11	100	100	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
Styrene	NC	NC	NC	11	0.0012	U	0.0011	U	0.00023	J	0.00094	U	0.0012	U	0.0011	U	0.0011	U
tert-Butylbenzene	5.9	100	100	NC	0.0025	U	0.0022	U	0.0021	U	0.0019	U	0.0025	U	0.0023	U	0.0022	U
Tetrachloroethene	1.3	5.5	19	5.9	0.00062	U	0.00054	U	0.00052	U	0.00047	U	0.00062	U	0.00056	U	0.00056	U
Toluene	0.7	100	100	1.3	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
trans-1,2-Dichloroethene	0.19	100	100	0.7	0.0018	U	0.0016	U	0.0016	U	0.0014	U	0.0018	U	0.0017	U	0.0017	U
trans-1,3-Dichloropropene	NC	NC	NC	0.19	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
trans-1,4-Dichloro-2-butene	NC	NC	NC	NC	0.0062	U	0.0054	U	0.0052	U	0.0047	U	0.0062	U	0.0056	U	0.0056	U
Trichloroethene	0.47	10	21	NC	0.00062	U	0.00054	U	0.00052	U	0.00047	U	0.00062	U	0.00056	U	0.00056	U
Trichlorofluoromethane	NC	NC	NC	0.47	0.0049	U	0.0043	U	0.0042	U	0.0037	U	0.0049	U	0.0045	U	0.0045	U
Vinyl acetate	NC	NC	NC	NC	0.012	U	0.011	U	0.01	U	0.0094	U	0.012	U	0.011	U	0.011	U
Vinyl chloride	0.02	0.21	0.9	NC	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
Xylenes, Total	0.26	100	100	0.02	0.0012	U	0.0011	U	0.001	U	0.00094	U	0.0012	U	0.0011	U	0.0011	U
Total TIC Compounds	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I = The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB14 (2-4)		SB15 (1-3)		SB-16 (1.5-4.5)		SB16 (6.5-8.5)		SB17 (1-3.5)		SB18 (1-4)		SB18 (11-13)	
LAB ID:					L2168050-05		L2168372-03		L2168372-01		L2168372-02		L2167681-04		L2167681-02		L2167681-03	
COLLECTION DATE:					12/10/2021		12/13/2021		12/13/2021		12/13/2021		12/9/2021		12/9/2021		12/9/2021	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
SEMI-VOLATILE ORGANICS																		
1,2,4,5-Tetrachlorobenzene	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
1,2-Dichlorobenzene	1.1	100	100	1.1	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
1,3-Dichlorobenzene	2.4	17	49	2.4	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
1,4-Dichlorobenzene	1.8	9.8	13	1.8	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
1,4-Dioxane	0.1	9.8	13	0.1	0.026	U	0.026	U	0.026	U	0.026	U	0.026	U	0.025	U	0.026	U
2,4,5-Trichlorophenol	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
2,4,6-Trichlorophenol	NC	NC	NC	NC	0.1	U	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U
2,4-Dichlorophenol	NC	NC	NC	NC	0.15	U	0.15	U	0.16	U	0.16	U	0.16	U	0.15	U	0.15	U
2,4-Dimethylphenol	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
2,4-Dinitrophenol	NC	NC	NC	NC	0.82	U	0.82	U	0.83	U	0.85	U	0.83	U	0.8	U	0.82	U
2,4-Dinitrotoluene	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
2,6-Dinitrotoluene	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
2-Chloronaphthalene	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
2-Chlorophenol	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
2-Methylnaphthalene	NC	NC	NC	NC	0.2	U	0.21	U	0.21	U	0.21	U	0.21	U	0.2	U	0.2	U
2-Methylphenol	0.33	100	100	0.33	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
2-Nitroaniline	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
2-Nitrophenol	NC	NC	NC	NC	0.37	U	0.37	U	0.37	U	0.38	U	0.37	U	0.36	U	0.37	U
3,3'-Dichlorobenzidine	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
3-Methylphenol/4-Methylphenol	0.33	34	100	0.33	0.24	U	0.25	U	0.25	U	0.26	U	0.25	U	0.24	U	0.25	U
3-Nitroaniline	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
4,6-Dinitro-o-cresol	NC	NC	NC	NC	0.44	U	0.45	U	0.45	U	0.46	U	0.45	U	0.44	U	0.44	U
4-Bromophenyl phenyl ether	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
4-Chloroaniline	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
4-Chlorophenyl phenyl ether	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
4-Nitroaniline	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
4-Nitrophenol	NC	NC	NC	NC	0.24	U	0.24	U	0.24	U	0.25	U	0.24	U	0.23	U	0.24	U
Acenaphthene	20	100	100	98	0.14	U	0.14	U	0.14	U	0.14	U	0.076	J	0.035	J	0.14	U
Acenaphthylene	100	100	100	107	0.14	U	0.14	U	0.14	U	0.14	U	0.28		0.13	U	0.14	U
Acetophenone	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Anthracene	100	100	100	1000	0.042	J	0.1	U	0.1	U	0.11	U	0.38		0.034	J	0.1	U
Benzo(a)anthracene	1	1	1	1	0.1		0.019	J	0.039	J	0.06	J	**2.6**		0.17		0.1	U
Benzo(a)pyrene	1	1	1	22	0.088	J	0.14	U	0.14	U	0.066	J	**2.7**		0.17		0.14	U
Benzo(b)fluoranthene	1	1	1	1.7	0.13		0.1	U	0.043	J	0.08	J	**3.6**		0.23		0.1	U
Benzo(ghi)perylene	100	100	100	1000	0.058	J	0.14	U	0.022	J	0.074	J	1.8		0.12	J	0.14	U
Benzo(k)fluoranthene	0.8	1	3.9	1.7	0.027	J	0.1	U	0.1	U	0.11	U	**0.92**		0.063	J	0.1	U
Benzoic Acid	NC	NC	NC	NC	0.55	U	0.56	U	0.56	U	0.57	U	0.56	U	0.54	U	0.56	U
Benzyl Alcohol	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Biphenyl	NC	NC	NC	NC	0.39	U	0.39	U	0.39	U	0.4	U	0.39	U	0.38	U	0.39	U
Bis(2-chloroethoxy)methane	NC	NC	NC	NC	0.18	U	0.18	U	0.19	U	0.19	U	0.19	U	0.18	U	0.18	U
Bis(2-chloroethyl)ether	NC	NC	NC	NC	0.15	U	0.15	U	0.16	U	0.16	U	0.16	U	0.15	U	0.15	U
Bis(2-chloroisopropyl)ether	NC	NC	NC	NC	0.2	U	0.21	U	0.21	U	0.21	U	0.21	U	0.2	U	0.2	U
Bis(2-ethylhexyl)phthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Butyl benzyl phthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Carbazole	NC	NC	NC	NC	0.024	J	0.17	U	0.17	U	0.18	U	0.051	J	0.17	U	0.17	U
Chrysene	1	1	3.9	1	0.09	J	0.1	U	0.029	J	0.056	J	**2.3**		0.16		0.1	U
Di-n-butylphthalate	NC	NC	NC	NC	0.47		0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Di-n-octylphthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Dibenzo(a,h)anthracene	0.33	0.33	0.33	1000	0.1	U	0.1	U	0.1	U	0.11	U	**0.49**		0.03	J	0.1	U
Dibenzofuran	7	14	59	210	0.17	U	0.17	U	0.17	U	0.18	U	0.029	J	0.17	U	0.17	U
Diethyl phthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Dimethyl phthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Fluoranthene	100	100	100	1000	0.23		0.023	J	0.056	J	0.097	J	4.3		0.36		0.027	J
Fluorene	30	100	100	386	0.17	U	0.17	U	0.17	U	0.18	U	0.072	J	0.022	J	0.17	U
Hexachlorobenzene	0.33	0.33	1.2	3.2	0.1	U	0.1	U	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U
Hexachlorobutadiene	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Hexachlorocyclopentadiene	NC	NC	NC	NC	0.49	U	0.49	U	0.49	U	0.51	U	0.49	U	0.48	U	0.49	U
Hexachloroethane	NC	NC	NC	NC	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.14	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	8.2	0.064	J	0.14	U	0.14	U	0.055	J	**2.1**		0.14		0.14	U
Isophorone	NC	NC	NC	NC	0.15	U	0.15	U	0.16	U	0.16	U	0.16	U	0.15	U	0.15	U
n-Nitrosodi-n-propylamine	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Naphthalene	12	100	100	12	0.17	U	0.17	U	0.17	U	0.18	U	0.089	J	0.17	U	0.17	U
NDPA/DPA	NC	NC	NC	NC	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.14	U
Nitrobenzene	NC	NC	NC	NC	0.15	U	0.15	U	0.16	U	0.16	U	0.16	U	0.15	U	0.15	U
p-Chloro-m-cresol	NC	NC	NC	NC	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Pentachlorophenol	0.8	2.4	6.7	0.8	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.14	U
Phenanthrene	100	100	100	1000	0.21		0.1	U	0.029	J	0.065	J	1.4		0.27		0.1	U
Phenol	0.33	100	100	0.33	0.17	U	0.17	U	0.17	U	0.18	U	0.17	U	0.17	U	0.17	U
Pyrene	100	100	100	1000	0.21		0.022	J	0.053	J	0.092	J	4		0.32		0.022	J
Total TIC Compounds	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-

All analyitcal results for soil in milligrams per kilogram (mg/kg).
Q: Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been assigned.
U = Not detected at the reported detection limit for the sample.
R1 =reanalyzed
NC = No criteria established for this contaminant
E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t
I - The lower value for the two columns has been reported due to obvious interference.
P - The RPD between the results for the two columns exceeds the method-specified criteria.
d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio
"-" = Analyte not analyzed
UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).
RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)
RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)
PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)
Reporting Limit Exceeds UUSCO

Concentration exceeds UUSCO
Concentration exceeds RSCO & UUSCO
Concentration exceeds RRSCO, RSCO & UUSCO
Concentration exceeds PGWSCO & UUSCO
Concentration exceeds PGWSCO, RSCO & UUSCO
Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB14 (2-4)		SB15 (1-3)		SB-16 (1.5-4.5)		SB16 (6.5-8.5)		SB17 (1-3.5)		SB18 (1-4)		SB18 (11-13)	
LAB ID:					L2168050-05		L2168372-03		L2168372-01		L2168372-02		L2167681-04		L2167681-02		L2167681-03	
COLLECTION DATE:					12/10/2021		12/13/2021		12/13/2021		12/13/2021		12/9/2021		12/9/2021		12/9/2021	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
CHLORINATED HERBICIDES BY GC																		
2,4,5-T	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	3.8	58	100	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-D	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL PETROLEUM HYDROCARBONS																		
TPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PESTICIDES																		
4,4'-DDD	0.0033	2.6	13	14	0.00163	U	0.00168	U	0.00166	U	0.00171	U	0.00165	U	0.00161	U	0.00158	U
4,4'-DDE	0.0033	1.8	8.9	17	0.00163	U	0.00146	J	0.00166	U	0.00171	U	0.00165	U	0.00161	U	0.00158	U
4,4'-DDT	0.0033	1.7	7.9	136	0.00305	U	0.00195	J	0.00311	U	0.00264	J	0.0031	U	0.00302	U	0.00296	U
Aldrin	0.005	0.019	0.097	0.19	0.00163	U	0.00168	U	0.00166	U	0.00171	U	0.00165	U	0.00161	U	0.00158	U
Alpha-BHC	0.02	0.097	0.48	0.02	0.000678	U	0.000698	U	0.000691	U	0.000713	U	0.000689	U	0.000672	U	0.000657	U
Beta-BHC	0.036	0.072	0.36	0.09	0.00163	U	0.00168	U	0.00166	U	0.00171	U	0.00165	U	0.00161	U	0.00158	U
Chlordane	NC	NC	NC	NC	0.0136	U	0.014	U	0.0138	U	0.0142	U	0.0138	U	0.0134	U	0.0131	U
cis-Chlordane	0.094	0.91	4.2	2.9	0.00204	U	0.00209	U	0.00207	U	0.00214	U	0.00174	JP	0.00202	U	0.00197	U
Delta-BHC	0.04	100	100	0.25	0.00163	U	0.00168	U	0.00166	U	0.00171	U	0.00165	U	0.00161	U	0.00158	U
Dieldrin	0.005	0.039	0.2	0.1	0.00102	U	0.00105	U	0.00104	U	0.00107	U	0.00103	U	0.00101	U	0.000986	U
Endosulfan I	2.4	4.8	24	102	0.00163	U	0.00168	U	0.00166	U	0.00171	U	0.00165	U	0.00161	U	0.00158	U
Endosulfan II	2.4	4.8	24	102	0.00163	U	0.00168	U	0.00166	U	0.00171	U	0.00165	U	0.00161	U	0.00158	U
Endosulfan sulfate	2.4	4.8	24	1000	0.000678	U	0.000698	U	0.000691	U	0.000713	U	0.000689	U	0.000672	U	0.000657	U
Endrin	0.014	2.2	11	0.06	0.000678	U	0.000698	U	0.000691	U	0.000713	U	0.000689	U	0.000672	U	0.000657	U
Endrin aldehyde	NC	NC	NC	NC	0.00204	U	0.00209	U	0.00207	U	0.00214	U	0.00206	U	0.00202	U	0.00197	U
Endrin ketone	NC	NC	NC	NC	0.00163	U	0.00168	U	0.00166	U	0.00171	U	0.00165	U	0.00161	U	0.00158	U
Heptachlor	0.042	0.42	2.1	0.38	0.000814	U	0.000838	U	0.000829	U	0.000855	U	0.000826	U	0.000806	U	0.000789	U
Heptachlor epoxide	NC	NC	NC	NC	0.00305	U	0.00314	U	0.00311	U	0.00321	U	0.0031	U	0.00302	U	0.00296	U
Lindane	0.1	0.28	1.3	0.1	0.000678	U	0.000698	U	0.000691	U	0.000713	U	0.000689	U	0.000672	U	0.000657	U
Methoxychlor	NC	NC	NC	NC	0.00305	U	0.00314	U	0.00311	U	0.00321	U	0.0031	U	0.00302	U	0.00296	U
Toxaphene	NC	NC	NC	NC	0.0305	U	0.0314	U	0.0311	U	0.0321	U	0.031	U	0.0302	U	0.0296	U
trans-Chlordane	NC	NC	NC	NC	0.00204	U	0.00209	U	0.00207	U	0.00214	U	0.0019	J	0.00202	U	0.00197	U
PCBs																		
Aroclor 1016	0.1	1	1	3.2	0.0334	U	0.0334	U	0.0344	U	0.034	U	0.0347	U	0.0334	U	0.0331	U
Aroclor 1221	0.1	1	1	3.2	0.0334	U	0.0334	U	0.0344	U	0.034	U	0.0347	U	0.0334	U	0.0331	U
Aroclor 1232	0.1	1	1	3.2	0.0334	U	0.0334	U	0.0344	U	0.034	U	0.0347	U	0.0334	U	0.0331	U
Aroclor 1242	0.1	1	1	3.2	0.0334	U	0.0334	U	0.0344	U	0.034	U	0.0347	U	0.0334	U	0.0331	U
Aroclor 1248	0.1	1	1	3.2	0.0334	U	0.0334	U	0.0344	U	0.034	U	0.0347	U	0.0334	U	0.0331	U
Aroclor 1254	0.1	1	1	3.2	0.0334	U	0.0334	U	0.0344	U	0.034	U	0.0347	U	0.0334	U	0.0331	U
Aroclor 1260	0.1	1	1	3.2	0.0334	U	0.0334	U	0.0344	U	0.034	U	0.0347	U	0.0334	U	0.0331	U
Aroclor 1262	0.1	1	1	3.2	0.0334	U	0.0334	U	0.0344	U	0.034	U	0.0347	U	0.0334	U	0.0331	U
Aroclor 1268	0.1	1	1	3.2	0.0334	U	0.0334	U	0.0344	U	0.034	U	0.0347	U	0.0334	U	0.0331	U
TOTAL METALS																		
Aluminum, Total	NC	NC	NC	NC	947		979		1570		6290		1320		1360		1050	
Antimony, Total	NC	NC	NC	NC	4.07	U	4.2	U	4.02	U	4.22	U	4.05	U	3.96	U	4.03	U
Arsenic, Total	13	16	16	16	1.28		0.839		1.69		1.16		1.55		1.39		1.29	
Barium, Total	350	350	400	820	6.56		6.13		12.2		62.8		9		9.47		3.75	
Beryllium, Total	7.2	14	72	47	0.049	J	0.042	J	0.072	J	0.169	J	0.073	J	0.071	J	0.056	J
Cadmium, Total	2.5	2.5	4.3	7.5	0.813	U	0.839	U	0.804	U	0.844	U	0.81	U	0.792	U	0.806	U
Calcium, Total	NC	NC	NC	NC	1270		382		3230		4680		2500		1060		1770	
Chromium, Total	NC	NC	NC	NC	3.62		2.5		7.34		17.2		5.36		4.71		11.2	
Cobalt, Total	NC	NC	NC	NC	1.34	J	0.907	J	2.14		7.89		1.72		1.9		1.47	J
Copper, Total	50	270	270	1720	3.1		2.59		4.88		22.7		4.72		3.92		3.22	
Iron, Total	NC	NC	NC	NC	2650		1920		3790		12200		3550		3470		3450	
Lead, Total	63	400	400	450	8.83		4.6		11.4		13.5		10.2		8.96		4.35	
Magnesium, Total	NC	NC	NC	NC	765		354		1300		4360		935		1020		649	
Manganese, Total	1600	2000	2000	2000	45.8		39.6		72.5		144		90.6		71.9		64.1	
Mercury, Total	0.18	0.81	0.81	0.73	0.068	U	0.068	U	0.075		0.053	J	0.05	J	0.075		0.065	U
Nickel, Total	30	140	310	130	3.59		1.66	J	6.25		13.3		4.76		7.05		4.43	
Potassium, Total	NC	NC	NC	NC	215		177	J	443		3320		310		352		244	
Selenium, Total	3.9	36	180	4	1.63	U	1.68	U	1.61	U	1.69	U	1.62	U	1.58	U	0.338	J
Silver, Total	2	36	180	8.3	0.813	U	0.839	U	0.804	U	0.844	U	0.81	U	0.792	U	0.806	U
Sodium, Total	NC	NC	NC	NC	36.8	J	11.8	J	49	J	152	J	70.3	J	68.2	J	52.5	J
Thallium, Total	NC	NC	NC	NC	1.63	U	1.68	U	1.61	U	1.69	U	1.62	U	1.58	U	1.61	U
Vanadium, Total	NC	NC	NC	NC	3.33		3.2		5.09		17.3		4.78		4.97		3.96	
Zinc, Total	109	2200	10000	2480	12.4		9.56		17.8		39.8		17.2		14.5		8.16	
GENERAL CHEMISTRY																		
Chromium, Hexavalent	1	22	110	19	0.826	U	0.853	U	0.842	U	0.862	U	0.848	U	0.815	U	0.827	U
Cyanide, Total	27	27	27	40	0.98	U	1	U	0.96	U	1	U	0.48	J	0.99	U	0.95	U
Solids, Total	NC	NC	NC	NC	96.9		93.8		95		92.8		94.3		98.2		96.7	

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB19 (1-3)		SB20 (1-3)		SB20 (9-11)		SB21 (1-3)		SB21 (10-12)		SB22 (0-2)		SB23 (1-3)	
LAB ID:					L2167681-01		L2166780-03		L2166780-04		L2166780-01		L2166780-02		L2210610-01		L2166661-03	
COLLECTION DATE:					12/9/2021		12/6/2021		12/6/2021		12/6/2021		12/6/2021		3/1/2022		12/3/2021	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
VOLATILE ORGANICS																		
1,1,1,2-Tetrachloroethane	NC	NC	NC	NC	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.0003	U	0.00072	U
1,1,1-Trichloroethane	0.68	100	100	NC	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.0003	U	0.00072	U
1,1,2,2-Tetrachloroethane	NC	NC	NC	0.68	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.0003	U	0.00072	U
1,1,2-Trichloroethane	NC	NC	NC	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
1,1-Dichloroethane	0.27	19	26	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
1,1-Dichloroethene	0.33	100	100	0.27	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
1,1-Dichloropropene	NC	NC	NC	0.33	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.0003	U	0.00072	U
1,2,3-Trichlorobenzene	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
1,2,3-Trichloropropane	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
1,2,4,5-Tetramethylbenzene	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
1,2,4-Trimethylbenzene	3.6	47	52	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
1,2-Dibromo-3-chloropropane	NC	NC	NC	3.6	0.0035	U	0.0038	U	0.004	U	0.0035	U	0.0031	U	0.0018	U	0.0043	U
1,2-Dibromoethane	NC	NC	NC	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
1,2-Dichlorobenzene	1.1	100	100	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
1,2-Dichloroethane	0.02	2.3	3.1	1.1	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
1,2-Dichloroethene, Total	NC	NC	NC	0.02	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
1,2-Dichloropropane	NC	NC	NC	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
1,3,5-Trimethylbenzene	8.4	47	52	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
1,3-Dichlorobenzene	2.4	17	49	8.4	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
1,3-Dichloropropane	NC	NC	NC	2.4	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
1,3-Dichloropropene, Total	NC	NC	NC	NC	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.0003	U	0.00072	U
1,4-Dichlorobenzene	1.8	9.8	13	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
1,4-Dioxane	0.1	9.8	13	1.8	0.092	U	***0.1***	***U***	***0.11***	***U***	0.094	U	0.083	U	0.048	U	***0.12***	***U***
2,2-Dichloropropane	NC	NC	NC	0.1	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
2-Butanone	0.12	100	100	NC	0.012	U	0.012	U	0.013	U	0.012	U	0.01	U	0.0061	U	0.014	U
2-Hexanone	NC	NC	NC	0.12	0.012	U	0.012	U	0.013	U	0.012	U	0.01	U	0.0061	U	0.014	U
4-Methyl-2-pentanone	NC	NC	NC	NC	0.012	U	0.012	U	0.013	U	0.012	U	0.01	U	0.0061	U	0.014	U
Acetone	0.05	100	100	NC	0.012	U	0.012	U	0.013	U	0.012	U	0.01	U	0.0061	U	0.014	U
Acrylonitrile	NC	NC	NC	0.05	0.0046	U	0.005	U	0.0054	U	0.0047	U	0.0041	U	0.0024	U	0.0058	U
Benzene	0.06	2.9	4.8	NC	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.0003	U	0.00072	U
Bromobenzene	NC	NC	NC	0.06	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
Bromochloromethane	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
Bromodichloromethane	NC	NC	NC	NC	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.0003	U	0.00072	U
Bromoform	NC	NC	NC	NC	0.0046	U	0.005	U	0.0054	U	0.0047	U	0.0041	U	0.0024	U	0.0058	U
Bromomethane	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
Carbon disulfide	NC	NC	NC	NC	0.012	U	0.012	U	0.013	U	0.012	U	0.01	U	0.0061	U	0.014	U
Carbon tetrachloride	0.76	1.4	2.4	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
Chlorobenzene	1.1	100	100	0.76	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.0003	U	0.00072	U
Chloroethane	NC	NC	NC	1.1	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
Chloroform	0.37	10	49	NC	0.00068	J	0.0019	U	0.00068	J	0.0018	U	0.0016	U	0.00091	U	0.0022	U
Chloromethane	NC	NC	NC	0.37	0.0046	U	0.005	U	0.0054	U	0.0047	U	0.0041	U	0.0024	U	0.0058	U
cis-1,2-Dichloroethene	0.25	59	100	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
cis-1,3-Dichloropropene	NC	NC	NC	0.25	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.0003	U	0.00072	U
Dibromochloromethane	NC	NC	NC	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
Dibromomethane	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
Dichlorodifluoromethane	NC	NC	NC	NC	0.012	U	0.012	U	0.013	U	0.012	U	0.01	U	0.0061	U	0.014	U
Ethyl ether	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
Ethylbenzene	1	30	41	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
Hexachlorobutadiene	NC	NC	NC	1	0.0046	U	0.005	U	0.0054	U	0.0047	U	0.0041	U	0.0024	U	0.0058	U
Isopropylbenzene	NC	NC	NC	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
Methyl tert butyl ether	0.93	62	100	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
Methylene chloride	0.05	51	100	0.93	0.0058	U	0.0063	U	0.0067	U	0.0059	U	0.0052	U	0.003	U	0.0072	U
n-Butylbenzene	12	100	100	0.05	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
n-Propylbenzene	3.9	100	100	12	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
Naphthalene	12	100	100	3.9	0.0046	U	0.005	U	0.0054	U	0.0047	U	0.0041	U	0.0024	U	0.0058	U
o-Chlorotoluene	NC	NC	NC	12	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
o-Xylene	NC	NC	NC	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
p-Chlorotoluene	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
p-Diethylbenzene	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
p-Ethyltoluene	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
p-Isopropyltoluene	NC	NC	NC	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
p/m-Xylene	NC	NC	NC	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
sec-Butylbenzene	11	100	100	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
Styrene	NC	NC	NC	11	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
tert-Butylbenzene	5.9	100	100	NC	0.0023	U	0.0025	U	0.0027	U	0.0023	U	0.0021	U	0.0012	U	0.0029	U
Tetrachloroethene	1.3	5.5	19	5.9	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.00032		0.00072	U
Toluene	0.7	100	100	1.3	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
trans-1,2-Dichloroethene	0.19	100	100	0.7	0.0017	U	0.0019	U	0.002	U	0.0018	U	0.0016	U	0.00091	U	0.0022	U
trans-1,3-Dichloropropene	NC	NC	NC	0.19	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
trans-1,4-Dichloro-2-butene	NC	NC	NC	NC	0.0058	U	0.0063	U	0.0067	U	0.0059	U	0.0052	U	0.003	U	0.0072	U
Trichloroethene	0.47	10	21	NC	0.00058	U	0.00063	U	0.00067	U	0.00059	U	0.00052	U	0.0003	U	0.00072	U
Trichlorofluoromethane	NC	NC	NC	0.47	0.0046	U	0.005	U	0.0054	U	0.0047	U	0.0041	U	0.0024	U	0.0058	U
Vinyl acetate	NC	NC	NC	NC	0.012	U	0.012	U	0.013	U	0.012	U	0.01	U	0.0061	U	0.014	U
Vinyl chloride	0.02	0.21	0.9	NC	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
Xylenes, Total	0.26	100	100	0.02	0.0012	U	0.0012	U	0.0013	U	0.0012	U	0.001	U	0.00061	U	0.0014	U
Total TIC Compounds	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-

All analytical results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB19 (1-3)		SB20 (1-3)		SB20 (9-11)		SB21 (1-3)		SB21 (10-12)		SB22 (0-2)		SB23 (1-3)	
LAB ID:					L2167681-01		L2166780-03		L2166780-04		L2166780-01		L2166780-02		L2210610-01		L2166661-03	
COLLECTION DATE:					12/9/2021		12/6/2021		12/6/2021		12/6/2021		12/6/2021		3/1/2022		12/3/2021	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
SEMI-VOLATILE ORGANICS																		
1,2,4,5-Tetrachlorobenzene	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
1,2-Dichlorobenzene	1.1	100	100	1.1	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
1,3-Dichlorobenzene	2.4	17	49	2.4	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
1,4-Dichlorobenzene	1.8	9.8	13	1.8	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
1,4-Dioxane	0.1	9.8	13	0.1	0.026	U	0.025	U	0.03	U	0.025	U	0.025	U	0.031	U	0.026	U
2,4,5-Trichlorophenol	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
2,4,6-Trichlorophenol	NC	NC	NC	NC	0.1	U	0.1	U	0.12	U	0.1	U	0.1	U	0.12	U	0.1	U
2,4-Dichlorophenol	NC	NC	NC	NC	0.15	U	0.15	U	0.18	U	0.15	U	0.15	U	0.18	U	0.16	U
2,4-Dimethylphenol	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
2,4-Dinitrophenol	NC	NC	NC	NC	0.82	U	0.81	U	0.96	U	0.81	U	0.8	U	0.99	U	0.84	U
2,4-Dinitrotoluene	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
2,6-Dinitrotoluene	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
2-Chloronaphthalene	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
2-Chlorophenol	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
2-Methylnaphthalene	NC	NC	NC	NC	0.21	U	0.2	U	0.24	U	0.2	U	0.2	U	0.25	U	0.21	U
2-Methylphenol	0.33	100	100	0.33	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
2-Nitroaniline	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
2-Nitrophenol	NC	NC	NC	NC	0.37	U	0.36	U	0.43	U	0.36	U	0.36	U	0.45	U	0.38	U
3,3'-Dichlorobenzidine	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
3-Methylphenol/4-Methylphenol	0.33	34	100	0.33	0.25	U	0.24	U	0.29	U	0.24	U	0.24	U	0.3	U	0.25	U
3-Nitroaniline	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
4,6-Dinitro-o-cresol	NC	NC	NC	NC	0.45	U	0.44	U	0.52	U	0.44	U	0.43	U	0.54	U	0.46	U
4-Bromophenyl phenyl ether	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
4-Chloroaniline	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
4-Chlorophenyl phenyl ether	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
4-Nitroaniline	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
4-Nitrophenol	NC	NC	NC	NC	0.24	U	0.24	U	0.28	U	0.24	U	0.23	U	0.29	U	0.24	U
Acenaphthene	20	100	100	98	0.14	U	0.13	U	0.16	U	0.14	U	0.13	U	0.16	U	0.045	J
Acenaphthylene	100	100	100	107	0.14	U	0.13	U	0.16	U	0.028	J	0.13	U	0.16	U	0.084	J
Acetophenone	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Anthracene	100	100	100	1000	0.1	U	0.1	U	0.12	U	0.039	J	0.1	U	0.12	U	0.13	
Benzo(a)anthracene	1	1	1	1	0.08	J	0.1	U	0.04	J	0.14		0.027	J	0.14		0.43	
Benzo(a)pyrene	1	1	1	22	0.076	J	0.13	U	0.16	U	0.13	J	0.13	U	0.14	J	0.41	
Benzo(b)fluoranthene	1	1	1	1.7	0.11		0.1	U	0.12	U	0.18		0.03	J	0.2		0.51	
Benzo(ghi)perylene	100	100	100	1000	0.062	J	0.13	U	0.16	U	0.093	J	0.13	U	0.089	J	0.26	
Benzo(k)fluoranthene	0.8	1	3.9	1.7	0.028	J	0.1	U	0.12	U	0.043	J	0.1	U	0.052	J	0.19	
Benzoic Acid	NC	NC	NC	NC	0.56	U	0.54	U	0.64	U	0.55	U	0.54	U	0.67	U	0.57	U
Benzyl Alcohol	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Biphenyl	NC	NC	NC	NC	0.39	U	0.38	U	0.45	U	0.38	U	0.38	U	0.47	U	0.4	U
Bis(2-chloroethoxy)methane	NC	NC	NC	NC	0.18	U	0.18	U	0.22	U	0.18	U	0.18	U	0.22	U	0.19	U
Bis(2-chloroethyl)ether	NC	NC	NC	NC	0.15	U	0.15	U	0.18	U	0.15	U	0.15	U	0.18	U	0.16	U
Bis(2-chloroisopropyl)ether	NC	NC	NC	NC	0.21	U	0.2	U	0.24	U	0.2	U	0.2	U	0.25	U	0.21	U
Bis(2-ethylhexyl)phthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.09	J	0.17	U	0.21	U	0.18	U
Butyl benzyl phthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Carbazole	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.019	J	0.17	U	0.026	J	0.042	J
Chrysene	1	1	3.9	1	0.074	J	0.1	U	0.032	J	0.14		0.024	J	0.15		0.42	
Di-n-butylphthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Di-n-octylphthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Dibenzo(a,h)anthracene	0.33	0.33	0.33	1000	0.1	U	0.1	U	0.12	U	0.023	J	0.1	U	0.12	U	0.062	J
Dibenzofuran	7	14	59	210	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.021	J
Diethyl phthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Dimethyl phthalate	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Fluoranthene	100	100	100	1000	0.13		0.019	J	0.067	J	0.26		0.041	J	0.36		0.86	
Fluorene	30	100	100	386	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.022	J	0.04	J
Hexachlorobenzene	0.33	0.33	1.2	3.2	0.1	U	0.1	U	0.12	U	0.1	U	0.1	U	0.12	U	0.1	U
Hexachlorobutadiene	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Hexachlorocyclopentadiene	NC	NC	NC	NC	0.49	U	0.48	U	0.57	U	0.48	U	0.48	U	0.59	U	0.5	U
Hexachloroethane	NC	NC	NC	NC	0.14	U	0.13	U	0.16	U	0.14	U	0.13	U	0.16	U	0.14	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	8.2	0.062	J	0.13	U	0.16	U	0.1	J	0.13	U	0.11	J	0.3	
Isophorone	NC	NC	NC	NC	0.15	U	0.15	U	0.18	U	0.15	U	0.15	U	0.18	U	0.16	U
n-Nitrosodi-n-propylamine	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Naphthalene	12	100	100	12	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.024	J
NDPA/DPA	NC	NC	NC	NC	0.14	U	0.13	U	0.16	U	0.14	U	0.13	U	0.16	U	0.14	U
Nitrobenzene	NC	NC	NC	NC	0.15	U	0.15	U	0.18	U	0.15	U	0.15	U	0.18	U	0.16	U
p-Chloro-m-cresol	NC	NC	NC	NC	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Pentachlorophenol	0.8	2.4	6.7	0.8	0.14	U	0.13	U	0.16	U	0.14	U	0.13	U	0.16	U	0.14	U
Phenanthrene	100	100	100	1000	0.078	J	0.1	U	0.034	J	0.16		0.025	J	0.29		0.48	
Phenol	0.33	100	100	0.33	0.17	U	0.17	U	0.2	U	0.17	U	0.17	U	0.21	U	0.18	U
Pyrene	100	100	100	1000	0.13		0.017	J	0.062	J	0.24		0.04	J	0.28		0.78	
Total TIC Compounds	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB19 (1-3)		SB20 (1-3)		SB20 (9-11)		SB21 (1-3)		SB21 (10-12)		SB22 (0-2)		SB23 (1-3)	
LAB ID:					L2167681-01		L2166780-03		L2166780-04		L2166780-01		L2166780-02		L2210610-01		L2166661-03	
COLLECTION DATE:					12/9/2021		12/6/2021		12/6/2021		12/6/2021		12/6/2021		3/1/2022		12/3/2021	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
CHLORINATED HERBICIDES BY GC																		
2,4,5-T	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	3.8	58	100	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-D	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL PETROLEUM HYDROCARBONS																		
TPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PESTICIDES																		
4,4'-DDD	0.0033	2.6	13	14	0.00163	U	0.00159	U	0.00183	U	0.000645	J	0.00158	U	0.000726	J	0.00134	J
4,4'-DDE	0.0033	1.8	8.9	17	0.00163	U	0.00159	U	0.00045	J	0.00161	U	0.00158	U	**0.00537**		0.0016	J
4,4'-DDT	0.0033	1.7	7.9	136	0.00306	U	0.00299	U	***0.00343***	***U***	0.00302	U	0.00296	U	0.00278	JP	**0.00664**	
Aldrin	0.005	0.019	0.097	0.19	0.00163	U	0.00159	U	0.00183	U	0.00161	U	0.00158	U	0.00192	U	0.00171	U
Alpha-BHC	0.02	0.097	0.48	0.02	0.000679	U	0.000664	U	0.000763	U	0.00067	U	0.000658	U	0.000799	U	0.000711	U
Beta-BHC	0.036	0.072	0.36	0.09	0.00163	U	0.00159	U	0.00183	U	0.00161	U	0.00158	U	0.00192	U	0.00171	U
Chlordane	NC	NC	NC	NC	0.0136	U	0.0133	U	0.0153	U	0.0134	U	0.0132	U	0.016	U	0.0142	U
cis-Chlordane	0.094	0.91	4.2	2.9	0.00204	U	0.00199	U	0.00229	U	0.00201	U	0.00197	U	0.0071	IP	0.00195	J
Delta-BHC	0.04	100	100	0.25	0.00163	U	0.00159	U	0.00183	U	0.00161	U	0.00158	U	0.00192	U	0.00171	U
Dieldrin	0.005	0.039	0.2	0.1	0.00102	U	0.000997	U	0.00114	U	0.001	U	0.000987	U	0.00279		0.00107	U
Endosulfan I	2.4	4.8	24	102	0.00163	U	0.00159	U	0.00183	U	0.00161	U	0.00158	U	0.00192	U	0.00171	U
Endosulfan II	2.4	4.8	24	102	0.00163	U	0.00159	U	0.00183	U	0.00161	U	0.00158	U	0.00192	U	0.00171	U
Endosulfan sulfate	2.4	4.8	24	1000	0.000679	U	0.000664	U	0.000763	U	0.00067	U	0.000658	U	0.000799	U	0.000711	U
Endrin	0.014	2.2	11	0.06	0.000679	U	0.000664	U	0.000763	U	0.00067	U	0.000658	U	0.000799	U	0.000711	U
Endrin aldehyde	NC	NC	NC	NC	0.00204	U	0.00199	U	0.00229	U	0.00201	U	0.00197	U	0.0024	U	0.00213	U
Endrin ketone	NC	NC	NC	NC	0.00163	U	0.00159	U	0.00183	U	0.00161	U	0.00158	U	0.00192	U	0.00171	U
Heptachlor	0.042	0.42	2.1	0.38	0.000815	U	0.000797	U	0.000916	U	0.000804	U	0.00079	U	0.000959	U	0.000853	U
Heptachlor epoxide	NC	NC	NC	NC	0.00306	U	0.00299	U	0.00343	U	0.00302	U	0.00296	U	0.0036	U	0.0032	U
Lindane	0.1	0.28	1.3	0.1	0.000679	U	0.000664	U	0.000763	U	0.00067	U	0.000658	U	0.000799	U	0.000711	U
Methoxychlor	NC	NC	NC	NC	0.00306	U	0.00299	U	0.00343	U	0.00302	U	0.00296	U	0.0036	U	0.0032	U
Toxaphene	NC	NC	NC	NC	0.0306	U	0.0299	U	0.0343	U	0.0302	U	0.0296	U	0.036	U	0.032	U
trans-Chlordane	NC	NC	NC	NC	0.00204	U	0.00199	U	0.00229	U	0.00201	U	0.00197	U	0.00334		0.00224	
PCBs																		
Aroclor 1016	0.1	1	1	3.2	0.0339	U	0.0329	U	0.038	U	0.0335	U	0.0324	U	0.0406	U	0.0348	U
Aroclor 1221	0.1	1	1	3.2	0.0339	U	0.0329	U	0.038	U	0.0335	U	0.0324	U	0.0406	U	0.0348	U
Aroclor 1232	0.1	1	1	3.2	0.0339	U	0.0329	U	0.038	U	0.0335	U	0.0324	U	0.0406	U	0.0348	U
Aroclor 1242	0.1	1	1	3.2	0.0339	U	0.0329	U	0.038	U	0.0335	U	0.0324	U	0.0406	U	0.0348	U
Aroclor 1248	0.1	1	1	3.2	0.0339	U	0.0329	U	0.038	U	0.0335	U	0.0324	U	0.0406	U	0.0348	U
Aroclor 1254	0.1	1	1	3.2	0.0339	U	0.0329	U	0.038	U	0.0335	U	0.0324	U	0.0406	U	0.0163	J
Aroclor 1260	0.1	1	1	3.2	0.0339	U	0.0329	U	0.038	U	0.0177	J	0.0324	U	0.0406	U	0.0156	J
Aroclor 1262	0.1	1	1	3.2	0.0339	U	0.0329	U	0.038	U	0.0335	U	0.0324	U	0.0406	U	0.0348	U
Aroclor 1268	0.1	1	1	3.2	0.0339	U	0.0329	U	0.038	U	0.0335	U	0.0324	U	0.0406	U	0.0348	U
TOTAL METALS																		
Aluminum, Total	NC	NC	NC	NC	1920		996		1100		1360		1160		3420		2300	
Antimony, Total	NC	NC	NC	NC	0.565	J	3.93	U	4.6	U	3.93	U	3.96	U	4.96	U	4.13	U
Arsenic, Total	13	16	16	16	1.72		1.51		1.62		1.49		1.27		2.36		1.83	
Barium, Total	350	350	400	820	20.7		2.61		6.15		13.2		8.04		24		62.9	
Beryllium, Total	7.2	14	72	47	0.105	J	0.047	J	0.055	J	0.055	J	0.04	J	0.079	J	0.107	J
Cadmium, Total	2.5	2.5	4.3	7.5	0.807	U	0.787	U	0.92	U	0.785	U	0.793	U	0.159	J	0.264	J
Calcium, Total	NC	NC	NC	NC	3070		313		615		1260		339		5600		13300	
Chromium, Total	NC	NC	NC	NC	6.93		2.92		3.5		4.64		3.56		6.49		7.82	
Cobalt, Total	NC	NC	NC	NC	2.58		1.53	J	1.61	J	1.89		1.63		2.31		2.85	
Copper, Total	50	270	270	1720	8.34		1.2		1.68		3.71		4.18		10.2		14.8	
Iron, Total	NC	NC	NC	NC	4580		2660		2820		3210		2930		5060		6000	
Lead, Total	63	400	400	450	22		3.15	J	3.43	J	11		9.2		18.4		44.2	
Magnesium, Total	NC	NC	NC	NC	1800		539		596		862		631		1840		5290	
Manganese, Total	1600	2000	2000	2000	96.1		52.7		62		63		43		122		96.1	
Mercury, Total	0.18	0.81	0.81	0.73	0.081		0.065	U	0.075	U	0.055	J	0.058	J	0.081	U	**0.191**	
Nickel, Total	30	140	310	130	12.1		3.73		3.81		5.54		4.13		4.65		9.9	
Potassium, Total	NC	NC	NC	NC	532		206		255		338		358		280		648	
Selenium, Total	3.9	36	180	4	0.282	J	0.204	J	0.405	J	1.57	U	1.58	U	1.98	U	1.65	U
Silver, Total	2	36	180	8.3	0.807	U	0.787	U	0.92	U	0.785	U	0.793	U	0.992	U	0.826	U
Sodium, Total	NC	NC	NC	NC	82.3	J	58	J	49.2	J	42.2	J	26.3	J	21	J	118	J
Thallium, Total	NC	NC	NC	NC	1.61	U	1.57	U	1.84	U	1.57	U	1.58	U	1.98	U	1.65	U
Vanadium, Total	NC	NC	NC	NC	6.93		3.66		3.84		4.15		4.23		8.52		9.61	
Zinc, Total	109	2200	10000	2480	27.5		12.5		11.4		19.3		9.89		33.8		58.8	
GENERAL CHEMISTRY																		
Chromium, Hexavalent	1	22	110	19	0.835	U	0.824	U	0.958	U	0.826	U	0.818	U	***1.01***	***U***	0.859	U
Cyanide, Total	27	27	27	40	0.98	U	1	U	0.25	J	1	U	0.99	U	1.2	U	1	U
Solids, Total	NC	NC	NC	NC	95.8		97.1		83.5		96.9		97.8		79		93.1	

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB24 (1-4)		SB24 (10-12)		SB25 (1-3)		SB26 (1-3)		SB26 (10-12)		SB27 (1-3)		SB28 (1-3)		SB29 (1-3)		SB29 (10-12)		SB30 (1-3)		BH-08 (8-10)	
LAB ID:					L2166661-01		L2166661-02		L2166146-04		L2166146-02		L2166146-03		L2166146-01		L2165829-04		L2165829-02		L2165829-03		L2165829-01		L2213796-01	
COLLECTION DATE:					12/3/2021		12/3/2021		12/2/2021		12/2/2021		12/2/2021		12/2/2021		12/1/2021		12/1/2021		12/1/2021		12/1/2021		3/16/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
VOLATILE ORGANICS																										
1,1,1,2-Tetrachloroethane	NC	NC	NC	NC	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.00052	U	0.00068	U	0.00054	U	0.00042	U
1,1,1-Trichloroethane	0.68	100	100	NC	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.00052	U	0.00068	U	0.00054	U	0.00042	U
1,1,2,2-Tetrachloroethane	NC	NC	NC	0.68	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.00052	U	0.00068	U	0.00054	U	0.00042	U
1,1,2-Trichloroethane	NC	NC	NC	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
1,1-Dichloroethane	0.27	19	26	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
1,1-Dichloroethene	0.33	100	100	0.27	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
1,1-Dichloropropene	NC	NC	NC	0.33	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.00052	U	0.00068	U	0.00054	U	0.00042	U
1,2,3-Trichlorobenzene	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
1,2,3-Trichloropropane	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
1,2,4,5-Tetramethylbenzene	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
1,2,4-Trimethylbenzene	3.6	47	52	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
1,2-Dibromo-3-chloropropane	NC	NC	NC	3.6	0.0045	U	0.0036	U	0.0033	U	0.004	U	0.0046	U	0.003	U	0.0037	U	0.0031	U	0.0041	U	0.0033	U	0.0025	U
1,2-Dibromoethane	NC	NC	NC	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
1,2-Dichlorobenzene	1.1	100	100	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
1,2-Dichloroethane	0.02	2.3	3.1	1.1	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
1,2-Dichloroethene, Total	NC	NC	NC	0.02	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
1,2-Dichloropropane	NC	NC	NC	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
1,3,5-Trimethylbenzene	8.4	47	52	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
1,3-Dichlorobenzene	2.4	17	49	8.4	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
1,3-Dichloropropane	NC	NC	NC	2.4	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
1,3-Dichloropropene, Total	NC	NC	NC	NC	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.00052	U	0.00068	U	0.00054	U	0.00042	U
1,4-Dichlorobenzene	1.8	9.8	13	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
1,4-Dioxane	0.1	9.8	13	1.8	***0.12***	***U***	0.097	U	0.089	U	***0.11***	***U***	***0.12***	***U***	0.081	U	0.098	U	0.083	U	***0.11***	***U***	0.087	U	0.068	U
2,2-Dichloropropane	NC	NC	NC	0.1	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
2-Butanone	0.12	100	100	NC	0.015	U	0.012	U	0.011	U	0.014	U	0.015	U	0.01	U	0.012	U	0.01	U	0.014	U	0.011	U	0.0029	J
2-Hexanone	NC	NC	NC	0.12	0.015	U	0.012	U	0.011	U	0.014	U	0.015	U	0.01	U	0.012	U	0.01	U	0.014	U	0.011	U	0.0084	U
4-Methyl-2-pentanone	NC	NC	NC	NC	0.015	U	0.012	U	0.011	U	0.014	U	0.015	U	0.01	U	0.012	U	0.01	U	0.014	U	0.011	U	0.0084	U
Acetone	0.05	100	100	NC	0.015	U	0.012		0.011	U	0.014	U	0.015	U	0.01	U	0.012	U	0.01	U	0.014	U	0.011	U	0.026	
Acrylonitrile	NC	NC	NC	0.05	0.006	U	0.0048	U	0.0044	U	0.0054	U	0.0062	U	0.0041	U	0.0049	U	0.0042	U	0.0054	U	0.0044	U	0.0034	U
Benzene	0.06	2.9	4.8	NC	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.0003	J	0.00068	U	0.00054	U	0.00017	J
Bromobenzene	NC	NC	NC	0.06	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
Bromochloromethane	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
Bromodichloromethane	NC	NC	NC	NC	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.00052	U	0.00068	U	0.00054	U	0.00042	U
Bromoform	NC	NC	NC	NC	0.006	U	0.0048	U	0.0044	U	0.0054	U	0.0062	U	0.0041	U	0.0049	U	0.0042	U	0.0054	U	0.0044	U	0.0034	U
Bromomethane	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
Carbon disulfide	NC	NC	NC	NC	0.015	U	0.012	U	0.011	U	0.014	U	0.015	U	0.01	U	0.012	U	0.01	U	0.014	U	0.011	U	0.0096	
Carbon tetrachloride	0.76	1.4	2.4	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
Chlorobenzene	1.1	100	100	0.76	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.00052	U	0.00068	U	0.00054	U	0.00042	U
Chloroethane	NC	NC	NC	1.1	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
Chloroform	0.37	10	49	NC	0.0023	U	0.0018	U	0.00034	J	0.00042	J	0.00046	J	0.00028	J	0.00035	J	0.00022	J	0.00027	J	0.00026	J	0.00091	J
Chloromethane	NC	NC	NC	0.37	0.006	U	0.0048	U	0.0044	U	0.0054	U	0.0062	U	0.0041	U	0.0049	U	0.0042	U	0.0054	U	0.0044	U	0.0034	U
cis-1,2-Dichloroethene	0.25	59	100	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
cis-1,3-Dichloropropene	NC	NC	NC	0.25	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.00052	U	0.00068	U	0.00054	U	0.00042	U
Dibromochloromethane	NC	NC	NC	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
Dibromomethane	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
Dichlorodifluoromethane	NC	NC	NC	NC	0.015	U	0.012	U	0.011	U	0.014	U	0.015	U	0.01	U	0.012	U	0.01	U	0.014	U	0.011	U	0.0084	U
Ethyl ether	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
Ethylbenzene	1	30	41	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
Hexachlorobutadiene	NC	NC	NC	1	0.006	U	0.0048	U	0.0044	U	0.0054	U	0.0062	U	0.0041	U	0.0049	U	0.0042	U	0.0054	U	0.0044	U	0.0034	U
Isopropylbenzene	NC	NC	NC	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
Methyl tert butyl ether	0.93	62	100	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
Methylene chloride	0.05	51	100	0.93	0.0075	U	0.006	U	0.0056	U	0.0068	U	0.0077	U	0.0051	U	0.0061	U	0.0052	U	0.0068	U	0.0054	U	0.0042	U
n-Butylbenzene	12	100	100	0.05	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
n-Propylbenzene	3.9	100	100	12	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
Naphthalene	12	100	100	3.9	0.006	U	0.0014	J	0.0044	U	0.0054	U	0.0062	U	0.0041	U	0.0049	U	0.0042	U	0.0054	U	0.0044	U	0.0022	J
o-Chlorotoluene	NC	NC	NC	12	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
o-Xylene	NC	NC	NC	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
p-Chlorotoluene	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
p-Diethylbenzene	NC	NC	NC	NC	0.003	U	0.00036	J	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
p-Ethyltoluene	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
p-Isopropyltoluene	NC	NC	NC	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
p/m-Xylene	NC	NC	NC	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
sec-Butylbenzene	11	100	100	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00048	J
Styrene	NC	NC	NC	11	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
tert-Butylbenzene	5.9	100	100	NC	0.003	U	0.0024	U	0.0022	U	0.0027	U	0.0031	U	0.002	U	0.0024	U	0.0021	U	0.0027	U	0.0022	U	0.0017	U
Tetrachloroethene	1.3	5.5	19	5.9	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.00052	U	0.00068	U	0.00054	U	0.00042	U
Toluene	0.7	100	100	1.3	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
trans-1,2-Dichloroethene	0.19	100	100	0.7	0.0023	U	0.0018	U	0.0017	U	0.002	U	0.0023	U	0.0015	U	0.0018	U	0.0016	U	0.002	U	0.0016	U	0.0013	U
trans-1,3-Dichloropropene	NC	NC	NC	0.19	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
trans-1,4-Dichloro-2-butene	NC	NC	NC	NC	0.0075	U	0.006	U	0.0056	U	0.0068	U	0.0077	U	0.0051	U	0.0061	U	0.0052	U	0.0068	U	0.0054	U	0.0042	U
Trichloroethene	0.47	10	21	NC	0.00075	U	0.0006	U	0.00056	U	0.00068	U	0.00077	U	0.00051	U	0.00061	U	0.00052	U	0.00068	U	0.00054	U	0.00042	U
Trichlorofluoromethane	NC	NC	NC	0.47	0.006	U	0.0048	U	0.0044	U	0.0054	U	0.0062	U	0.0041	U	0.0049	U	0.0042	U	0.0054	U	0.0044	U	0.0034	U
Vinyl acetate	NC	NC	NC	NC	0.015	U	0.012	U	0.011	U	0.014	U	0.015	U	0.01	U	0.012	U	0.01	U	0.014	U	0.011	U	0.0084	U
Vinyl chloride	0.02	0.21	0.9	NC	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
Xylenes, Total	0.26	100	100	0.02	0.0015	U	0.0012	U	0.0011	U	0.0014	U	0.0015	U	0.001	U	0.0012	U	0.001	U	0.0014	U	0.0011	U	0.00084	U
Total TIC Compounds	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.068	J

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB24 (1-4)		SB24 (10-12)		SB25 (1-3)		SB26 (1-3)		SB26 (10-12)		SB27 (1-3)		SB28 (1-3)		SB29 (1-3)		SB29 (10-12)		SB30 (1-3)		BH-08 (8-10)	
LAB ID:					L2166661-01		L2166661-02		L2166146-04		L2166146-02		L2166146-03		L2166146-01		L2165829-04		L2165829-02		L2165829-03		L2165829-01		L2213796-01	
COLLECTION DATE:					12/3/2021		12/3/2021		12/2/2021		12/2/2021		12/2/2021		12/2/2021		12/1/2021		12/1/2021		12/1/2021		12/1/2021		3/16/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
SEMI-VOLATILE ORGANICS																										
1,2,4,5-Tetrachlorobenzene	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
1,2,4-Trichlorobenzene	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
1,2-Dichlorobenzene	1.1	100	100	1.1	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
1,3-Dichlorobenzene	2.4	17	49	2.4	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
1,4-Dichlorobenzene	1.8	9.8	13	1.8	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
1,4-Dioxane	0.1	9.8	13	0.1	0.027	U	0.028	U	0.027	U	0.027	U	0.026	U	0.027	U	0.028	U	0.027	U	0.027	U	0.026	U	0.031	U
2,4,5-Trichlorophenol	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
2,4,6-Trichlorophenol	NC	NC	NC	NC	0.11	U	0.11	U	0.11	U	0.11	U	0.1	U	0.11	U	0.11	U	0.11	U	0.11	U	0.1	U	0.12	U
2,4-Dichlorophenol	NC	NC	NC	NC	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.17	U	0.16	U	0.16	U	0.15	U	0.18	U
2,4-Dimethylphenol	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
2,4-Dinitrophenol	NC	NC	NC	NC	0.86	U	0.88	U	0.86	U	0.87	U	0.84	U	0.87	U	0.9	U	0.85	U	0.87	U	0.82	U	0.99	U
2,4-Dinitrotoluene	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
2,6-Dinitrotoluene	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
2-Chloronaphthalene	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
2-Chlorophenol	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
2-Methylnaphthalene	NC	NC	NC	NC	0.21	U	0.22	U	0.21	U	0.22	U	0.21	U	0.22	U	0.032	J	0.21	U	0.22	U	0.2	U	0.25	U
2-Methylphenol	0.33	100	100	0.33	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
2-Nitroaniline	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
2-Nitrophenol	NC	NC	NC	NC	0.39	U	0.4	U	0.38	U	0.39	U	0.38	U	0.39	U	0.41	U	0.38	U	0.39	U	0.37	U	0.44	U
3,3'-Dichlorobenzidine	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
3-Methylphenol/4-Methylphenol	0.33	34	100	0.33	0.26	U	0.26	U	0.26	U	0.26	U	0.25	U	0.26	U	0.27	U	0.26	U	0.26	U	0.24	U	0.3	U
3-Nitroaniline	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
4,6-Dinitro-o-cresol	NC	NC	NC	NC	0.46	U	0.48	U	0.46	U	0.47	U	0.45	U	0.47	U	0.49	U	0.46	U	0.47	U	0.44	U	0.54	U
4-Bromophenyl phenyl ether	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
4-Chloroaniline	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
4-Chlorophenyl phenyl ether	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
4-Nitroaniline	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
4-Nitrophenol	NC	NC	NC	NC	0.25	U	0.26	U	0.25	U	0.25	U	0.24	U	0.25	U	0.26	U	0.25	U	0.25	U	0.24	U	0.29	U
Acenaphthene	20	100	100	98	0.14	U	0.051	J	0.14	U	0.033	J	0.14	U	0.14	U	0.019	J	0.14	U	0.14	U	0.14	U	0.044	J
Acenaphthylene	100	100	100	107	0.14	U	0.14	J	0.14	U	0.038	J	0.14	U	0.14	U	0.046	J	0.14	U	0.14	U	0.14	U	0.053	J
Acetophenone	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Anthracene	100	100	100	1000	0.044	J	0.4		0.054	J	0.097	J	0.1	U	0.077	J	0.11		0.074	J	0.11	U	0.1	U	0.072	J
Benzo(a)anthracene	1	1	1	1	0.16		0.85		0.25		0.29		0.1	U	0.28		0.33		0.22		0.11	U	0.071	J	0.16	
Benzo(a)pyrene	1	1	1	22	0.15		0.71		0.24		0.27		0.14	U	0.27		0.29		0.2		0.14	U	0.063	J	0.19	
Benzo(b)fluoranthene	1	1	1	1.7	0.19		0.86		0.32		0.33		0.1	U	0.33		0.36		0.26		0.11	U	0.085	J	0.2	
Benzo(ghi)perylene	100	100	100	1000	0.11	J	0.4		0.17		0.18		0.14	U	0.18		0.19		0.13	J	0.14	U	0.046	J	0.11	J
Benzo(k)fluoranthene	0.8	1	3.9	1.7	0.057	J	0.25		0.094	J	0.13		0.1	U	0.12		0.14		0.08	J	0.11	U	0.1	U	0.065	J
Benzoic Acid	NC	NC	NC	NC	0.58	U	0.59	U	0.58	U	0.59	U	0.57	U	0.58	U	0.61	U	0.58	U	0.59	U	0.55	U	0.67	U
Benzyl Alcohol	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Biphenyl	NC	NC	NC	NC	0.41	U	0.42	U	0.41	U	0.41	U	0.4	U	0.41	U	0.43	U	0.4	U	0.41	U	0.39	U	0.47	U
Bis(2-chloroethoxy)methane	NC	NC	NC	NC	0.19	U	0.2	U	0.19	U	0.2	U	0.19	U	0.19	U	0.2	U	0.19	U	0.2	U	0.18	U	0.22	U
Bis(2-chloroethyl)ether	NC	NC	NC	NC	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.17	U	0.16	U	0.16	U	0.15	U	0.18	U
Bis(2-chloroisopropyl)ether	NC	NC	NC	NC	0.21	U	0.22	U	0.21	U	0.22	U	0.21	U	0.22	U	0.22	U	0.21	U	0.22	U	0.2	U	0.25	U
Bis(2-ethylhexyl)phthalate	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Butyl benzyl phthalate	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Carbazole	NC	NC	NC	NC	0.18	U	0.032	J	0.18	U	0.036	J	0.17	U	0.019	J	0.023	J	0.021	J	0.18	U	0.17	U	0.02	J
Chrysene	1	1	3.9	1	0.14		0.76		0.24		0.27		0.1	U	0.28		0.33		0.21		0.11	U	0.064	J	0.18	
Di-n-butylphthalate	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Di-n-octylphthalate	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Dibenzo(a,h)anthracene	0.33	0.33	0.33	1000	0.021	J	0.1	J	0.039	J	0.043	J	0.1	U	0.037	J	0.053	J	0.033	J	0.11	U	0.1	U	0.025	J
Dibenzofuran	7	14	59	210	0.18	U	0.04	J	0.18	U	0.021	J	0.17	U	0.18	U	0.031	J	0.18	U	0.18	U	0.17	U	0.024	J
Diethyl phthalate	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Dimethyl phthalate	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Fluoranthene	100	100	100	1000	0.32		1.6		0.42		0.59		0.1	U	0.56		0.55		0.42		0.022	J	0.12		0.32	
Fluorene	30	100	100	386	0.18	U	0.094	J	0.18	U	0.037	J	0.17	U	0.18	U	0.024	J	0.02	J	0.18	U	0.17	U	0.028	J
Hexachlorobenzene	0.33	0.33	1.2	3.2	0.11	U	0.11	U	0.11	U	0.11	U	0.1	U	0.11	U	0.11	U	0.11	U	0.11	U	0.1	U	0.12	U
Hexachlorobutadiene	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Hexachlorocyclopentadiene	NC	NC	NC	NC	0.51	U	0.52	U	0.51	U	0.52	U	0.5	U	0.52	U	0.54	U	0.51	U	0.52	U	0.49	U	0.59	U
Hexachloroethane	NC	NC	NC	NC	0.14	U	0.15	U	0.14	U	0.14	U	0.14	U	0.14	U	0.15	U	0.14	U	0.14	U	0.14	U	0.16	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	8.2	0.11	J	0.45		0.18		0.19		0.14	U	0.18		0.21		0.14		0.14	U	0.05	J	0.12	J
Isophorone	NC	NC	NC	NC	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.17	U	0.16	U	0.16	U	0.15	U	0.18	U
n-Nitrosodi-n-propylamine	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Naphthalene	12	100	100	12	0.18	U	0.053	J	0.18	U	0.18	U	0.17	U	0.18	U	0.09	J	0.18	U	0.18	U	0.17	U	0.038	J
NDPA/DPA	NC	NC	NC	NC	0.14	U	0.15	U	0.14	U	0.14	U	0.14	U	0.14	U	0.15	U	0.14	U	0.14	U	0.14	U	0.16	U
Nitrobenzene	NC	NC	NC	NC	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.16	U	0.17	U	0.16	U	0.16	U	0.15	U	0.18	U
p-Chloro-m-cresol	NC	NC	NC	NC	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Pentachlorophenol	0.8	2.4	6.7	0.8	0.14	U	0.15	U	0.14	U	0.14	U	0.14	U	0.14	U	0.15	U	0.14	U	0.14	U	0.14	U	0.16	U
Phenanthrene	100	100	100	1000	0.16		0.96		0.17		0.36		0.1	U	0.25		0.27		0.28		0.11	U	0.051	J	0.22	
Phenol	0.33	100	100	0.33	0.18	U	0.18	U	0.18	U	0.18	U	0.17	U	0.18	U	0.19	U	0.18	U	0.18	U	0.17	U	0.21	U
Pyrene	100	100	100	1000	0.29		1.4		0.4		0.53		0.1	U	0.5		0.52		0.38		0.019	J	0.11		0.32	
Total TIC Compounds	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.05	J

All analytical results for soil in milligrams per kilogram (mg/kg).
Q: Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been assigned.
U = Not detected at the reported detection limit for the sample.
R1 =reanalyzed
NC = No criteria established for this contaminant
E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t
I - The lower value for the two columns has been reported due to obvious interference.
P - The RPD between the results for the two columns exceeds the method-specified criteria.
d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio
"-" = Analyte not analyzed
UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).
RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)
RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)
PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)
Reporting Limit Exceeds UUSCO
Concentration exceeds UUSCO
Concentration exceeds RSCO & UUSCO
Concentration exceeds RRSCO, RSCO & UUSCO
Concentration exceeds PGWSCO & UUSCO
Concentration exceeds PGWSCO, RSCO & UUSCO
Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 1
Soil Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	Part 375 Unrestricted Use SCOs	Part 375 Residential SCOs	Part 375 Restricted-Residential SCOs	Part 375 Protection of Groundwater SCOs	SB24 (1-4)		SB24 (10-12)		SB25 (1-3)		SB26 (1-3)		SB26 (10-12)		SB27 (1-3)		SB28 (1-3)		SB29 (1-3)		SB29 (10-12)		SB30 (1-3)		BH-08 (8-10)	
LAB ID:					L2166661-01		L2166661-02		L2166146-04		L2166146-02		L2166146-03		L2166146-01		L2165829-04		L2165829-02		L2165829-03		L2165829-01		L2213796-01	
COLLECTION DATE:					12/3/2021		12/3/2021		12/2/2021		12/2/2021		12/2/2021		12/2/2021		12/1/2021		12/1/2021		12/1/2021		12/1/2021		3/16/2022	
SAMPLE MATRIX:					Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore		Soil/Terracore	
ANALYTE	mg/kg	mg/kg	mg/kg	mg/kg	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
CHLORINATED HERBICIDES BY GC																										
2,4,5-T	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	3.8	58	100	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-D	NC	NC	NC	NC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL PETROLEUM HYDROCARBONS																										
TPH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	537	
PESTICIDES																										
4,4'-DDD	0.0033	2.6	13	14	0.00171	U	0.00172	U	0.0017	U	0.00166	U	0.00167	U	0.00174	U	0.00237		0.00097	J	0.00169	U	0.00166	U	***0.0996***	***U***
4,4'-DDE	0.0033	1.8	8.9	17	**0.00372**		0.00172	U	0.00227		0.00166	U	0.00167	U	0.00228		0.00175	U	0.00104	J	0.00169	U	0.000443	J	***0.0996***	***U***
4,4'-DDT	0.0033	1.7	7.9	136	**0.00634**		0.00323	U	0.00318	U	0.00312	U	0.00313	U	0.00195	JP	0.00328	U	0.00313	U	0.00317	U	0.0031	U	***0.187***	***U***
Aldrin	0.005	0.019	0.097	0.19	0.00171	U	0.00172	U	0.0017	U	0.00166	U	0.00167	U	0.00174	U	0.00175	U	0.00167	U	0.00169	U	0.00166	U	***0.0996***	***U***
Alpha-BHC	0.02	0.097	0.48	0.02	0.000711	U	0.000718	U	0.000707	U	0.000693	U	0.000695	U	0.000727	U	0.000728	U	0.000696	U	0.000706	U	0.00069	U	***0.0415***	***U***
Beta-BHC	0.036	0.072	0.36	0.09	0.00171	U	0.00172	U	0.0017	U	0.00166	U	0.00167	U	0.00174	U	0.00175	U	0.00167	U	0.00169	U	0.00166	U	***0.0996***	***U***
Chlordane	NC	NC	NC	NC	0.0142	U	0.0144	U	0.0141	U	0.0138	U	0.0139	U	0.0145	U	0.0146	U	0.0139	U	0.0141	U	0.0138	U	0.83	U
cis-Chlordane	0.094	0.91	4.2	2.9	0.00225	IP	0.00215	U	0.00127	J	0.000765	J	0.00208	U	0.00123	JP	0.00218	U	0.000705	JP	0.00212	U	0.000683	JP	***0.124***	***U***
Delta-BHC	0.04	100	100	0.25	0.00171	U	0.00172	U	0.0017	U	0.00166	U	0.00167	U	0.00174	U	0.00175	U	0.00167	U	0.00169	U	0.00166	U	***0.0996***	***U***
Dieldrin	0.005	0.039	0.2	0.1	0.00138		0.00108	U	**0.00669**	**P**	0.00104	U	0.00104	U	0.00109	U	0.00109	U	0.00104	U	0.00106	U	0.00103	U	***0.0623***	***U***
Endosulfan I	2.4	4.8	24	102	0.00171	U	0.00172	U	0.0017	U	0.00166	U	0.00167	U	0.00174	U	0.00175	U	0.00167	U	0.00169	U	0.00166	U	0.0996	U
Endosulfan II	2.4	4.8	24	102	0.00171	U	0.00172	U	0.0017	U	0.00166	U	0.00167	U	0.00174	U	0.00175	U	0.00167	U	0.00169	U	0.00166	U	0.0996	U
Endosulfan sulfate	2.4	4.8	24	1000	0.000711	U	0.000718	U	0.000707	U	0.000693	U	0.000695	U	0.000727	U	0.000728	U	0.000696	U	0.000706	U	0.00069	U	0.0415	U
Endrin	0.014	2.2	11	0.06	0.000711	U	0.000718	U	0.000707	U	0.000693	U	0.000695	U	0.000727	U	0.000728	U	0.000696	U	0.000706	U	0.00069	U	***0.0415***	***U***
Endrin aldehyde	NC	NC	NC	NC	0.00213	U	0.00215	U	0.00212	U	0.00208	U	0.00208	U	0.00218	U	0.00218	U	0.00209	U	0.00212	U	0.00207	U	0.124	U
Endrin ketone	NC	NC	NC	NC	0.00171	U	0.00172	U	0.0017	U	0.00166	U	0.00167	U	0.00174	U	0.00175	U	0.00167	U	0.00169	U	0.00166	U	0.0996	U
Heptachlor	0.042	0.42	2.1	0.38	0.000854	U	0.000861	U	0.000849	U	0.000831	U	0.000834	U	0.000872	U	0.000874	U	0.000835	U	0.000847	U	0.000828	U	***0.0498***	***U***
Heptachlor epoxide	NC	NC	NC	NC	0.0032	U	0.00323	U	0.00318	U	0.00312	U	0.00313	U	0.00327	U	0.00328	U	0.00313	U	0.00317	U	0.0031	U	0.187	U
Lindane	0.1	0.28	1.3	0.1	0.000711	U	0.000718	U	0.000707	U	0.000693	U	0.000695	U	0.000727	U	0.000728	U	0.000696	U	0.000706	U	0.00069	U	0.0415	U
Methoxychlor	NC	NC	NC	NC	0.0032	U	0.00323	U	0.00318	U	0.00312	U	0.00313	U	0.00327	U	0.00328	U	0.00313	U	0.00317	U	0.0031	U	0.187	U
Toxaphene	NC	NC	NC	NC	0.032	U	0.0323	U	0.0318	U	0.0312	U	0.0313	U	0.0327	U	0.0328	U	0.0313	U	0.0317	U	0.031	U	1.87	U
trans-Chlordane	NC	NC	NC	NC	0.00277		0.00215	U	0.00223	P	0.00253	IP	0.00208	U	0.000932	JIP	0.00218	U	0.000693	JIP	0.00212	U	0.00207	U	0.124	U
PCBs																										
Aroclor 1016	0.1	1	1	3.2	0.0341	U	0.0368	U	0.0358	U	0.0356	U	0.0334	U	0.0345	U	***0.185***	***U***	0.0354	U	0.0361	U	0.0335	U	0.0406	U
Aroclor 1221	0.1	1	1	3.2	0.0341	U	0.0368	U	0.0358	U	0.0356	U	0.0334	U	0.0345	U	***0.185***	***U***	0.0354	U	0.0361	U	0.0335	U	0.0406	U
Aroclor 1232	0.1	1	1	3.2	0.0341	U	0.0368	U	0.0358	U	0.0356	U	0.0334	U	0.0345	U	***0.185***	***U***	0.0354	U	0.0361	U	0.0335	U	0.0406	U
Aroclor 1242	0.1	1	1	3.2	0.0341	U	0.0368	U	0.0358	U	0.0356	U	0.0334	U	0.0345	U	***0.185***	***U***	0.0354	U	0.0361	U	0.0335	U	0.0361	J
Aroclor 1248	0.1	1	1	3.2	0.0341	U	0.0368	U	0.0358	U	0.0356	U	0.0334	U	0.0345	U	***0.185***	***U***	0.0354	U	0.0361	U	0.0335	U	0.0406	U
Aroclor 1254	0.1	1	1	3.2	0.00432	J	0.0368	U	0.0358	U	0.0225	JP	0.0334	U	0.013	J	**1.74**		0.0128	J	0.0361	U	0.0335	U	0.0316	J
Aroclor 1260	0.1	1	1	3.2	0.0341	U	0.0368	U	0.0838		0.0132	J	0.0334	U	0.00856	J	***0.185***	***U***	0.00665	J	0.0361	U	0.0335	U	0.0129	J
Aroclor 1262	0.1	1	1	3.2	0.0341	U	0.0368	U	0.0358	U	0.0356	U	0.0334	U	0.0345	U	***0.185***	***U***	0.0354	U	0.0361	U	0.0335	U	0.0406	U
Aroclor 1268	0.1	1	1	3.2	0.0341	U	0.0368	U	0.0358	U	0.0356	U	0.0334	U	0.0345	U	***0.185***	***U***	0.0354	U	0.0361	U	0.0335	U	0.0406	U
TOTAL METALS																										
Aluminum, Total	NC	NC	NC	NC	2420		2370		4880		3640		1540		3110		5810		4400		969		1890		8940	
Antimony, Total	NC	NC	NC	NC	4.23	U	4.38	U	4.21	U	4.3	U	4.04	U	4.32	U	4.48	U	4.32	U	4.27	U	4.07	U	4.92	U
Arsenic, Total	13	16	16	16	0.719	J	2.86		3.08		2.24		1.56		3.16		2.13		1.84		1.13		2.36		2.18	
Barium, Total	350	350	400	820	21.1		10.5		84.6		57.9		13		50.9		129		73.4		8.56		25.2		107	
Beryllium, Total	7.2	14	72	47	0.068	J	0.096	J	0.27	J	0.172	J	0.073	J	0.173	J	0.296	J	0.224	J	0.043	J	0.09	J	0.394	J
Cadmium, Total	2.5	2.5	4.3	7.5	0.135	J	0.149	J	0.506	J	0.335	J	0.113	J	0.294	J	0.493	J	0.337	J	0.854	U	0.187	J	1.11	
Calcium, Total	NC	NC	NC	NC	1760		9980		11000		7090		3810		5410		11500		23400		26400		4110		10900	
Chromium, Total	NC	NC	NC	NC	5.82		13.6		16.6		11.2		4.59		10.6		20		13.9		6.89		6.73		32.8	
Cobalt, Total	NC	NC	NC	NC	2.96		3.26		8.9		5.68		2.23		4.35		10.3		7		1.29	J	3.01		11.8	
Copper, Total	50	270	270	1720	13.3		**74.2**		32.8		21.1		3.96		15.1		24.4		19.4		2.24		8.04		**69.8**	
Iron, Total	NC	NC	NC	NC	6400		6530		12300		8940		4300		7940		14100		10700		2930		5870		19200	
Lead, Total	63	400	400	450	12.7		16.2		**113**		59.2		12.3		45.3		55.8		34.9		2.88	J	22.1		**69.5**	
Magnesium, Total	NC	NC	NC	NC	1530		4790		10520		5060		1520		3260		12300		7070		13400		2250		8510	
Manganese, Total	1600	2000	2000	2000	58.5		103		242		143		69.2		167		232		209		36.1		89.8		254	
Mercury, Total	0.18	0.81	0.81	0.73	0.068	U	**0.268**		**0.199**		**0.212**		0.084		0.167		**0.276**		**0.181**		0.075	U	0.108		**0.268**	
Nickel, Total	30	140	310	130	5.76		7.79		**86.4**		**38.8**		10.4		21.6		**99**		**57.8**		4.73		12.6		**32.3**	
Potassium, Total	NC	NC	NC	NC	1440		392		1830		1320		420		1050		2590		1950		277		645		3140	
Selenium, Total	3.9	36	180	4	1.69	U	0.377	J	1.68	U	1.72	U	1.62	U	1.73	U	1.79	U	0.268	J	0.239	J	1.63	U	0.305	J
Silver, Total	2	36	180	8.3	0.846	U	0.49	J	0.354	J	0.86	U	0.809	U	0.268	J	0.466	J	0.864	U	0.854	U	0.813	U	1.2	
Sodium, Total	NC	NC	NC	NC	73.6	J	104	J	424		143	J	89.1	J	122	J	142	J	175		212		70.8	J	234	
Thallium, Total	NC	NC	NC	NC	1.69	U	1.75	U	1.68	U	1.72	U	1.62	U	1.73	U	1.79	U	1.73	U	1.71	U	1.63	U	1.97	U
Vanadium, Total	NC	NC	NC	NC	7.39		10.8		16.3		11.3		5.6		11.3		18.2		14		5.36		7.45		40.7	
Zinc, Total	109	2200	10000	2480	19.5		20.9		96.1		58.6		14.9		46.5		69.3		44.9		7.71		26.5		91.4	
GENERAL CHEMISTRY																										
Chromium, Hexavalent	1	22	110	19	0.859	U	0.897	U	0.882	U	0.881	U	0.844	U	0.88	U	0.916	U	0.87	U	0.874	U	0.837	U	***1.01***	***U***
Cyanide, Total	27	27	27	40	1	U	1.1	U	1	U	1.1	U	0.98	U	1	U	0.3	J	0.87	J	1	U	0.97	U	1.2	U
Solids, Total	NC	NC	NC	NC	93.1		89.2		90.7		90.8		94.8		90.9		87.3		91.9		91.5		95.6		79.4	

All analyitcal results for soil in milligrams per kilogram (mg/kg).

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

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

R1 =reanalyzed

NC = No criteria established for this contaminant

E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

J = Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater t

I - The lower value for the two columns has been reported due to obvious interference.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

d = For pesticide and PCB analysis, the concentration between primary and secondary columns is greater than 40%. The lower concentratio

"-" = Analyte not analyzed

UUSCO = NYSDEC's December 2006 Unrestricted Use Soil Cleanup Objectives (6 NYCRR Part 375).

RSCO = NYSDEC's December 2006 Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

RRSCO = NYSDEC's December 2006 Restricted Residential Use Soil Cleanup Objectives (6 NYCRR 375-6)

PGWSCO = NYSDEC's December 2006 Protection to Groundwater Soil Cleanup Objectives (6 NYCRR 375-6)

Reporting Limit Exceedes UUSCO

Concentration exceeds UUSCO

Concentration exceeds RSCO & UUSCO

Concentration exceeds RRSCO, RSCO & UUSCO

Concentration exceeds PGWSCO & UUSCO

Concentration exceeds PGWSCO, RSCO & UUSCO

Concentration exceeds PGWSCO, RRSCO, RSCO & UUSCO

Table 2
Soil Waste Classifcation Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	EPA Table 1:	COMP (SB-01)		COMP(SB-02,SB-03)		COMP (SB-04,SB-05)		COMP SB-05A		COMP (SB-06, SB-07)		COMP SB-07(0-20)		COMP (SB-08)		COMP(SB-09,SB-10)	
LAB ID:	Maxiumum	L2224285-03		L2223664-05		L2224019-05		L2216294-02		L2224285-12		L2224285-06		L2224019-08		L2224463-05	
COLLECTION DATE:	Concentration for	5/9/2022		5/5/2022		5/6/2022		3/30/2022		5/9/2022		5/9/2022		5/6/2022		5/10/2022	
SAMPLE MATRIX:	TCLP	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
ANALYTE	(mg/l)	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TCLP VOLATILES																	
1,1-Dichloroethene	0.7	-	-	-	-	-	-	0.005	U	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.5	-	-	-	-	-	-	0.005	U	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	7.5	-	-	-	-	-	-	0.025	U	-	-	-	-	-	-	-	-
2-Butanone	200	-	-	-	-	-	-	0.05	U	-	-	-	-	-	-	-	-
Benzene	0.5	-	-	-	-	-	-	0.005	U	-	-	-	-	-	-	-	-
Carbon tetrachloride	0.5	-	-	-	-	-	-	0.005	U	-	-	-	-	-	-	-	-
Chlorobenzene	100	-	-	-	-	-	-	0.005	U	-	-	-	-	-	-	-	-
Chloroform	6	-	-	-	-	-	-	0.0075	U	-	-	-	-	-	-	-	-
Tetrachloroethene	0.7	-	-	-	-	-	-	0.005	U	-	-	-	-	-	-	-	-
Trichloroethene	0.5	-	-	-	-	-	-	0.005	U	-	-	-	-	-	-	-	-
Vinyl chloride	0.2	-	-	-	-	-	-	0.01	U	-	-	-	-	-	-	-	-
TCLP SEMIVOLATILES																	
2,4,5-Trichlorophenol	400	-	-	-	-	-	-	0.025	U	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	2	-	-	-	-	-	-	0.025	U	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	0.13	-	-	-	-	-	-	0.025	U	-	-	-	-	-	-	-	-
2-Methylphenol	200	-	-	-	-	-	-	0.025	U	-	-	-	-	-	-	-	-
3-Methylphenol/4-Methylphenol	200	-	-	-	-	-	-	0.025	U	-	-	-	-	-	-	-	-
Hexachlorobenzene	0.13	-	-	-	-	-	-	0.01	U	-	-	-	-	-	-	-	-
Hexachlorobutadiene	0.5	-	-	-	-	-	-	0.01	U	-	-	-	-	-	-	-	-
Hexachloroethane	3	-	-	-	-	-	-	0.01	U	-	-	-	-	-	-	-	-
Nitrobenzene	2	-	-	-	-	-	-	0.01	U	-	-	-	-	-	-	-	-
Pentachlorophenol	100	-	-	-	-	-	-	0.05	U	-	-	-	-	-	-	-	-
Pyridine	5	-	-	-	-	-	-	0.018	U	-	-	-	-	-	-	-	-
TCLP HERBICIDES																	
2,4,5-TP (Silvex)	1	-	-	-	-	-	-	0.005	U	-	-	-	-	-	-	-	-
2,4-D	10	-	-	-	-	-	-	0.025	U	-	-	-	-	-	-	-	-
TCLP PESTICIDES																	
Chlordane	0.03	-	-	-	-	-	-	0.001	U	-	-	-	-	-	-	-	-
Endrin	0.02	-	-	-	-	-	-	0.0002	U	-	-	-	-	-	-	-	-
Heptachlor	0.008	-	-	-	-	-	-	0.0001	U	-	-	-	-	-	-	-	-
Heptachlor epoxide	0.008	-	-	-	-	-	-	0.0001	U	-	-	-	-	-	-	-	-
Lindane	0.4	-	-	-	-	-	-	0.0001	U	-	-	-	-	-	-	-	-
Methoxychlor	10	-	-	-	-	-	-	0.001	U	-	-	-	-	-	-	-	-
Toxaphene	0.5	-	-	-	-	-	-	0.001	U	-	-	-	-	-	-	-	-
TCLP METALS																	
Arsenic, TCLP	5	1	U	1		1	U	0.02	J	0.028	J	1	U	0.02	J	1	U
Barium, TCLP	100	0.504		0.429		0.387	J	0.213	J	0.347	J	0.417	J	0.288	J	0.235	J
Cadmium, TCLP	1	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Chromium, TCLP	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Lead, TCLP	5	0.469	J	0.041	U	0.5	U	0.5	U	0.5	U	0.284	J	0.5	U	0.048	J
Mercury, TCLP	0.2	0.0013		0.001	U	0.001	U	0.001	U	0.001	J	0.001	U	0.001	U	0.001	U
Selenium, TCLP	1	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Silver, TCLP	5	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
GENERAL CHEMISTRY																	
Cyanide, Reactive	NC	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
pH (H)	2 - 12.5	11.4		10.7		9.6		10.9		11.4		8.4		8.5		8	
Sulfide, Reactive	NC	10	U	10	U	10	U	10	U	10	U	10	U	10	U	34	
IGNITABILITY OF SOLIDS																	
Ignitability	NC	NI		NI		NI		NI		NI		NI		NI		NI	

Notes:

Analytical results in milligrams per liter (mg/L), or as otherwise indicated.

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been assigned.

J = Estimated concentration

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

"-" = Analyte not analyzed

NI = Not Ignitable

I = Ignitable

NC = No criteria established for this contaminant

EPA Table 1 - Maxiumum Concentration of Contaminants for the Toxicity Characteristic Leaching Procedure (TCLP) per 40CFR Part 261 as of September 10, 2015.

Table 2
Soil Waste Classifcation Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	EPA Table 1:	COMP #1 (30,29,28)		COMP #2 (27,26,25)		COMP #3 (24,23)		COMP #4 (21,20)		COMP #5 (19,18)		COMP #6 (13,14,17)		COMP #7 (16,11)		COMP #8 (15,12)		SB22 COMP (0-5)	
LAB ID:	Maxiumum	L2166146-05		L2166146-06		L2166661-04		L2166780-05		L2167681-05		L2168050-06		L2168372-05		L2168372-06		L2210610-02	
COLLECTION DATE:	Concentration for	12/2/2021		12/2/2021		12/3/2021		12/6/2021		12/9/2021		12/10/2021		12/13/2021		12/13/2021		3/1/2022	
SAMPLE MATRIX:	TCLP	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
ANALYTE	(mg/l)	Conc.	Q	Conc	Q	Conc.	Q	Conc	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc	Q	Conc	Q
TCLP VOLATILES																			
1,1-Dichloroethene	0.7	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
1,2-Dichloroethane	0.5	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
1,4-Dichlorobenzene	7.5	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
2-Butanone	200	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Benzene	0.5	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Carbon tetrachloride	0.5	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Chlorobenzene	100	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Chloroform	6	0.0075	U	0.0075	U	0.0075	U	0.0075	U	0.0075	U	0.0075	U	0.0075	U	0.0075	U	0.0075	U
Tetrachloroethene	0.7	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Trichloroethene	0.5	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.052		0.005	U
Vinyl chloride	0.2	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
TCLP SEMIVOLATILES																			
2,4,5-Trichlorophenol	400	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
2,4,6-Trichlorophenol	2	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
2,4-Dinitrotoluene	0.13	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
2-Methylphenol	200	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
3-Methylphenol/4-Methylphenol	200	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
Hexachlorobenzene	0.13	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Hexachlorobutadiene	0.5	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Hexachloroethane	3	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Nitrobenzene	2	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Pentachlorophenol	100	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Pyridine	5	0.018	U	0.018	U	0.018	U	0.018	U	0.018	U	0.018	U	0.018	U	0.018	U	0.018	U
TCLP HERBICIDES																			
2,4,5-TP (Silvex)	1	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
2,4-D	10	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
TCLP PESTICIDES																			
Chlordane	0.03	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Endrin	0.02	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U
Heptachlor	0.008	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U
Heptachlor epoxide	0.008	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U
Lindane	0.4	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U
Methoxychlor	10	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Toxaphene	0.5	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
TCLP METALS																			
Arsenic, TCLP	5	0.03	J	0.038	J	1	U	1	U	0.023	J	0.02	J	1	U	0.019	J	1	U
Barium, TCLP	100	0.38	J	0.319	J	0.259	J	0.185	J	0.213	J	0.228	J	0.083	J	0.093	J	0.391	J
Cadmium, TCLP	1	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Chromium, TCLP	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Lead, TCLP	5	0.061	J	0.279	J	0.035	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Mercury, TCLP	0.2	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U	0.001	U
Selenium, TCLP	1	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Silver, TCLP	5	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
GENERAL CHEMISTRY																			
Cyanide, Reactive	NC	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
pH (H)	2 - 12.5	8.4		8.3		9		8		8.3		8.1		8.4		7.8		8.4	
Sulfide, Reactive	NC	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
IGNITABILITY OF SOLIDS																			
Ignitability	NC	NI		NI		NI		NI		NI		NI		NI		NI		NI	

Notes:

Analytical results in milligrams per liter (mg/L), or as otherwise

Q: Laboratory Qualifier

An empty Q column indicates no laboratory qualifier has been a

J = Estimated concentration

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

"-" = Analyte not analyzed

NI = Not Ignitable

I = Ignitable

NC = No criteria established for this contaminant

EPA Table 1 - Maxiumum Concentration of Contaminants for th

Table 3
Groundwater Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	NYS AWQS	TWP-07		GW-DUP		SB13		SB16 GW		SB17	
LAB ID:		L2224285-07		L2224285-08		L2169771-03		L2170846-01		L2169537-04	
COLLECTION DATE:		5/9/2022		5/9/2022		12/17/2021		12/23/2021		12/16/2021	
ANALYTE	(ug/l)	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
VOLATILE ORGANICS											
1,1,1,2-Tetrachloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,1,1-Trichloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,1,2,2-Tetrachloroethane	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,2-Trichloroethane	1	***1.5***	***U***	***1.5***	***U***	***1.5***	***U***	***1.5***	***U***	***1.5***	***U***
1,1-Dichloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,1-Dichloroethene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloropropene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2,3-Trichlorobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2,3-Trichloropropane	0.04	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***
1,2,4,5-Tetramethylbenzene	5	2	U	2	U	2	U	2	U	2	U
1,2,4-Trichlorobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2,4-Trimethylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2-Dibromo-3-chloropropane	0.04	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***
1,2-Dibromoethane	0.0006	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***
1,2-Dichlorobenzene	3	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2-Dichloroethane	0.6	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichloroethene, Total	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2-Dichloropropane	1	***1***	***U***	***1***	***U***	***1***	***U***	***1***	***U***	***1***	***U***
1,3,5-Trimethylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,3-Dichlorobenzene	3	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,3-Dichloropropane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,3-Dichloropropene, Total	NC	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,4-Dichlorobenzene	3	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,4-Dioxane	NC	250	U	250	U	250	U	250	U	250	U
2,2-Dichloropropane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
2-Butanone	50	5	U	5	U	5	U	5	U	5	U
2-Hexanone	50	5	U	5	U	5	U	5	U	5	U
4-Methyl-2-pentanone	NC	5	U	5	U	5	U	5	U	5	U
Acetone	50	5	U	5	U	5	U	5	U	5	U
Acrylonitrile	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Benzene	1	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Bromochloromethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Bromodichloromethane	50	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromoform	50	2	U	2	U	2	U	2	U	2	U
Bromomethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Carbon disulfide	60	5	U	5	U	5	U	5	U	5	U
Carbon tetrachloride	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chlorobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Chloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Chloroform	7	2.5	U	2.5	U	3.8		2.5	U	2.5	U
Chloromethane	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
cis-1,2-Dichloroethene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
cis-1,3-Dichloropropene	0.4	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***
Dibromochloromethane	50	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dibromomethane	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Dichlorodifluoromethane	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Ethyl ether	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Ethylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Hexachlorobutadiene	0.5	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***
Isopropylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Methyl tert butyl ether	10	0.9	J	0.96	J	2.5	U	2.5	U	2.5	U
Methylene chloride	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
n-Butylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
n-Propylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Naphthalene	10	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
o-Chlorotoluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
o-Xylene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
p-Chlorotoluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
p-Diethylbenzene	NC	2	U	2	U	2	U	2	U	2	U
p-Ethyltoluene	NC	2	U	2	U	2	U	2	U	2	U
p-Isopropyltoluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
p/m-Xylene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
sec-Butylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Styrene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
tert-Butylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Tetrachloroethene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Toluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
trans-1,2-Dichloroethene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
trans-1,3-Dichloropropene	0.4	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***
trans-1,4-Dichloro-2-butene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Trichloroethene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichlorofluoromethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Vinyl acetate	NC	5	U	5	U	5	U	5	U	5	U
Vinyl chloride	2	**2**		**2.1**		1	U	1	U	1	U
Xylenes, Total	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U

All analytical results for groundwater in micrograms per liter (ug/L).
Q = Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been assigned.
NC = No criteria established for this contaminant
U = Not detected at the reported detection limit for the sample.
J = The concentration given is an approximate value.
"-" = Not analyzed
SB-26 DUP is a duplicate sample of SB-26
GW-DUP is a duplicate sample of TWP-07
NY-AWQS: New York TOGS 111 Ambient Water Quality Standards criteria reflects all addendum to criteria through June 2004.
Reporting Limit Exceedes NYS AWQS
Concentration Exceeds NYS AWQS

MATRIXNEWORLD
Engineering Progress

Table 3
Groundwater Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	NYS AWQS	TWP-07		GW-DUP		SB13		SB16 GW		SB17	
LAB ID:		L2224285-07		L2224285-08		L2169771-03		L2170846-01		L2169537-04	
COLLECTION DATE:		5/9/2022		5/9/2022		12/17/2021		12/23/2021		12/16/2021	
ANALYTE	(ug/l)	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
SEMIVOLATILE ORGANICS											
1,2,4,5-Tetrachlorobenzene	5	***10***	***U***	***10***	***U***	***10***	***U***	***10***	***U***	***10***	***U***
1,2,4-Trichlorobenzene	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
1,2-Dichlorobenzene	3	2	U	2	U	2	U	2	U	2	U
1,3-Dichlorobenzene	3	2	U	2	U	2	U	2	U	2	U
1,4-Dichlorobenzene	3	2	U	2	U	2	U	2	U	2	U
2,4,5-Trichlorophenol	NC	5	U	5	U	5	U	5	U	5	U
2,4,6-Trichlorophenol	NC	5	U	5	U	5	U	5	U	5	U
2,4-Dichlorophenol	1	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
2,4-Dimethylphenol	50	5	U	5	U	5	U	5	U	5	U
2,4-Dinitrophenol	10	***20***	***U***	***20***	***U***	***20***	***U***	***20***	***U***	***20***	***U***
2,4-Dinitrotoluene	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
2,6-Dinitrotoluene	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
2-Chlorophenol	NC	2	U	2	U	2	U	2	U	2	U
2-Methylphenol	NC	5	U	5	U	5	U	5	U	5	U
2-Nitroaniline	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
2-Nitrophenol	NC	10	U	10	U	10	U	10	U	10	U
3,3'-Dichlorobenzidine	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
3-Methylphenol/4-Methylphenol	NC	5	U	5	U	5	U	5	U	5	U
3-Nitroaniline	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
4,6-Dinitro-o-cresol	NC	10	U	10	U	10	U	10	U	10	U
4-Bromophenyl phenyl ether	NC	2	U	2	U	2	U	2	U	2	U
4-Chloroaniline	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
4-Chlorophenyl phenyl ether	NC	2	U	2	U	2	U	2	U	2	U
4-Nitroaniline	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
4-Nitrophenol	NC	10	U	10	U	10	U	10	U	10	U
Acetophenone	NC	5	U	5	U	5	U	5	U	5	U
Benzoic Acid	NC	50	U	50	U	50	U	50	U	50	U
Benzyl Alcohol	NC	2	U	2	U	2	U	2	U	2	U
Biphenyl	NC	2	U	2	U	2	U	2	U	2	U
Bis(2-chloroethoxy)methane	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Bis(2-chloroethyl)ether	1	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***
Bis(2-chloroisopropyl)ether	5	2	U	2	U	2	U	2	U	2	U
Bis(2-ethylhexyl)phthalate	5	3	U	3	U	3	U	3	U	3	U
Butyl benzyl phthalate	50	5	U	5	U	5	U	5	U	5	U
Carbazole	NC	2	U	2	U	2	U	2	U	2	U
Di-n-butylphthalate	50	5	U	5	U	5	U	5	U	5	U
Di-n-octylphthalate	50	5	U	5	U	5	U	5	U	5	U
Dibenzofuran	NC	2	U	2	U	2	U	2	U	2	U
Diethyl phthalate	50	5	U	5	U	5	U	5	U	5	U
Dimethyl phthalate	50	5	U	5	U	5	U	5	U	5	U
Hexachlorocyclopentadiene	5	***20***	***U***	***20***	***U***	***20***	***U***	***20***	***U***	***20***	***U***
Isophorone	50	5	U	5	U	5	U	5	U	5	U
n-Nitrosodi-n-propylamine	NC	5	U	5	U	5	U	5	U	5	U
NDPA/DPA	50	2	U	2	U	2	U	2	U	2	U
Nitrobenzene	0.4	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***
p-Chloro-m-cresol	NC	2	U	2	U	2	U	2	U	2	U
Phenol	1	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
2-Chloronaphthalene	10	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
2-Methylnaphthalene	NC	0.1	U	0.1	U	0.03	J	0.1	U	0.1	U
Acenaphthene	20	0.1	U	0.1	U	0.02	J	0.1	U	0.1	U
Acenaphthylene	NC	0.1	U	0.1	U	0.02	J	0.1	U	0.1	U
Anthracene	50	0.02	J	0.1	U	0.03	J	0.1	U	0.1	U
Benzo(a)anthracene	0.002	**0.04**	**J**	***0.1***	***U***	**0.04**	**J**	***0.1***	***U***	***0.1***	***U***
Benzo(a)pyrene	0.002	**0.02**	**J**	***0.1***	***U***	**0.02**	**J**	***0.1***	***U***	***0.1***	***U***
Benzo(b)fluoranthene	0.002	**0.03**	**J**	***0.1***	***U***	**0.02**	**J**	***0.1***	***U***	***0.1***	***U***
Benzo(ghi)perylene	NC	0.02	J	0.1	U	0.02	J	0.1	U	0.1	U
Benzo(k)fluoranthene	0.002	**0.02**	**J**	***0.1***	***U***	**0.02**	**J**	***0.1***	***U***	***0.1***	***U***
Chrysene	0.002	**0.02**	**J**	***0.1***	***U***	**0.03**	**J**	***0.1***	***U***	**0.02**	**J**
Dibenzo(a,h)anthracene	NC	0.1	U	0.1	U	0.02	J	0.1	U	0.1	U
Fluoranthene	50	0.05	J	0.1	U	0.03	J	0.1	U	0.02	J
Fluorene	50	0.02	J	0.1	U	0.03	J	0.1	U	0.1	U
Hexachlorobenzene	0.04	***0.8***	***U***	***0.8***	***U***	***0.8***	***U***	***0.8***	***U***	***0.8***	***U***
Hexachlorobutadiene	0.5	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***
Hexachloroethane	5	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Indeno(1,2,3-cd)pyrene	0.002	**0.02**	**J**	***0.1***	***U***	**0.02**	**J**	***0.1***	***U***	***0.1***	***U***
Naphthalene	10	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Pentachlorophenol	1	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Phenanthrene	50	0.06	J	0.1	U	0.04	J	0.1	U	0.03	J
Pyrene	50	0.04	J	0.1	U	0.03	J	0.1	U	0.03	J

All analytical results for groundwater in micrograms per liter (ug/L).
Q = Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been assigned.
NC = No criteria established for this contaminant
U = Not detected at the reported detection limit for the sample.
J = The concentration given is an approximate value.
"-" = Not analyzed
SB-26 DUP is a duplicate sample of SB-26
GW-DUP is a duplicate sample of TWP-07
NY-AWQS: New York TOGS 111 Ambient Water Quality Standards criteria reflects all addendum to criteria through June 2004.
Reporting Limit Exceedes NYS AWQS
Concentration Exceeds NYS AWQS

Table 3
Groundwater Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	NYS AWQS	TWP-07		GW-DUP		SB13		SB16 GW		SB17	
LAB ID:		L2224285-07		L2224285-08		L2169771-03		L2170846-01		L2169537-04	
COLLECTION DATE:		5/9/2022		5/9/2022		12/17/2021		12/23/2021		12/16/2021	
ANALYTE	(ug/l)	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
CHLORINATED HERBICIDES											
2,4,5-T	35	2	U	2	U	2	U	-		2	U
2,4,5-TP (Silvex)	nc	2	U	2	U	2	U	-		2	U
2,4-D	50	10	U	10	U	10	U	-		10	U
ORGANOCHLORINE PESTICIDES											
4,4'-DDD	0.3	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
4,4'-DDE	0.2	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
4,4'-DDT	0.2	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Aldrin	0	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***
Alpha-BHC	0.01	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***
Beta-BHC	0.04	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Chlordane	0.05	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***
cis-Chlordane	NC	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Delta-BHC	0.04	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Dieldrin	0.004	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***
Endosulfan I	NC	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Endosulfan II	NC	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Endosulfan sulfate	NC	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Endrin	0	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***
Endrin aldehyde	5	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Endrin ketone	5	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Heptachlor	0.04	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Heptachlor epoxide	0.03	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Lindane	0.05	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Methoxychlor	35	0.143	U	0.143	U	0.143	U	0.143	U	0.143	U
Toxaphene	0.06	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***
trans-Chlordane	NC	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
POLYCHLORINATED BIPHENYLS BY											
Aroclor 1016	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1221	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1232	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1242	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1248	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1254	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1260	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1262	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1268	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
DISSOLVED METALS											
Aluminum, Dissolved	NC	7.56	J	5.93	J	20	U	50	U	100	U
Antimony, Dissolved	3	0.53	J	***4***	***U***	0.96	J	***20***	***U***	***40***	***U***
Arsenic, Dissolved	25	4.01		5.51		2.22		1.56	J	1.74	J
Barium, Dissolved	1000	327.8		290.4		74.76		17.23		10.31	
Beryllium, Dissolved	3	0.5	U	0.5	U	1	U	2.5	U	***5***	***U***
Cadmium, Dissolved	5	0.2	U	0.2	U	0.12	J	1	U	2	U
Calcium, Dissolved	NC	149000		141000		185000		164000		94100	
Chromium, Dissolved	50	1	U	1	U	0.89	J	5	U	10	U
Cobalt, Dissolved	NC	2.18		2.49		1	U	2.5	U	5	U
Copper, Dissolved	200	0.46	JB	1	U	12.85		5	U	10	U
Iron, Dissolved	300	31.6	J	24.5	J	100	U	250	U	***500***	***U***
Lead, Dissolved	25	1	U	1	U	2	U	5	U	10	U
Magnesium, Dissolved	35000	**110000**		**107000**		**150000**		**490000**		5030	
Manganese, Dissolved	300	**3100**		**2815**		1.63	J	2.2	J	**499.2**	
Mercury, Dissolved	0.7	0.4	U	0.2	U	0.11	J	***2***	***U***	0.2	U
Nickel, Dissolved	100	3.62		4.29		4	U	10	U	20	U
Potassium, Dissolved	NC	62300		59800		36500		132000		3680	
Selenium, Dissolved	10	5	U	5	U	***10***	***U***	***25***	***U***	***50***	***U***
Silver, Dissolved	50	0.4	U	0.4	U	0.8	U	2	U	4	U
Sodium, Dissolved	20000	**1280000**		**1200000**		**1260000**		**4020000**		16300	
Thallium, Dissolved	0.5	0.14	J	***1***	***U***	0.32	J	***5***	***U***	***10***	***U***
Vanadium, Dissolved	NC	5	U	5	U	10	U	25	U	50	U
Zinc, Dissolved	2000	10	U	10	U	20	U	50	U	100	U
TOTAL METALS											
Aluminum, Total	NC	132000		101000		30.3		19.7		315	
Antimony, Total	3	***20***	***U***	***8***	***U***	***8***	***U***	***4***	***U***	***40***	***U***
Arsenic, Total	25	**59.22**		**37.41**		2.21		1.34		2.73	J
Barium, Total	1000	**1772**		**1532**		76.11		18.04		12.03	
Beryllium, Total	3	**10.12**		**8.29**		1	U	0.5	U	***5***	***U***
Cadmium, Total	5	0.87	J	0.73		0.4	U	0.2	U	2	U
Calcium, Total	NC	156000		142000		183000		45700		96800	
Chromium, Total	50	**259.3**		**187.1**		0.88	J	0.19	J	3.17	J
Cobalt, Total	NC	149.6		120.8		1	U	0.5	U	5	U
Copper, Total	200	**539.6**		**411.4**		12.83		2.03		10	U
Iron, Total	300	**240000**		**223000**		98.6	J	50.3		**1390**	
Lead, Total	25	**305.2**		**257.7**		2	U	10	U	10	U
Magnesium, Total	35000	**151000**		**163000**		**147000**		**493000**		5190	
Manganese, Total	300	**9196**		**9452**		2.96		0.76	J	**496.2**	
Mercury, Total	0.7	0.53	J	0.48	J	0.09	J	0.1	J	0.2	U
Nickel, Total	100	**515.9**		**387**		4	U	0.84	J	20	U
Potassium, Total	NC	63600		56000		36100		79400		3860	
Selenium, Total	10	**70.5**		**48.7**		***10***	***U***	5	U	***50***	***U***
Silver, Total	50	2	U	0.49	J	0.8	U	0.4	U	4	U
Sodium, Total	20000	**1460000**		**1390000**		**1220000**		**4370000**		16200	
Thallium, Total	0.5	**2.84**	**J**	**1.47**	**J**	***2***	***U***	***10***	***U***	***10***	***U***
Vanadium, Total	NC	327.3		228.8		10	U	5	U	50	U
Zinc, Total	2000	552.1		362.8		20	U	10	U	100	U
GENERAL CHEMISTRY											
Chromium, Trivalent	NC	-	-	-	-	10	U	-		10	U
Chromium, Hexavalent	50	10	U	10	U	10	U	10	U	10	U
Cyanide, Total	200	2	J	2	J	5	U	5	U	2	J

All analytical results for groundwater in micrograms per liter (ug/L).
*
Q = Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been assigned.
NC = No criteria established for this contaminant
U = Not detected at the reported detection limit for the sample.
J = The concentration given is an approximate value.
"-" = Not analyzed
SB-26 DUP is a duplicate sample of SB-26
GW-DUP is a duplicate sample of TWP-07
NY-AWQS: New York TOGS 111 Ambient Water Quality Standards criteria reflects all addendum to criteria through June 2004.
Reporting Limit Exceedes NYS AWQS
Concentration Exceeds NYS AWQS

Table 3
Groundwater Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	NYS AWQS	SB20		SB21		SB24 GW		SB26		SB26 DUP		SB29	
LAB ID:		L2169771-01		L2169771-02		L2170846-02		L2169537-01		L2169537-02		L2169537-03	
COLLECTION DATE:		12/17/2021		12/17/2021		12/23/2021		12/16/2021		12/16/2021		12/16/2021	
ANALYTE	(ug/l)	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
VOLATILE ORGANICS													
1,1,1,2-Tetrachloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,1,1-Trichloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,1,2,2-Tetrachloroethane	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,2-Trichloroethane	1	***1.5***	***U***	***1.5***	***U***	***1.5***	***U***	***1.5***	***U***	***1.5***	***U***	***1.5***	***U***
1,1-Dichloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,1-Dichloroethene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloropropene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2,3-Trichlorobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2,3-Trichloropropane	0.04	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***
1,2,4,5-Tetramethylbenzene	5	2	U	2	U	2	U	2	U	2	U	2	U
1,2,4-Trichlorobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2,4-Trimethylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2-Dibromo-3-chloropropane	0.04	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***
1,2-Dibromoethane	0.0006	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***
1,2-Dichlorobenzene	3	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2-Dichloroethane	0.6	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichloroethene, Total	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2-Dichloropropane	1	***1***	***U***	***1***	***U***	***1***	***U***	***1***	***U***	***1***	***U***	***1***	***U***
1,3,5-Trimethylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,3-Dichlorobenzene	3	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,3-Dichloropropane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,3-Dichloropropene, Total	NC	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,4-Dichlorobenzene	3	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,4-Dioxane	NC	250	U	250	U	250	U	250	U	250	U	250	U
2,2-Dichloropropane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
2-Butanone	50	5	U	5	U	5	U	5	U	5	U	5	U
2-Hexanone	50	5	U	5	U	5	U	5	U	5	U	5	U
4-Methyl-2-pentanone	NC	5	U	5	U	5	U	5	U	5	U	5	U
Acetone	50	5	U	5	U	5	U	5	U	5	U	5	U
Acrylonitrile	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Benzene	1	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Bromochloromethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Bromodichloromethane	50	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromoform	50	2	U	2	U	2	U	2	U	2	U	2	U
Bromomethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Carbon disulfide	60	5	U	5	U	5	U	5	U	5	U	5	U
Carbon tetrachloride	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chlorobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Chloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Chloroform	7	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	0.7	J
Chloromethane	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
cis-1,2-Dichloroethene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
cis-1,3-Dichloropropene	0.4	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***
Dibromochloromethane	50	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dibromomethane	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Dichlorodifluoromethane	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Ethyl ether	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Ethylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Hexachlorobutadiene	0.5	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***
Isopropylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Methyl tert butyl ether	10	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Methylene chloride	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
n-Butylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
n-Propylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Naphthalene	10	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
o-Chlorotoluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
o-Xylene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
p-Chlorotoluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
p-Diethylbenzene	NC	2	U	2	U	2	U	2	U	2	U	2	U
p-Ethyltoluene	NC	2	U	2	U	2	U	2	U	2	U	2	U
p-Isopropyltoluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
p/m-Xylene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
sec-Butylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Styrene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
tert-Butylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Tetrachloroethene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Toluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
trans-1,2-Dichloroethene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
trans-1,3-Dichloropropene	0.4	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***
trans-1,4-Dichloro-2-butene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Trichloroethene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichlorofluoromethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Vinyl acetate	NC	5	U	5	U	5	U	5	U	5	U	5	U
Vinyl chloride	2	1	U	1	U	1	U	1	U	1	U	1	U
Xylenes, Total	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U

All analytical results for groundwater in micrograms per liter (ug/L
Q = Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been ass
NC = No criteria established for this contaminant
U = Not detected at the reported detection limit for the sample.
J = The concentration given is an approximate value.
"-" = Not analyzed
SB-26 DUP is a duplicate sample of SB-26
GW-DUP is a duplicate sample of TWP-07
NY-AWQS: New York TOGS 111 Ambient Water Quality Standa
Reporting Limit Exceedes NYS AWQS
Concentration Exceeds NYS AWQS

MATRIXNEWORLD
Engineering Progress

Table 3
Groundwater Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

SAMPLE ID:	NYS AWQS	SB20		SB21		SB24 GW		SB26		SB26 DUP		SB29	
LAB ID:		L2169771-01		L2169771-02		L2170846-02		L2169537-01		L2169537-02		L2169537-03	
COLLECTION DATE:		12/17/2021		12/17/2021		12/23/2021		12/16/2021		12/16/2021		12/16/2021	
ANALYTE	(ug/l)	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
SEMIVOLATILE ORGANICS													
1,2,4,5-Tetrachlorobenzene	5	***10***	***U***	***10***	***U***	***10***	***U***	***10***	***U***	***10***	***U***	***10***	***U***
1,2,4-Trichlorobenzene	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
1,2-Dichlorobenzene	3	2	U	2	U	2	U	2	U	2	U	2	U
1,3-Dichlorobenzene	3	2	U	2	U	2	U	2	U	2	U	2	U
1,4-Dichlorobenzene	3	2	U	2	U	2	U	2	U	2	U	2	U
2,4,5-Trichlorophenol	NC	5	U	5	U	5	U	5	U	5	U	5	U
2,4,6-Trichlorophenol	NC	5	U	5	U	5	U	5	U	5	U	5	U
2,4-Dichlorophenol	1	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
2,4-Dimethylphenol	50	5	U	5	U	5	U	5	U	5	U	5	U
2,4-Dinitrophenol	10	***20***	***U***	***20***	***U***	***20***	***U***	***20***	***U***	***20***	***U***	***20***	***U***
2,4-Dinitrotoluene	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
2,6-Dinitrotoluene	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
2-Chlorophenol	NC	2	U	2	U	2	U	2	U	2	U	2	U
2-Methylphenol	NC	5	U	5	U	5	U	5	U	5	U	5	U
2-Nitroaniline	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
2-Nitrophenol	NC	10	U	10	U	10	U	10	U	10	U	10	U
3,3'-Dichlorobenzidine	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
3-Methylphenol/4-Methylphenol	NC	5	U	5	U	5	U	5	U	5	U	5	U
3-Nitroaniline	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
4,6-Dinitro-o-cresol	NC	10	U	10	U	10	U	10	U	10	U	10	U
4-Bromophenyl phenyl ether	NC	2	U	2	U	2	U	2	U	2	U	2	U
4-Chloroaniline	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
4-Chlorophenyl phenyl ether	NC	2	U	2	U	2	U	2	U	2	U	2	U
4-Nitroaniline	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
4-Nitrophenol	NC	10	U	10	U	10	U	10	U	10	U	10	U
Acetophenone	NC	5	U	5	U	5	U	5	U	5	U	5	U
Benzoic Acid	NC	50	U	50	U	50	U	50	U	50	U	50	U
Benzyl Alcohol	NC	2	U	2	U	2	U	2	U	2	U	2	U
Biphenyl	NC	2	U	2	U	2	U	2	U	2	U	2	U
Bis(2-chloroethoxy)methane	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Bis(2-chloroethyl)ether	1	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***
Bis(2-chloroisopropyl)ether	5	2	U	2	U	2	U	2	U	2	U	2	U
Bis(2-ethylhexyl)phthalate	5	3	U	3	U	3	U	3	U	3	U	3	U
Butyl benzyl phthalate	50	5	U	5	U	5	U	5	U	5	U	5	U
Carbazole	NC	2	U	2	U	2	U	2	U	2	U	2	U
Di-n-butylphthalate	50	5	U	5	U	5	U	5	U	5	U	5	U
Di-n-octylphthalate	50	5	U	5	U	5	U	5	U	5	U	5	U
Dibenzofuran	NC	2	U	2	U	2	U	2	U	2	U	2	U
Diethyl phthalate	50	5	U	5	U	5	U	5	U	5	U	5	U
Dimethyl phthalate	50	5	U	5	U	5	U	5	U	5	U	5	U
Hexachlorocyclopentadiene	5	***20***	***U***	***20***	***U***	***20***	***U***	***20***	***U***	***20***	***U***	***20***	***U***
Isophorone	50	5	U	5	U	5	U	5	U	5	U	5	U
n-Nitrosodi-n-propylamine	NC	5	U	5	U	5	U	5	U	5	U	5	U
NDPA/DPA	50	2	U	2	U	2	U	2	U	2	U	2	U
Nitrobenzene	0.4	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***
p-Chloro-m-cresol	NC	2	U	2	U	2	U	2	U	2	U	2	U
Phenol	1	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
2-Chloronaphthalene	10	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
2-Methylnaphthalene	NC	0.1	U	0.03	J	0.1	U	0.1	U	0.1	U	0.1	U
Acenaphthene	20	0.1	U	0.03	J	0.1	U	0.1	U	0.1	U	0.1	U
Acenaphthylene	NC	0.1	U	0.02	J	0.1	U	0.1	U	0.1	U	0.1	U
Anthracene	50	0.1	U	0.03	J	0.1	U	0.1	U	0.1	U	0.01	J
Benzo(a)anthracene	0.002	**0.03**	**J**	**0.05**	**J**	***0.1***	***U***	***0.1***	***U***	***0.1***	***U***	**0.08**	**J**
Benzo(a)pyrene	0.002	***0.1***	***U***	**0.03**	**J**	***0.1***	***U***	***0.1***	***U***	***0.1***	***U***	**0.06**	**J**
Benzo(b)fluoranthene	0.002	**0.01**	**J**	**0.04**	**J**	***0.1***	***U***	***0.1***	***U***	***0.1***	***U***	**0.1**	
Benzo(ghi)perylene	NC	0.1	U	0.03	J	0.1	U	0.1	U	0.1	U	0.06	J
Benzo(k)fluoranthene	0.002	***0.1***	***U***	**0.04**	**J**	***0.1***	***U***	***0.1***	***U***	***0.1***	***U***	**0.03**	**J**
Chrysene	0.002	***0.1***	***U***	**0.04**	**J**	***0.1***	***U***	***0.1***	***U***	**0.02**	**J**	**0.09**	**J**
Dibenzo(a,h)anthracene	NC	0.1	U	0.04	J	0.1	U	0.1	U	0.1	U	0.1	U
Fluoranthene	50	0.03	J	0.05	J	0.1	U	0.03	J	0.02	J	0.16	
Fluorene	50	0.1	U	0.04	J	0.1	U	0.1	U	0.1	U	0.1	U
Hexachlorobenzene	0.04	***0.8***	***U***	***0.8***	***U***	***0.8***	***U***	***0.8***	***U***	***0.8***	***U***	***0.8***	***U***
Hexachlorobutadiene	0.5	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***
Hexachloroethane	5	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Indeno(1,2,3-cd)pyrene	0.002	***0.1***	***U***	**0.04**	**J**	***0.1***	***U***	***0.1***	***U***	***0.1***	***U***	**0.06**	**J**
Naphthalene	10	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Pentachlorophenol	1	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Phenanthrene	50	0.04	J	0.05	J	0.03	J	0.1	U	0.1	U	0.09	J
Pyrene	50	0.03	J	0.05	J	0.02	J	0.04	J	0.03	J	0.15	

All analytical results for groundwater in micrograms per liter (ug/L
Q = Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been ass
NC = No criteria established for this contaminant
U = Not detected at the reported detection limit for the sample.
J = The concentration given is an approximate value.
"-" = Not analyzed
SB-26 DUP is a duplicate sample of SB-26
GW-DUP is a duplicate sample of TWP-07
NY-AWQS: New York TOGS 111 Ambient Water Quality Standa
Reporting Limit Exceedes NYS AWQS
Concentration Exceeds NYS AWQS

Table 3
Groundwater Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	NYS AWQS	SB20		SB21		SB24 GW		SB26		SB26 DUP		SB29	
LAB ID:		L2169771-01		L2169771-02		L2170846-02		L2169537-01		L2169537-02		L2169537-03	
COLLECTION DATE:		12/17/2021		12/17/2021		12/23/2021		12/16/2021		12/16/2021		12/16/2021	
ANALYTE	(ug/l)	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
CHLORINATED HERBICIDES													
2,4,5-T	35	2	U	2	U	-		2	U	2	U	2	U
2,4,5-TP (Silvex)	nc	2	U	2	U	-		2	U	2	U	2	U
2,4-D	50	10	U	10	U	-		10	U	10	U	10	U
ORGANOCHLORINE PESTICIDES													
4,4'-DDD	0.3	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
4,4'-DDE	0.2	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
4,4'-DDT	0.2	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Aldrin	0	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***
Alpha-BHC	0.01	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***	***0.014***	***U***
Beta-BHC	0.04	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Chlordane	0.05	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***
cis-Chlordane	NC	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Delta-BHC	0.04	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Dieldrin	0.004	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***
Endosulfan I	NC	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Endosulfan II	NC	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Endosulfan sulfate	NC	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Endrin	0	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***	***0.029***	***U***
Endrin aldehyde	5	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Endrin ketone	5	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U	0.029	U
Heptachlor	0.04	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Heptachlor epoxide	0.03	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Lindane	0.05	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
Methoxychlor	35	0.143	U	0.143	U	0.143	U	0.143	U	0.143	U	0.143	U
Toxaphene	0.06	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***	***0.143***	***U***
trans-Chlordane	NC	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U	0.014	U
POLYCHLORINATED BIPHENYLS BY													
Aroclor 1016	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1221	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1232	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1242	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1248	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1254	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1260	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1262	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
Aroclor 1268	0.09	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U	0.071	U
DISSOLVED METALS													
Aluminum, Dissolved	NC	6.85	J	6.71	J	4.37	J	100	U	100	U	7.49	J
Antimony, Dissolved	3	0.62	J	0.79	J	1.05	J	***40***	***U***	***40***	***U***	***4***	***U***
Arsenic, Dissolved	25	3.25		0.89		0.89		5	U	5	U	1.45	
Barium, Dissolved	1000	7.96		12.28		3.37		43.42		37.84		22.05	
Beryllium, Dissolved	3	0.5	U	0.5	U	0.5	U	***5***	***U***	***5***	***U***	0.5	U
Cadmium, Dissolved	5	0.2	U	0.2	U	0.2	U	2	U	2	U	0.2	U
Calcium, Dissolved	NC	37500		84400		112000		232000		191000		39400	
Chromium, Dissolved	50	1	U	1	U	0.37	J	10	U	10	U	1	U
Cobalt, Dissolved	NC	2.04		1.05		0.5	U	5	U	5	U	0.5	U
Copper, Dissolved	200	1	U	0.4	J	1	U	10	U	10	U	1.6	
Iron, Dissolved	300	**1370**		**596**		55		***500***	***U***	***500***	***U***	50	U
Lead, Dissolved	25	1	U	1	U	1	U	10	U	10	U	1	U
Magnesium, Dissolved	35000	7640		7910		18000		**588000**		**534000**		**405000**	
Manganese, Dissolved	300	**1088**		**489.3**		119		60.62		41.72		1.89	
Mercury, Dissolved	0.7	0.2	U	0.09	J	0.2	U	0.2	U	0.2	U	0.2	U
Nickel, Dissolved	100	2	U	0.67	J	1.4	J	14.4	J	11.41	J	1.79	J
Potassium, Dissolved	NC	3210		4430		16600		183000		163000		78400	
Selenium, Dissolved	10	5	U	5	U	5	U	***50***	***U***	***50***	***U***	5	U
Silver, Dissolved	50	0.4	U	0.4	U	0.4	U	4	U	4	U	0.4	U
Sodium, Dissolved	20000	14200		18700		**108000**		**4810000**		**4830000**		**3490000**	
Thallium, Dissolved	0.5	***1***	***U***	0.28	J	***1***	***U***	***10***	***U***	***10***	***U***	***1***	***U***
Vanadium, Dissolved	NC	5	U	5	U	2.45	J	50	U	50	U	5	U
Zinc, Dissolved	2000	5.63	J	10	U	4.32	JB	100	U	100	U	10	U
TOTAL METALS													
Aluminum, Total	NC	240		242		39.3		100	U	62.1	J	100	U
Antimony, Total	3	***4***	***U***	***4***	***U***	***4***	***U***	***40***	***U***	***40***	***U***	***40***	***U***
Arsenic, Total	25	4.25		1.97		1.02		5	U	5	U	1.91	J
Barium, Total	1000	8.99		13.84		3.68		38.74		38.51		24.29	
Beryllium, Total	3	0.5	U	0.5	U	0.5	U	***5***	***U***	***5***	***U***	***5***	***U***
Cadmium, Total	5	0.2	U	0.2	U	0.2	U	2	U	2	U	2	U
Calcium, Total	NC	37400		82100		109000		177000		181000		131000	
Chromium, Total	50	2.25		2.95		0.64	J	10	U	10	U	10	U
Cobalt, Total	NC	2.38		1.24		0.5	U	5	U	5	U	5	U
Copper, Total	200	0.89	J	1.45		1	U	10	U	10	U	10	U
Iron, Total	300	**2850**		**2700**		234		***500***	***U***	***500***	***U***	***500***	***U***
Lead, Total	25	0.97	J	0.65	J	1	U	10	U	10	U	10	U
Magnesium, Total	35000	7880		7680		18200		**500000**		**513000**		**368000**	
Manganese, Total	300	**1050**		**527.5**		125.5		44.1		41.13		10	U
Mercury, Total	0.7	0.13	J	0.2	U	0.09	J	0.2	U	0.2	U	0.2	U
Nickel, Total	100	1.12	J	1.08	J	1.76	J	12.46	J	13.37	J	20	U
Potassium, Total	NC	3330		4440		17200		153000		154000		121000	
Selenium, Total	10	5	U	5	U	5	U	***50***	***U***	***50***	***U***	***50***	***U***
Silver, Total	50	0.4	U	0.4	U	0.4	U	4	U	4	U	4	U
Sodium, Total	20000	14400		17900		**100000**		**4730000**		**4800000**		**3570000**	
Thallium, Total	0.5	0.2	J	***1***	***U***	***1***	***U***	***10***	***U***	***10***	***U***	***10***	***U***
Vanadium, Total	NC	5	U	5	U	2.42	J	50	U	50	U	50	U
Zinc, Total	2000	10	U	10	U	10	U	100	U	100	U	100	U
GENERAL CHEMISTRY													
Chromium, Trivalent	NC	10	U	10	U	-		10	U	10	U	10	U
Chromium, Hexavalent	50	10	U	10	U	10	U	10	U	10	U	10	U
Cyanide, Total	200	5	U	3	J	5	U	5	U	5	U	5	U

All analytical results for groundwater in micrograms per liter (ug/L
Q = Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been ass
NC = No criteria established for this contaminant
U = Not detected at the reported detection limit for the sample.
J = The concentration given is an approximate value.
"-" = Not analyzed
SB-26 DUP is a duplicate sample of SB-26
GW-DUP is a duplicate sample of TWP-07
NY-AWQS: New York TOGS 111 Ambient Water Quality Standa
Reporting Limit Exceedes NYS AWQS
Concentration Exceeds NYS AWQS

Table 4
Quality Assurance/Quality Control Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	NYS AWQS	TRIP BLANK		TRIP BLANK		TRIP BLANK		GW FIELD BLANK		FIELD BLANK-SOIL	
LAB ID:		L2169771-04		L2170846-03		L2224285-09		L2169537-05		L2223664-06	
COLLECTION DATE:		11/19/2021		12/23/2021		5/9/2022		12/16/2021		5/5/2022	
ANALYTE	(ug/l)	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
VOLATILE ORGANICS											
1,1,1,2-Tetrachloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,1,1-Trichloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,1,2,2-Tetrachloroethane	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,2-Trichloroethane	1	***1.5***	***U***	***1.5***	***U***	***1.5***	***U***	***1.5***	***U***	***1.5***	***U***
1,1-Dichloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,1-Dichloroethene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloropropene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2,3-Trichlorobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2,3-Trichloropropane	0.04	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***
1,2,4,5-Tetramethylbenzene	5	2	U	2	U	2	U	2	U	2	U
1,2,4-Trichlorobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2,4-Trimethylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2-Dibromo-3-chloropropane	0.04	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***
1,2-Dibromoethane	0.0006	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***	***2***	***U***
1,2-Dichlorobenzene	3	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2-Dichloroethane	0.6	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichloroethene, Total	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,2-Dichloropropane	1	***1***	***U***	***1***	***U***	***1***	***U***	***1***	***U***	***1***	***U***
1,3,5-Trimethylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,3-Dichlorobenzene	3	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,3-Dichloropropane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,3-Dichloropropene, Total	NC	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,4-Dichlorobenzene	3	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
1,4-Dioxane	NC	250	U	250	U	250	U	250	U	250	U
2,2-Dichloropropane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
2-Butanone	50	5	U	5	U	5	U	5	U	5	U
2-Hexanone	50	5	U	5	U	5	U	5	U	5	U
4-Methyl-2-pentanone	NC	5	U	5	U	5	U	5	U	5	U
Acetone	50	5	U	5	U	5	U	5	U	2.4	J
Acrylonitrile	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Benzene	1	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Bromochloromethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Bromodichloromethane	50	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Bromoform	50	2	U	2	U	2	U	2	U	2	U
Bromomethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Carbon disulfide	60	5	U	5	U	5	U	5	U	5	U
Carbon tetrachloride	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chlorobenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Chloroethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Chloroform	7	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Chloromethane	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
cis-1,2-Dichloroethene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
cis-1,3-Dichloropropene	0.4	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***
Dibromochloromethane	50	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dibromomethane	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Dichlorodifluoromethane	5	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***	***5***	***U***
Ethyl ether	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Ethylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Hexachlorobutadiene	0.5	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***	***2.5***	***U***
Isopropylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Methyl tert butyl ether	10	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Methylene chloride	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
n-Butylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
n-Propylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Naphthalene	10	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
o-Chlorotoluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
o-Xylene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
p-Chlorotoluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
p-Diethylbenzene	NC	2	U	2	U	2	U	2	U	2	U
p-Ethyltoluene	NC	2	U	2	U	2	U	2	U	2	U
p-Isopropyltoluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
p/m-Xylene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
sec-Butylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Styrene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
tert-Butylbenzene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Tetrachloroethene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Toluene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
trans-1,2-Dichloroethene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
trans-1,3-Dichloropropene	0.4	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***	***0.5***	***U***
trans-1,4-Dichloro-2-butene	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Trichloroethene	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichlorofluoromethane	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Vinyl acetate	NC	5	U	5	U	5	U	5	U	5	U
Vinyl chloride	2	1	U	1	U	1	U	1	U	1	U
Xylenes, Total	NC	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U

All analytical results for groundwater in micrograms per liter (ug/L).
Q = Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been assigned.
NC = No criteria established for this contaminant
U = Not detected at the reported detection limit for the sample.
J = The concentration given is an approximate value.
NY-AWQS: New York TOGS 1.1.1 Glass GA Ambient Water Quality Standards criteria
Reporting Limit Exceedes NYS AWQS
Analyte detected exceeding NYS AWQS

Table 4
Quality Assurance/Quality Control Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	NYS AWQS	TRIP BLANK		TRIP BLANK		TRIP BLANK		GW FIELD BLANK		FIELD BLANK-SOIL	
LAB ID:		L2169771-04		L2170846-03		L2224285-09		L2169537-05		L2223664-06	
COLLECTION DATE:		11/19/2021		12/23/2021		5/9/2022		12/16/2021		5/5/2022	
ANALYTE	(ug/l)	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
SEMIVOLATILE ORGANICS											
1,2,4,5-Tetrachlorobenzene	5	-	-	-	-	-	-	***10***	***U***	***10***	***U***
1,2,4-Trichlorobenzene	5	-	-	-	-	-	-	***5***	***U***	***5***	***U***
1,2-Dichlorobenzene	3	-	-	-	-	-	-	2	U	2	U
1,3-Dichlorobenzene	3	-	-	-	-	-	-	2	U	2	U
1,4-Dichlorobenzene	3	-	-	-	-	-	-	2	U	2	U
2,4,5-Trichlorophenol	NC	-	-	-	-	-	-	5	U	5	U
2,4,6-Trichlorophenol	NC	-	-	-	-	-	-	5	U	5	U
2,4-Dichlorophenol	1	-	-	-	-	-	-	***5***	***U***	***5***	***U***
2,4-Dimethylphenol	50	-	-	-	-	-	-	5	U	5	U
2,4-Dinitrophenol	10	-	-	-	-	-	-	***20***	***U***	***20***	***U***
2,4-Dinitrotoluene	5	-	-	-	-	-	-	***5***	***U***	***5***	***U***
2,6-Dinitrotoluene	5	-	-	-	-	-	-	***5***	***U***	***5***	***U***
2-Chlorophenol	NC	-	-	-	-	-	-	2	U	2	U
2-Methylphenol	NC	-	-	-	-	-	-	5	U	2	U
2-Nitroaniline	5	-	-	-	-	-	-	***5***	***U***	**2**	**U**
2-Nitrophenol	NC	-	-	-	-	-	-	10	U	5	U
3,3'-Dichlorobenzidine	5	-	-	-	-	-	-	***5***	***U***	***5***	***U***
3-Methylphenol/4-Methylphenol	NC	-	-	-	-	-	-	5	U	10	U
3-Nitroaniline	5	-	-	-	-	-	-	***5***	***U***	***5***	***U***
4,6-Dinitro-o-cresol	NC	-	-	-	-	-	-	10	U	5	U
4-Bromophenyl phenyl ether	NC	-	-	-	-	-	-	2	U	*5*	*U*
4-Chloroaniline	5	-	-	-	-	-	-	***5***	***U***	**10**	**U**
4-Chlorophenyl phenyl ether	NC	-	-	-	-	-	-	2	U	2	U
4-Nitroaniline	5	-	-	-	-	-	-	***5***	***U***	***5***	***U***
4-Nitrophenol	NC	-	-	-	-	-	-	10	U	2	U
Acetophenone	NC	-	-	-	-	-	-	5	U	***5***	***U***
Benzoic Acid	NC	-	-	-	-	-	-	50	U	10	U
Benzyl Alcohol	NC	-	-	-	-	-	-	2	U	2	U
Biphenyl	NC	-	-	-	-	-	-	2	U	2	U
Bis(2-chloroethoxy)methane	5	-	-	-	-	-	-	*5*	*U*	5	U
Bis(2-chloroethyl)ether	1	-	-	-	-	-	-	*2*	*U*	2	U
Bis(2-chloroisopropyl)ether	5	-	-	-	-	-	-	2	U	***2***	***U***
Bis(2-ethylhexyl)phthalate	5	-	-	-	-	-	-	1.7	J	***2***	***U***
Butyl benzyl phthalate	50	-	-	-	-	-	-	5	U	***2***	***U***
Carbazole	NC	-	-	-	-	-	-	2	U	**2**	**U**
Di-n-butylphthalate	50	-	-	-	-	-	-	5	U	***2***	***U***
Di-n-octylphthalate	50	-	-	-	-	-	-	5	U	50	U
Dibenzofuran	NC	-	-	-	-	-	-	2	U	2	U
Diethyl phthalate	50	-	-	-	-	-	-	5	U	2	U
Dimethyl phthalate	50	-	-	-	-	-	-	5	U	***5***	***U***
Hexachlorocyclopentadiene	5	-	-	-	-	-	-	***20***	***U***	***2***	***U***
Isophorone	50	-	-	-	-	-	-	5	U	2	U
n-Nitrosodi-n-propylamine	NC	-	-	-	-	-	-	5	U	3	U
NDPA/DPA	50	-	-	-	-	-	-	2	U	5	U
Nitrobenzene	0.4	-	-	-	-	-	-	***2***	***U***	**2**	**U**
p-Chloro-m-cresol	NC	-	-	-	-	-	-	2	U	*2*	*U*
Phenol	1	-	-	-	-	-	-	***5***	***U***	5	U
2-Chloronaphthalene	10	-	-	-	-	-	-	0.2	U	5	U
2-Methylnaphthalene	NC	-	-	-	-	-	-	0.1	U	2	U
Acenaphthene	20	-	-	-	-	-	-	0.1	U	2	U
Acenaphthylene	NC	-	-	-	-	-	-	0.1	U	5	U
Anthracene	50	-	-	-	-	-	-	0.1	U	5	U
Benzo(a)anthracene	0.002	-	-	-	-	-	-	***0.1***	***U***	2	U
Benzo(a)pyrene	0	-	-	-	-	-	-	***0.1***	***U***	2	U
Benzo(b)fluoranthene	0.002	-	-	-	-	-	-	***0.1***	***U***	***2***	***U***
Benzo(ghi)perylene	NC	-	-	-	-	-	-	0.1	U	***2***	***U***
Benzo(k)fluoranthene	0.002	-	-	-	-	-	-	***0.1***	***U***	***20***	***U***
Chrysene	0.002	-	-	-	-	-	-	**0.08**	**J**	2	U
Dibenzo(a,h)anthracene	NC	-	-	-	-	-	-	0.1	U	***2***	***U***
Fluoranthene	50	-	-	-	-	-	-	0.1	U	5	U
Fluorene	50	-	-	-	-	-	-	0.1	U	5	U
Hexachlorobenzene	0.04	-	-	-	-	-	-	***0.8***	***U***	2	U
Hexachlorobutadiene	0.5	-	-	-	-	-	-	***0.5***	***U***	2	U
Hexachloroethane	5	-	-	-	-	-	-	0.8	U	***2***	***U***
Indeno(1,2,3-cd)pyrene	0.002	-	-	-	-	-	-	***0.1***	***U***	2	U
Naphthalene	10	-	-	-	-	-	-	0.1	U	***10***	***U***
Pentachlorophenol	1	-	-	-	-	-	-	0.8	U	2	U
Phenanthrene	50	-	-	-	-	-	-	0.1	U	***5***	***U***
Pyrene	50	-	-	-	-	-	-	0.1	U	2	U

All analytical results for groundwater in micrograms per liter (ug/L).
Q = Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been assigned.
NC = No criteria established for this contaminant
"-" = Analyte not analyzed
U = Not detected at the reported detection limit for the sample.
J = The concentration given is an approximate value.
NY-AWQS: New York TOGS 1.1.1 Glass GA Ambient Water Quality Standards criteria
Reporting Limit Exceedes NYS AWQS
Analyte detected exceeding NYS AWQS

Table 4
Quality Assurance/Quality Control Analytical Results
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

SAMPLE ID:	NYS AWQS	TRIP BLANK		TRIP BLANK		TRIP BLANK		GW FIELD BLANK		FIELD BLANK-SOIL	
LAB ID:		L2169771-04		L2170846-03		L2224285-09		L2169537-05		L2223664-06	
COLLECTION DATE:		11/19/2021		12/23/2021		5/9/2022		12/16/2021		5/5/2022	
ANALYTE	(ug/l)	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
CHLORINATED HERBICIDES											
2,4,5-T	35	-	-	-	-	-	-	2	U	2	U
2,4,5-TP (Silvex)	NC	-	-	-	-	-	-	2	U	2	U
2,4-D	50	-	-	-	-	-	-	10	U	10	U
ORGANOCHLORINE PESTICIDES											
4,4'-DDD	0.3	-	-	-	-	-	-	0.029	U	0.029	U
4,4'-DDE	0.2	-	-	-	-	-	-	0.029	U	0.029	U
4,4'-DDT	0.2	-	-	-	-	-	-	0.029	U	0.029	U
Aldrin	0	-	-	-	-	-	-	***0.014***	***U***	***0.014***	***U***
Alpha-BHC	0.01	-	-	-	-	-	-	***0.014***	***U***	***0.014***	***U***
Beta-BHC	0.04	-	-	-	-	-	-	**0.014**	**U**	**0.014**	**U**
Chlordane	0.05	-	-	-	-	-	-	***0.143***	***U***	***0.143***	***U***
cis-Chlordane	NC	-	-	-	-	-	-	0.014	U	0.014	U
Delta-BHC	0.04	-	-	-	-	-	-	0.014	U	0.014	U
Dieldrin	0.004	-	-	-	-	-	-	***0.029***	***U***	***0.029***	***U***
Endosulfan I	NC	-	-	-	-	-	-	0.014	U	0.014	U
Endosulfan II	NC	-	-	-	-	-	-	0.029	U	0.029	U
Endosulfan sulfate	NC	-	-	-	-	-	-	0.029	U	0.029	U
Endrin	0	-	-	-	-	-	-	***0.029***	***U***	***0.029***	***U***
Endrin aldehyde	5	-	-	-	-	-	-	0.029	U	0.029	U
Endrin ketone	5	-	-	-	-	-	-	0.029	U	0.029	U
Heptachlor	0.04	-	-	-	-	-	-	0.014	U	0.014	U
Heptachlor epoxide	0.03	-	-	-	-	-	-	0.014	U	0.014	U
Lindane	0.05	-	-	-	-	-	-	0.014	U	0.014	U
Methoxychlor	35	-	-	-	-	-	-	0.143	U	0.143	U
Toxaphene	0.06	-	-	-	-	-	-	***0.143***	***U***	***0.143***	***U***
trans-Chlordane	NC	-	-	-	-	-	-	0.014	U	0.014	U
POLYCHLORINATED BIPHENYLS BY											
Aroclor 1016	0.09	-	-	-	-	-	-	0.071	U	0.071	U
Aroclor 1221	0.09	-	-	-	-	-	-	0.071	U	0.071	U
Aroclor 1232	0.09	-	-	-	-	-	-	0.071	U	0.071	U
Aroclor 1242	0.09	-	-	-	-	-	-	0.071	U	0.071	U
Aroclor 1248	0.09	-	-	-	-	-	-	0.071	U	0.071	U
Aroclor 1254	0.09	-	-	-	-	-	-	0.071	U	0.071	U
Aroclor 1260	0.09	-	-	-	-	-	-	0.071	U	0.071	U
Aroclor 1262	0.09	-	-	-	-	-	-	0.071	U	0.071	U
Aroclor 1268	0.09	-	-	-	-	-	-	0.071	U	0.071	U
DISSOLVED METALS											
Aluminum, Total	NC	-	-	-	-	-	-	3.64	J	-	-
Antimony, Total	3	-	-	-	-	-	-	0.5	J	-	-
Arsenic, Total	25	-	-	-	-	-	-	0.5	U	-	-
Barium, Total	1000	-	-	-	-	-	-	0.5	U	-	-
Beryllium, Total	3	-	-	-	-	-	-	0.5	U	-	-
Cadmium, Total	5	-	-	-	-	-	-	0.2	U	-	-
Calcium, Total	NC	-	-	-	-	-	-	100	U	-	-
Chromium, Total	50	-	-	-	-	-	-	1	U	-	-
Cobalt, Total	NC	-	-	-	-	-	-	0.5	U	-	-
Copper, Total	200	-	-	-	-	-	-	1	U	-	-
Iron, Total	300	-	-	-	-	-	-	50	U	-	-
Lead, Total	25	-	-	-	-	-	-	1	U	-	-
Magnesium, Total	35000	-	-	-	-	-	-	70	U	-	-
Manganese, Total	300	-	-	-	-	-	-	1	U	-	-
Mercury, Total	0.7	-	-	-	-	-	-	0.2	U	-	-
Nickel, Total	100	-	-	-	-	-	-	2	U	-	-
Potassium, Total	NC	-	-	-	-	-	-	100	U	-	-
Selenium, Total	10	-	-	-	-	-	-	5	U	-	-
Silver, Total	50	-	-	-	-	-	-	0.4	U	-	-
Sodium, Total	20000	-	-	-	-	-	-	72.6	J	-	-
Thallium, Total	0.5	-	-	-	-	-	-	***1***	***U***	-	-
Vanadium, Total	NC	-	-	-	-	-	-	5	U	-	-
Zinc, Total	2000	-	-	-	-	-	-	10	U	-	-
TOTAL METALS											
Aluminum, Total	NC	-	-	-	-	-	-	10	U	100	U
Antimony, Total	3	-	-	-	-	-	-	***4***	***U***	***50***	***U***
Arsenic, Total	25	-	-	-	-	-	-	0.5	U	**2**	J
Barium, Total	1000	-	-	-	-	-	-	**0.2**	J	10	U
Beryllium, Total	3	-	-	-	-	-	-	0.5	U	***5***	***U***
Cadmium, Total	5	-	-	-	-	-	-	0.2	U	***5***	***U***
Calcium, Total	NC	-	-	-	-	-	-	100	U	42	J
Chromium, Total	50	-	-	-	-	-	-	1	U	10	U
Cobalt, Total	NC	-	-	-	-	-	-	0.5	U	20	U
Copper, Total	200	-	-	-	-	-	-	1	U	10	U
Iron, Total	300	-	-	-	-	-	-	50	U	**11**	J
Lead, Total	25	-	-	-	-	-	-	1	U	10	U
Magnesium, Total	35000	-	-	-	-	-	-	70	U	100	U
Manganese, Total	300	-	-	-	-	-	-	1	U	10	U
Mercury, Total	0.7	-	-	-	-	-	-	0.2	U	0.4	U
Nickel, Total	100	-	-	-	-	-	-	2	U	25	U
Potassium, Total	NC	-	-	-	-	-	-	100	U	2500	U
Selenium, Total	10	-	-	-	-	-	-	5	U	***10***	***U***
Silver, Total	50	-	-	-	-	-	-	0.4	U	7	U
Sodium, Total	20000	-	-	-	-	-	-	100	U	2000	U
Thallium, Total	0.5	-	-	-	-	-	-	***1***	***U***	***20***	***U***
Vanadium, Total	NC	-	-	-	-	-	-	5	U	10	U
Zinc, Total	2000	-	-	-	-	-	-	10	U	50	U
GENERAL CHEMISTRY											
Chromium, Trivalent	NC	-	-	-	-	-	-	10	U	-	-
Chromium, Hexavalent	50	-	-	-	-	-	-	10	U	10	U
Cyanide, Total	200	-	-	-	-	-	-	5	U	5	U

All analytical results for groundwater in micrograms per liter (ug/L).
Q = Laboratory Qualifier
An empty Q column indicates no laboratory qualifier has been assigned.
NC = No criteria established for this contaminant
"-" = Analyte not analyzed
U = Not detected at the reported detection limit for the sample.
J = The concentration given is an approximate value.
NY-AWQS: New York TOGS 1.1.1 Glass GA Ambient Water Quality Standards criteria
Reporting Limit Exceedes NYS AWQS
Analyte detected exceeding NYS AWQS

Table 5
Permanent Monitoring Well
Groundwater Elevation Data
North/West Battery Park City Resiliency Project
New York, New York
20-1152

MATRIXNEWORLD
Engineering Progress

Well Name	Total Depth (ft-bgs)	Screen Interval (ft-bgs)	Top of Casing Elevation (ft)	Depth to Water (ft)	GW Elevation (ft)
SB-13	16.80	10-20	11.25	10.20	1.05
SB-16	16.50	10-20	12.42	8.70	3.72
SB-17	20.00	7-17	12.45	14.10	-1.65
SB-20	16.50	10-20	9.77	10.10	-0.33
SB-21	17.70	10-20	9.81	10.90	-1.09
SB-24	17.05	8-18	12.39	11.10	1.29
SB-26	18.60	8-18	12.38	3.00	9.38
SB-29	20.00	10-20	11.80	9.50	2.30

Note: TWP-07 was installed as a temporary well and not surveyed; therefore, it has not been included in this table.

NEW YORK STATE OF OPPORTUNITY. | Battery Park City Authority

North/West Battery Park City Resiliency Project

Environmental Sampling Report

June 2024

DRAFT

Turner · ECRUZ ARCADIS SCAPE BIG WSP

1 Overview and Objectives

1.1 Introduction and Project Site

The North/West Battery Park City Authority (BPCA) Resiliency Project includes the creation of an integrated coastal flood risk management system along the Manhattan shoreline with the Hudson River (project area). The flood wall will require excavation to support construction of the foundation wall.

In 2023 and 2024, environmental sampling was conducted along the alignment to support environmental site characterization and waste management/disposal of excavated soils, groundwater, and sediment during construction. Environmental sampling was conducted to supplement limited investigations conducted previously in 2021 and 2022.

The 2023/2024 environmental sampling was conducted concurrently with geotechnical borings advanced along the proposed flood wall alignment. Environmental samples were collected concurrently with geotechnical samples to characterize environmental site conditions and determine potential disposal or reuse options of excavated material. Due to the limited space available onsite to stockpile material, Turner EE Cruise is not planning to reuse any excavated material within the project limits; therefore, a Beneficial Use Determination (BUD) will not be pursued. Soil analytical results are presented to provide characterization information for future disposal at an off-site facility and to provide characterization information for deeper soils that were not sampled during the 2021/2022 sampling event. Toxicity Characteristic Leaching Procedure (TCLP) soil sampling data will be used to determine if the solid waste requires disposal as hazardous material. Groundwater samples were also collected from existing monitoring wells along the alignment. No sediment samples were collected during the 2021-2022 sampling; therefore, sediment samples were collected concurrently with the geotechnical water borings to provide a general understanding of contaminants present in sediment within the project area.

The proposed alignment of the flood wall has been separated into the following seven (7) reaches with respective alignment number, and approximate location as shown on **Figure 1**:

1. Reach 1 (Alignment 1A) – West Street Crossing/Tribeca
2. Reach 2 (Alignment 2B) – North Esplanade
3. Reach 3 (Alignment 3A) – Rockefeller Park
4. Reach 4 (Alignment 4B) – Belvedere Plaza
5. Reach 5 (Alignment 5A) – North Cove
6. Reach 6 (Alignment 6A) – South Esplanade
7. Reach 7 (Alignment 7A) – South Cove

1.2 Regulatory Programs

The list below cites applicable environmental sampling programs and regulations that are pertinent to the project site:

- NYCRR 360.13 – Defines special requirements for pre-determined beneficial use of fill material and specifies testing, sampling, and analytical requirements along with acceptable fill uses.

DRAFT

- NYCRR Part 375-6 – Defines the soil cleanup objectives pertinent to the project site [Residential Soil Cleanup Objectives (RSCOs), Restricted-Residential Soil Cleanup Objectives (RRSCOs), Protection of Groundwater Soil Cleanup Objectives (PGWSCOs), and the Unrestricted Use SCOs (UUSCOs)].
- 40 Code of Federal Regulations (CFR) 261.21-261.23 – Defines properties which determine if a solid waste exhibits characteristics of ignitability, reactivity, or corrosivity.
- 40 CFR Part 261.24, Table 1: Environmental Protection Agency's (EPAs) Maximum Concentration of Contaminants for the Toxicity Characteristic – Defines maximum TCLP concentrations. If TCLP samples exceed concentrations in 40 CRF Part 261.24, the material must be disposed of as hazardous waste.
- New York Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (NYS AWQS) Class GA criteria – Presents Division of Water ambient water quality standards and guidance values and groundwater effluent limitations.
- Additional sediment quality parameters and sampling requirements are provided in TOGS 5.1.9 if management of dredged material is necessary.

DRAFT

6 2023 Environmental Sampling Results of Analyses

In order to support environmental site characterization, waste management of excavated soils, sediment, and groundwater disposal at the Site, Arcadis submitted for analysis 54 discrete soil samples, 4 duplicate soil samples, 13 composite soil samples, 6 groundwater samples, 1 duplicate groundwater sample, 6 discrete sediment samples, and 1 composite sediment sample for analysis as detailed on **Table 1**.

As described in Section 1.2, environmental samples were compared to the following applicable standards:

Discrete Soil and Sediment Samples

- RSCOs
- RRSCOs
- PGWSCOs (soil only)
- UUSCOs
- TOGS 5.1.9 Threshold Values (sediment only)

Composite Soil and Sediment Samples

- TCLP 40 CFR Part 261.24

Groundwater

- TOGS 1.1.1 NYS AWQS Class GA criteria

Analytical results were utilized to provide characterization information for future disposal at an off-site facility. TCLP sampling data will be used to determine if the solid waste requires disposal as hazardous material.

Tables 3 through **9** summarize any exceedances of regulatory standards. Soil and sediment sampling logs are included in **Appendix B** and groundwater sampling logs are included in **Appendix C**. Analytical data tables and laboratory reports are included in **Appendix D** and **Appendix E**, respectively.

6.1 Soil Sampling Results

6.1.1 Metals

As detailed in **Table 3**, several metals including lead, nickel, total chromium, silver, arsenic, cadmium, copper, zinc and mercury were detected exceeding their respective PGWSCOs, RSCOs, RRSCOs, and/or UUSCOs. Total chromium was detected in all of the soil samples, with the highest detection (263 mg/kg) found in the sample collected from B-5 in the 40-52 ft bgs interval. SCOs are available for trivalent and hexavalent chromium but not for total chromium. For comparison purposes, both the trivalent and hexavalent SCOs are shown in the table below and in **Appendix D**; however, results are compared to the hexavalent SCOs because they are the more stringent standards.

Many of the exceedances were found in the 40-52 bgs interval of boring B-5 located in Reach 7. The majority of these exceedances were for the UUSCOs, the most restrictive standards. Samples collected from B-22 and B-27 in Reach 3 exceeded PGWSCOs, RRSCOs, RSCOs, and UUSCOs for mercury (B-22) and arsenic (B-22 and B-27). As noted in Section 3, there was evidence of staining in both B-5 and B-22.

DRAFT

Table 3: Metals Exceedances

Reach	Sample ID	Depth (ft bgs)	Analyte	PGWSCO (mg/kg)	RRSCO (mg/kg)	RSCO (mg/kg)	UUSCO (mg/kg)	Result (mg/kg)
Reach 7	B-3	0-2	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	13.1
		2-4	Lead	450	400	400	63	391 F2
			Nickel	130	310	140	30	99.1
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	27.8
			Copper	1720	270	270	50	73.5
			Mercury	0.73	0.81	0.81	0.18	0.27 B
		4-6	Nickel	130	310	140	30	98.7
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	27.1
			Copper	1720	270	270	50	98.8
		6-8	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	4.8
		8-10	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	4.6
		10-12	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	13.3
		35-37	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	8.9
	B-5	40-52	Lead	450	400	400	63	360
			Nickel	130	310	140	30	46.3
			Silver	8.3	180	36	2	22.4
			Arsenic	16	16	16	13	23.4
			Cadmium	7.5	4.3	2.5	2.5	7.8
			Total Chromium*	1 [30]	22 [36]	110 [180]	19 [NS]	263
			Copper	1720	270	270	50	402
			Zinc	2480	10,000	2200	109	459
			Mercury	0.73	0.81	0.81	0.18	5.7
Reach 6	B-9	0-2	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	7.2
			Mercury	0.73	0.81	0.81	0.18	0.21
		2-4	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	14.7
			Nickel	140	310	140	30	31.6 F1
		4-6	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	18.1
		6-8	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	10.6
			Mercury	0.73	0.81	0.81	0.18	0.21

DRAFT

Reach	Sample ID	Depth (ft bgs)	Analyte	PGWSCO (mg/kg)	RRSCO (mg/kg)	RSCO (mg/kg)	UUSCO (mg/kg)	Result (mg/kg)
		8-10	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	15.6
Reach 5	B-14	0-2	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	11.2
		2-4	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	4.3
		4.6	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	4.1
Reach 4	B-19	0-2	Lead	450	400	400	63	90.0
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	20.4
			Copper	1720	270	270	50	76.1
			Zinc	2480	10,000	2200	109	175
		2-4	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	20.4
		4-6	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	8.8
		6-8	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	8.4
		8-10	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	25.9
		10-12	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	26.2
		20-22	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	2.9
		65-67	Lead	450	400	400	63	85.5
			Silver	8.3	180	36	2	2.3
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	71.1
			Copper	1720	270	270	50	79.0
			Zinc	2480	10000	2200	109	149
			Mercury	0.73	0.81	0.81	0.18	0.70
Reach 3	B-22	0-2	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	6.5
		2-4	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	5.6
			Zinc	2480	10,000	2200	109	170
		4-6	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	4.7
		6-8	Lead	450	400	400	63	94.3
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	12.9
			Copper	1720	270	270	50	104
			Zinc	2480	10,000	2200	109	1090
		8-10	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	8.5
		10-12	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	6.0

DRAFT

Reach	Sample ID	Depth (ft bgs)	Analyte	PGWSCO (mg/kg)	RRSCO (mg/kg)	RSCO (mg/kg)	UUSCO (mg/kg)	Result (mg/kg)
		20-22	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	5.9
		59-61	Lead	450	400	400	63	282
			Nickel	140	310	140	30	40.4
			Silver	8.3	180	36	2	3.6
			Arsenic	16	16	16	13	45.1
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	63.8
			Copper	1720	270	270	50	196
			Zinc	2480	10000	2200	109	334
			Mercury	0.73	0.81	0.81	0.18	15.6
	B-27	0-2	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	4.7
		2-4	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	5.8
		4-6	Arsenic	16	16	16	13	26.9
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	23.0
		6-8	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	8.8
		8-10	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	7.5
		10-12	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	44.6
		20-22	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	5.8
Reach 2	B-33	0-2	Lead	450	400	400	63	109
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	14.2
			Mercury	0.73	0.81	0.81	0.18	0.41
		2-4	Lead	450	400	400	63	117
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	15.7
			Mercury	0.73	0.81	0.81	0.18	0.35
		4-6	Lead	450	400	400	63	102
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	13.0
			Mercury	0.73	0.81	0.81	0.18	0.25
		6-8	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	13.9
		8-10	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	14.7
		10-12	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	15.1

DRAFT

Reach	Sample ID	Depth (ft bgs)	Analyte	PGWSCO (mg/kg)	RRSCO (mg/kg)	RSCO (mg/kg)	UUSCO (mg/kg)	Result (mg/kg)
Reach 1	B-39	0-2	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	28.8
		2-4	Lead	450	400	400	63	90.2
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	18.5
			Mercury	0.73	0.81	0.81	0.18	0.40
		4-6	Lead	450	400	400	63	82.9
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	20.8
			Mercury	0.73	0.81	0.81	0.18	0.28
	B-39A	10-12	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	11.6
			Mercury	0.73	0.81	0.81	0.18	0.22
		20-22	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	11.6
	B-44	0-2	Lead	450	400	400	63	78.3
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	13.5
		2-4	Lead	450	400	400	63	164
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	15.2
			Mercury	0.73	0.81	0.81	0.18	0.23
		4-6	Lead	450	400	400	63	393 F2
			Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	16.1
			Zinc	2480	10000	2200	109	267
			Mercury	0.73	0.81	0.81	0.18	0.32
		20-22	Total Chromium*	19 [NS]	22 [36]	110 [180]	1 [30]	12.3

Highlighted standard was exceeded in the associated sample or its duplicate. Where a duplicate sample was collected, the higher concentration is shown in the table.

* SCOs are available for trivalent & hexavalent-chromium, not total chromium. Results are compared to hexavalent-chromium SCOs because they are the more stringent standards. Trivalent-chromium SCOs are shown in brackets.

NS – No Standard

B – Compound was found in the method blank and the sample

F1 – MS and/or MSD recovery exceeds control limits

F2 - MS/MSD relative percent difference exceeds control limits

6.1.2 Pesticides

As detailed in **Table 4**, several pesticides including 4,4-DDT, 4,4-DDD, and 44-DDE, were detected exceeding their respective UUSCOs. All of the pesticide exceedances were from relatively shallow soils (0-6 bgs) and the majority of the exceedances were detected in samples from boring B-44 in Reach 1. There were no pesticides detected in exceedance of standards within Reach 2, 3, and 5.

Table 4: Pesticide Exceedances

Reach	Sample ID	Depth (ft bgs)	Analyte	PGWSCO (mg/kg)	RRSCO (mg/kg)	RSCO (mg/kg)	UUSCO (mg/kg)	Result (mg/kg)
Reach 6	B-9	2-4	4,4-DDT	136	7.9	1.7	0.0033	0.010
			4,4-DDE	17	8.9	1.8	0.0033	0.0042 J
Reach 4	B-19	0-2	4,4-DDE	17	8.9	1.8	0.0033	0.0074
		2-4	4,4-DDE	17	8.9	1.8	0.0033	0.0050 J
Reach 1	B-44	0-2	4,4-DDT	136	7.9	1.7	0.0033	0.075
			4,4-DDD	14	13	2.6	0.0033	0.0052 J
			4,4-DDE	17	8.9	1.8	0.0033	0.039
		2-4	4,4-DDT	136	7.9	1.7	0.0033	0.021
			4,4-DDE	17	8.9	1.8	0.0033	0.013
		4-6	4,4-DDT	136	7.9	1.7	0.0033	0.0076
			4,4-DDE	17	8.9	1.8	0.0033	0.0039 J

Highlighted standard was exceeded in the associated sample or its duplicate. Where a duplicate sample was collected, the higher concentration is shown in the table.
J - Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value

6.1.3 PCBs

As detailed in **Table 5**, one sample from boring B-5, located in Reach 7, exceeded the UUSCO for total PCBs. There were no PCBs detected in exceedance of standards within Reach 1, 2, 3, 4, 5, and 6.

Table 5: PCB Exceedances

Reach	Sample ID	Depth (ft bgs)	Analyte	PGWSCO (mg/kg)	RRSCO (mg/kg)	RSCO (mg/kg)	UUSCO (mg/kg)	Result (mg/kg)
Reach 7	B-5	40-52	Total PCBs	3.2	1	1	0.1	0.69

Highlighted standard was exceeded in the associated sample or its duplicate. Where a duplicate sample was collected, the higher concentration is shown in the table.

6.1.4 SVOCs

As detailed in **Table 6**, several SVOCs including 4-methylphenol, indeno(1,2,3-cd)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, benzo(a)pyrene, and benzo(a)anthracene were detected exceeding their respective PGWSCOs, RSCOs, and/or UUSCOs. Visible staining was evident in all samples with exceedances with the exception of those collected from B-39. There were no SVOCs detected in exceedance of standards within Reach 2, 5, and 6.

Table 6: SVOC Exceedances

Reach	Sample ID	Depth (ft bgs)	Analyte	PGWSCO (mg/kg)	RRSCO (mg/kg)	RSCO (mg/kg)	UUSCO (mg/kg)	Result (mg/kg)
Reach 7	B-5	40-52	Indeno(1,2,3-cd)pyrene	8.2	0.5	0.5	0.5	0.75
			Benzo(b)fluoranthene	1.7	1	1	1	1.3
			Chrysene	1	3.9	1	1	1.3
			Benzo(a)pyrene	22	1	1	1	1.2
			Benzo(a)anthracene	1	1	1	1	1.3
Reach 4	B-19	65-67	Indeno(1,2,3-cd)pyrene	8.2	0.5	0.5	0.5	0.55
			Chrysene	1	3.9	1	1	1.1
			Benzo(a)pyrene	22	1	1	1	1.1
			Benzo(a)anthracene	1	1	1	1	1.1
Reach 3	B-22	59-61	4-Methylphenol	0.33	100	34	0.33	0.78
			Indeno(1,2,3-cd)pyrene	8.2	0.5	0.5	0.5	1.2
			Benzo(b)fluoranthene	1.7	1	1	1	2.8
			Benzo(k)fluoranthene	1.7	2.8	1	0.8	0.93
			Chrysene	1	3.9	1	1	4.1
			Benzo(a)pyrene	22	1	1	1	3.2
			Benzo(a)anthracene	1	1	1	1	3.7
Reach 1	B-39	2-4	Indeno(1,2,3-cd)pyrene	8.2	0.5	0.5	0.5	0.71
			Benzo(b)fluoranthene	1.7	1	1	1	1.7
			Chrysene	1	3.9	1	1	1.3
			Benzo(a)pyrene	22	1	1	1	1.4
			Benzo(a)anthracene	1	1	1	1	1.4
		4-6	Indeno(1,2,3-cd)pyrene	8.2	0.5	0.5	0.5	1.0
			Benzo(b)fluoranthene	1.7	1	1	1	2.3
			Chrysene	1	3.9	1	1	1.5
			Benzo(a)pyrene	22	1	1	1	1.9
			Benzo(a)anthracene	1	1	1	1	1.5

DRAFT

Highlighted standard was exceeded in the associated sample or its duplicate. Where a duplicate sample was collected, the higher concentration is shown in the table.

6.1.5 VOCs

Acetone is the only VOC detected in exceedance of a standard. Acetone was detected exceeding its PGWSCO and UUSCO in Reach 7 [B-3 (4-6), B-3 (8-10), and B-5 (40-52)], Reach 6 [B-9 (0-2) and B-9 (2-4)], and Reach 3 [B-22 (59-61), B-27 (0-2), B-27 (4-6), and B-27 (10-12)] at concentrations ranging from 0.053 mg/kg to 0.18 mg/kg, just above the PGWSCO/UUSCO of 0.05 mg/kg. Acetone was not detected above the RSCO (100 mg/kg) in any of the soil samples. Low levels of acetone (0.01 to 0.1 mg/kg) were also detected in multiple soil samples during the 2021-2022 environmental sampling. Acetone is used as an intermediate in chemical manufacturing and as a solvent in many products, including paints and coatings, cleaning products, personal care products, lubricants, and plastics[1]. Low levels of acetone may be present in site soils due to the presence of urban fill. Acetone is also a common laboratory contaminant which can be detected at low levels in soil samples due to laboratory cross-contamination; however, it was not detected in any of the method or field blank samples. Acetone in soil readily leaches into groundwater; however, acetone was not detected in any groundwater samples collected onsite, as noted in Section 5.2.1. There were no VOCs detected in exceedance of standards within Reach 1, 2, 4, and 5.

6.1.6 Waste Classification

None of the composite samples exceed the TLCP standards for herbicides, metals, pesticides, SVOCs, or VOCs. Due to inadequate sample material, some samples were not able to be sampled for herbicides or pesticides as noted on Table 1.

6.2 Groundwater Sampling Results

6.2.1 Groundwater Characterization

As detailed in **Table 7**, several metals including iron, magnesium, manganese, and sodium were detected exceeding the TOGS 1.1.1 NYS AWQS Class GA criteria. There were no SVOCs detected in exceedance of standards. The only VOC detected in exceedance of standards was chloroform in SB-21 at a concentration of 60 micrograms per liter (ug/l), exceeding the NYS AWQS of 7 ug/l.

Table 7: Groundwater Exceedances

Analyte	Analyte	TOGS NYS AWQS (ug/l)	Result (ug/l)
B(OW)-26	Iron (total)	300	1280
	Manganese (total)	300	891
	Sodium (total)	20,000	113,000 B
	Sodium (dissolved)	20,000	122,000 B

[1] https://www.atsdr.cdc.gov/ToxProfiles/tp21-c5.pdf

DRAFT

Analyte	Analyte	TOGS NYS AWQS (ug/l)	Result (ug/l)
SB-17	Iron (dissolved)	300	822
	Iron (total)	300	826
	Manganese (dissolved)	300	457
	Manganese (total)	300	440
	Sodium (dissolved)	20,000	152,000 B
	Sodium (total)	20,000	160,000
SB-21	Iron (dissolved)	300	1640
	Chloroform	7	60
SB-24	Iron (dissolved)	300	1150
	Iron (total)	300	1990
	Sodium (dissolved)	20,000	57,200 B
	Sodium (total)	20,000	58,600 B
SB-26	Iron (total)	300	635 J
	Magnesium (dissolved)	35,000	422,000
	Magnesium (total)	35,000	441,000
	Sodium (dissolved)	20,000	3,640,000 B
	Sodium (total)	20,000	3,720,000
SB-29	Iron (total)	300	2250
	Magnesium (dissolved)	35,000	574,000
	Magnesium (total)	35,000	578,000
	Sodium (dissolved)	20,000	4,700,000 B
	Sodium (total)	20,000	4,750,000

Highlighted standard was exceeded in the associated sample or its duplicate. Where a duplicate sample was collected, the higher concentration is shown in the table.
B – Compound was found in the method blank and the sample.
J - Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value

6.2.2 Groundwater Discharge

If dewatering is required and a sewer discharge permit is pursued, additional analyses would be required as shown in the table below and in **Appendix F**. Additional sampling and testing would be completed during construction by the dewatering subcontractor as part of an application for a dewatering permit. Samples would be required to be taken downstream from pretreatment equipment if such exists, and be representative of the nature of the proposed groundwater discharge. All laboratory analyses would need to be conducted by a New York State Department of Health certified wastewater laboratory for the parameters listed in below.

DRAFT

Table 8: Groundwater Discharge Limits

Parameter	Daily Limit	Units
Non-polar material	50	mg/l
pH	5-12	Standard Units
Temperature	<150	Degrees Fahrenheit
Flash Point	>140	Degrees Fahrenheit
Cadmium	2	mg/l
Chromium (VI)	5	mg/l
Copper	5	mg/l
Lead	2	mg/l
Mercury	0.05	mg/l
Nickel	3	mg/l
Zinc	5	mg/l
Benzene	134	ug/l
methyl-tert-butyl-ether	50	Ug/l
Naphthalene	47	Ug/l
Phenol	--	--
Tetrachloroethylene	20	Ug/l
Toluene	74	Ug/l
1,2,4-trichlorobenzene	--	--
1,1,1-trichloroethane	--	--
Xylenes	74	Ug/l
PCBs (total)	1	Ug/l
Total Suspended Solids	350	Mg/l
Carbonaceous Biochemical Oxygen Demand (CBOD)	--	--
Chloride	--	--
Total Nitrogen	--	--
Total Solids	--	--

DRAFT

6.3 Sediment Sampling Results

6.3.1 Metals

As detailed in **Table 9**, several metals including lead, nickel, silver, arsenic, cadmium, chromium, copper, zinc, and mercury were detected exceeding their respective TOGS, RSCOs, RRSCOs, and/or UUSCOs. Total chromium was also detected in all of the sediment samples, with the highest detection (187 mg/kg) found in the sample collected from B-47 in the 4.5-6.5 ft interval. SCOs are available for trivalent and hexavalent chromium but not for total chromium. For comparison purposes, both the trivalent and hexavalent SCOs are shown in the table below and in **Appendix D**; however, results are compared to the hexavalent SCOs because they are the more stringent standards.

Exceedances of the SCOs were found in all three boring locations throughout all depths. The majority of these exceedances were for the UUSCOs or TOGS, the most restrictive standards. Several metals (mercury, arsenic, cadmium, and total chromium) were detected above the RRSCOs. All of the sediment samples exceeded the TOGS, RRSCO, RSCO, and UUSCO for mercury at concentrations ranging from 1.3 mg/kg to 8.5 mg/kg. Five out of six of the sediment samples exceeded the TOGS, RRSCO, RSCO, and UUSCO for arsenic at concentrations ranging from 19.6 to 33.1 mg/kg.

Table 9: Sediment Metals Exceedances

Reach	Sample ID	Depth (ft below the mudline)	Analyte	TOGS 5.1.9 (mg/kg)	RRSCO (mg/kg)	RSCO (mg/kg)	UUSCO (mg/kg)	Result (mg/kg)
Reach 6	B-46	2-4	Lead	33	400	400	63	253
			Silver	NS	180	36	2	5.8
			Arsenic	14	16	16	13	19.7
			Cadmium	1.2	4.3	2.5	2.5	2.1
			Total Chromium*	NS	110 [180]	22 [36]	1 [30]	79.8
			Copper	33	270	270	50	175
			Zinc	NS	10,000	2,200	109	344
			Mercury	0.17	0.81	0.81	0.18	3.3
		4-6	Lead	33	400	400	63	221
			Silver	NS	180	36	2	4.8
			Arsenic	14	16	16	13	30.6
			Cadmium	1.2	4.3	2.5	2.5	1.4
			Total Chromium*	NS	110 [180]	22 [36]	1 [30]	73.0
			Copper	33	270	270	50	180
			Zinc	NS	10,000	2,200	109	306
			Mercury	0.17	0.81	0.81	0.18	8.5
	B-47	4.5-6.5	Lead	33	400	400	63	242
			Nickel	NS	310	140	30	40.3
			Silver	NS	180	36	2	10.4

DRAFT

Reach	Sample ID	Depth (ft below the mudline)	Analyte	TOGS 5.1.9 (mg/kg)	RRSCO (mg/kg)	RSCO (mg/kg)	UUSCO (mg/kg)	Result (mg/kg)
			Arsenic	14	16	16	13	19.6
			Cadmium	1.2	4.3	2.5	2.5	4.5
			Total Chromium*	NS	110 [180]	22 [36]	1 [30]	187
			Copper	33	270	270	50	246
			Zinc	NS	10,000	2,200	109	337
			Mercury	0.17	0.81	0.81	0.18	1.3
		6.5-8.5	Lead	33	400	400	63	216
			Silver	NS	180	36	2	6.4
			Arsenic	14	16	16	13	23.7
			Cadmium	1.2	4.3	2.5	2.5	3.1
			Total Chromium*	NS	110 [180]	22 [36]	1 [30]	107
			Copper	33	270	270	50	168
			Zinc	NS	10,000	2,200	109	291
			Mercury	0.17	0.81	0.81	0.18	4.2
		9.5-11.3	Lead	33	400	400	63	288
			Nickel	NS	310	140	30	37.4
			Silver	NS	180	36	2	8.2
			Arsenic	14	16	16	13	33.1
			Cadmium	1.2	4.3	2.5	2.5	3.5
			Total Chromium*	NS	110 [180]	22 [36]	1 [30]	108
			Copper	33	270	270	50	227
			Zinc	NS	10,000	2,200	109	453
			Mercury	0.17	0.81	0.81	0.18	2.5
Reach 4	B-48	0-2	Lead	33	400	400	63	124
			Nickel	NS	310	140	30	31.3
			Silver	NS	180	36	2	4.3
			Cadmium	1.2	4.3	2.5	2.5	2.2
			Total Chromium*	NS	110 [180]	22 [36]	1 [30]	99.8
			Copper	33	270	270	50	111
			Zinc	NS	10,000	2,200	109	189
			Mercury	0.17	0.81	0.81	0.18	1.9

NS – No Standard

* SCOs are available for trivalent & hexavalent-chromium, not total chromium. Results are compared to hexavalent-chromium SCOs because they are the more stringent standards. Trivalent-chromium SCOs are shown in brackets.

DRAFT

6.3.2 Pesticides

No pesticides were detected in any of the sediment samples.

6.3.3 PCBs

No PCBs were detected in any of the sediment samples.

6.3.4 SVOCs

No SVOCs were detected in exceedance of their respective SCOs or TOGS.

6.3.5 VOCs

Acetone is the only VOC detected in exceedance of a standard. Acetone was detected exceeding its UUSCO in Reach 6 (B-46 and B-47) and Reach 4 (B-48) at concentrations ranging from 0.053 mg/kg to 0.10 mg/kg, just above the UUSCO of 0.05 mg/kg. Acetone was not detected above the RSCO (100 mg/kg) in any of the sediment samples. Acetone is a common laboratory contaminant which can be detected at low levels in samples due to laboratory cross-contamination; however, it was not detected in any of the method or field blank samples.

6.3.6 Waste Classification

Insufficient material was available for composite sample collection at borings B-47 and B-48, as noted on **Table 1**. The composite sediment sample collected from boring B-46 did not exceed the TLCP standards for herbicides, metals, pesticides, SVOCs, or VOCs.

6.4 Quality Assurance/Quality Control

All samples arrived at the laboratory in good condition and were properly preserved and on ice. No quality issues were identified that adversely affected the analytical results. 17 trip blanks, five MS/MSD samples (four soil and one groundwater), five duplicate samples (four soil and one groundwater sample) and 19 field blanks were collected as part of the environmental sampling. Insufficient material was available to collect duplicate and MS/MSD sediment samples. VOCs were not detected in any trip blank. Metals, pesticides, PCBs, SVOCs, and VOCs were not detected in the field blanks with the exception of low levels of aluminum (8.5 J ug/l and 16.4 J ug/l), lead (0.30 J ug/l and 0.54 J ug/l), magnesium (24 J ug/l), and sodium (301 J ug/l and 83 J ug/l), calcium (68.0 J ug/l and 110 ug/l), copper (0.96 J ug/l), potassium (65.8 J ug/l and 85.8 J ug/l), zinc (2.9 J ug/l in two samples), and chloromethane (0.46 J, 0.67 J, and 0.40 J). The “J” laboratory qualifiers indicate that the result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value. All associated samples were properly flagged with laboratory qualifiers and all duplicate sampling results were comparable to the parent sample. Analytical results for quality assurance/quality control samples are included in **Appendix D**.

DRAFT

7 Conclusions and Recommendations

7.1 Soil

In general, soils at the site are indicative of urban fill with exceedances of metals, pesticides, SVOCs, and acetone detected above PGWSCOs, RRSCOs, RSCOs, and UUSCOs, in keeping with previous sampling results from 2021-2022. During the 2021-2022 sampling event, soil samples were not collected from all the Reaches in the current alignment of the flood wall. Soil samples collected in 2021 and 2022 were also limited in depth (maximum 13 ft bgs). The anticipated depth of excavation based on the depth of bedrock found during the 2023 investigation is 50.5 to 100 ft, which exceeds the depth of the soil sampling data from 2021 and 2022. Additional soil samples collected as part of this sampling effort provide characterization information for these deeper soils to help determine disposal options and costs.

A summary of soil exceedances of the PGWSCOs, RRSCOs, and RSCOs in each Reach for the 2021/2022 and 2023 sampling is included in **Table 11**. Contamination above residential standards consists primarily of SVOCs and metals in both shallow and deeper soils. Low levels of acetone may be present in site soils due to the presence of urban fill. Acetone is also a common laboratory contaminant which can be detected at low levels in soil samples due to laboratory cross-contamination; however, it was not detected in any of the method or field blank samples. Acetone in soil readily leaches into groundwater; however, acetone was not detected in any groundwater samples collected onsite.

Collectively, soil samples from the 2021/2022 and the 2023 events provide generator knowledge of potential contaminants present for disposal and costing purposes for all Reaches except Reach 2 and Reach 5. In Reach 2, samples greater than 12 ft bgs were not able to be collected where evidence of staining and petroleum odor were present. In Reach 5, samples greater than 6 ft bgs were not able to be collected due to the presence of concrete. Therefore, within Reaches 2 and 5, additional samples may be necessary to characterize these soils. Additional analytical sampling and data may also be required from any of the Reaches during construction to comply with requirements from the receiving facility.

Based on the TCLP analytical results no solid waste from the project area is expected to require disposal as hazardous material.

DRAFT

Table 10: Conclusions and Recommendations

Reach	2021-2022 Shallow Soil Findings (0-13 ft bgs)	2023 Sampling Depth Range	2023 Shallow Soil Findings (0-12 ft bgs)	2023 Deep Soil Findings (Greater than 12 ft bgs)	Conclusions and Recommendations
Reach 1	SVOCs exceeding RSCOs, RRSCOs, and PGWSCOs from 0-5 ft bgs. No sampling below 5 ft bgs.	Discrete Sampling: 0-22 ft bgs Composite TCLP Sampling: 0-82 ft bgs	SVOCs exceeding RSCOs, RRSCOs, and PGWSCOs from 2-6 ft bgs. No exceedances below 6 ft bgs. Evidence of historic fill present up to 12 ft bgs	No exceedances of RSCOs, RRSCOs, or PGWSCOs. Evidence of historic fill present up to-37 ft bgs.	SVOC contamination in shallow soils (0-6 ft bgs) coinciding with observation of historic fill material. No evidence of contamination below 6 feet bgs No additional sampling recommended
Reach 2	No exceedances of RSCOs, RRSCOs, or PGWSCOs from 0-5 ft bgs. No sampling below 5 ft bgs.	Discrete Sampling: 0-12 ft bgs Composite TLCP Sampling: 0-85 ft bgs	No exceedances of RSCOs, RRSCOs, or PGWSCOs. Evidence of historic fill up to 12 ft bgs	No samples collected due insufficient recovery A petroleum odor/sheen 15-17 ft bgs, staining and petroleum odor 25-27 ft bgs, and evidence of historic fill up to 42 ft bgs.	No evidence of contamination in shallow soils 0-12 ft bgs Additional sampling to characterize deeper soils where staining and petroleum odors were present (15-27 ft bgs)

DRAFT

Reach	2021-2022 Shallow Soil Findings (0-13 ft bgs)	2023 Sampling Depth Range	2023 Shallow Soil Findings (0-12 ft bgs)	2023 Deep Soil Findings (Greater than 12 ft bgs)	Conclusions and Recommendations
Reach 3	SVOCs exceeding RSCOs, RRSCOs, and PGWSCOs from 1-3.5 ft bgs.	Discrete Sampling: 0-61 ft bgs Composite TCLP Sampling: 0-82 ft bgs	Metals exceeding PGWSCOs, RRSCOs, and RSCOs from 0-6 ft bgs Acetone exceeding PGWSCO 0-12 ft bgs	Metals and SVOCs exceeding RRSCOs, RSCOs, and PGWSCOs at 59-61 ft bgs Acetone exceeding PGWSCO 59-61 ft bgs Staining and petroleum odor 59-61 ft bgs,	Metals and SVOC contamination evident in both shallow (0-12 ft bgs) and deeper soils (>12 ft bgs) No additional sampling recommended
Reach 4	No samples collected in this Reach.	Discrete Sampling 0-67 ft bgs Composite TCLP Sampling: 0-65 ft bgs	Acetone exceeding PGWSCO 0-4 ft bgs Grey staining with no odor or elevated PID readings at 8-10 ft bgs	SVOCs exceeding RRSCOs, RSCOs, and PGWSCOs at 65-67 ft bgs Staining and petroleum odor 65-67 ft bgs	SVOC contamination evident in deeper soils (> 12 ft bgs) No additional sampling recommended.
Reach 5	No exceedances of RSCOs, RRSCOs, or PGWSCOs from 1-12 ft bgs.	Discrete Sampling: 0-6 ft bgs Composite TCLP Sampling: None collected	No exceedances. No samples collected 6-12 ft bgs due to presence of concrete.	No samples collected due to presence of concrete.	No evidence of contamination in shallow soils (0-6 ft bgs). Additional sampling to characterize deeper soils > 6 ft bgs

DRAFT

Reach	2021-2022 Shallow Soil Findings (0-13 ft bgs)	2023 Sampling Depth Range	2023 Shallow Soil Findings (0-12 ft bgs)	2023 Deep Soil Findings (Greater than 12 ft bgs)	Conclusions and Recommendations
Reach 6	No exceedances of RSCOs, RRSCOs, or PGWSCOs from 8-10 ft bgs.	Discrete Sampling: 0-10 ft bgs Composite TCLP Sampling: 0-55 ft bgs	Acetone exceeding PGWSCO 0-4 ft bgs. Insufficient recovery 10-12 ft bgs Evidence of historic fill up to 8 ft bgs	No discrete samples collected due to insufficient recovery Evidence of historic fill up to 37 ft bgs	No evidence of contamination in shallow soils (0-10 ft bgs) No additional sampling recommended
Reach 7	PCBs exceeding RRSCO from 1-3 ft bgs. SVOCs exceeding RSCOs, RRSCOs, and PGWSCOs from 8-10 ft. bgs. Acetone exceeding PGWSCO from 0-2 ft bgs.	Discrete Sampling: 0-37 ft bgs Composite TCLP Sampling: 0-52 ft bgs	Acetone exceeding PGWSCOs 4-10 ft bgs.	Metals and SVOCs, exceeding RRSCOs, RSCOs, and PGWSCOs at 40-52 ft bgs Acetone exceeding PGWSCO at 40-52 ft bgs Staining and petroleum odors 40-52 ft bgs	PCB and SVOC contamination evident in shallow soils (0-10 ft bgs). Metals and SVOC contamination evident in deeper soil No additional sampling recommended

DRAFT

7.2 Groundwater

Groundwater analytical results indicated that Site groundwater contains metals exceeding the NYS AWQS which is consistent with groundwater present in areas of regional historic fill and is consistent with previous sampling results from 2021/2022. Although the metals detected above their respective NYS AWQS may be indicative of contamination from historic fill they are also naturally occurring in regional native soils. Chloroform was the only VOC detected exceeding the NYS AWQS. During the previous 2021/2022 sampling event, chloroform was detected at concentrations less than the NYS AWQS. As stated in Section 5.2.2, if dewatering is required during construction and a sewer discharge permit is pursued, additional sampling and analyses would be required to determine any treatment that may be needed prior to discharge to comply with the limitations for effluent to sanitary or combined sewers as identified in the NYC Department of Environmental Protection Water Quality Control Application for discharges (see **Appendix F)**. Additional sampling and testing would be completed during construction by the dewatering subcontractor as part of an application for a dewatering permit.

7.3 Sediment

Sediment analytical results indicated that Site sediment contains metals exceeding the TOGS, RRSCOs, RSCOs, and/or UUSCOs similar to those detected in Site soils and in similar concentrations. The majority of these exceedances were for the UUSCOs, the most restrictive standards. The only metals in sediment detected above the TOGS, RRSCOs, and/or RSCOs were mercury, arsenic, total chromium, and cadmium. As noted in Section 6.3.1, mercury and arsenic were consistently detected in exceedance of RRSCOs in the sediment samples. Mercury was detected at concentrations up to ten times the RRSCO. TCLP analytical results did not detect hazardous levels of contamination in the sampled sediment.

Low levels of acetone were also detected in sediments. Acetone is a common laboratory contaminant which can be detected at low levels in samples due to laboratory cross-contamination.

Sediment samples from the 2024 event provide a general understanding of potential contaminants present in river sediments. The number of samples able to be collected was limited and sediment samples were only collected from Reach 4 to a depth of 2 ft below the mudline and in Reach 6 to a depth of 11.3 ft below the mudline. Additional analytical sampling and data will be required as part of the Project. Due to the limited nature of the sediment samples collected, additional sampling of material removed for pile installation in Reaches 2, 4, 5 and 6 will be completed during construction and prior to disposal. Additional sampling of sediment related to dredging for the bridging structures in Reach 5 is addressed in the Sediment Sampling and Analysis Plan.

DRAFT

Tables

DRAFT

Table 1
Environmental Sample Summary
Battery Park City Authority

ARCADIS

						Groundwater Analytes											Soil/Sediment Analytes											
Reach	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	TCL VOCs 8260D	TCL BNAs 8270E	TCL Metals (w/s Hg) 6020B	Dissolved TCL Metals (w/s Hg) 6020B (Field Filtered)	Mercury 7470A	Disolved Mercury 7470A (Field Filtered)	Total Suspended Solids SM 2540D	Solids, Total Disolved 2540C-2015 (Field Filtered)	TCL VOCs 8260D	TCL SVOCs EPA 8270E	TCL PCBs EPA 8082A	TAL Metals 6020B	TCL Pesticides EPA 8081B		TCLP VOCs 8260D	TCLP SVOCs EPA 8270E	TCLP Metals 6020B	TCLP Pesticides EPA 8081B	TCLP Herbicide EPA 8151A	Comments
	Soil																										
	B-39 (0-2)	9/5/23	1145	G	S											X	X	X	X	X							
	B-39 (2-4)	9/6/23	0000	G	S											X	X	X	X	X							
	B-39 (4-6)	9/6/23	0015	G	S											X	X	X	X	X							
	B-39 (6-8)																										No Sample Collected due to insufficient recovery
	B-39 (8-10)																										No Sample Collected due to insufficient recovery
	B-39A (10-12)	9/6/23	2225	G	S											X	X	X	X	X							Location of boring moved 3 feet due to presence of wood debris
	B-39A (20-22)	9/6/23	2256	G	S											X	X	X	X	X							Location of boring moved 3 feet due to presence of wood debris
Reach 1	B-44 (0-2)	7/25/2023	1145	G	S											X	X	X	X	X							
	B-44 (2-4)	7/25/2023	1200	G	S											X	X	X	X	X							
	DUP-Soil-072523	7/25/2023	1245	G	S											X	X	X	X	X							Duplicate of B-44 (4-6)
	B-44 (4-6)	7/25/2023	1250	G	S		X									X	X	X	X	X							
	B-44 (6-8)	7/25/2023																									no discrete samples were collected due to insufficient material/recovery (gravel)
	B-44 (8-10)	7/25/2023																									no discrete samples were collected due to insufficient material/recovery (gravel)
	B-44 (10-12)	7/25/2023																									no discrete samples were collected due to insufficient material/recovery (gravel)
	B-44 (20-22)	7/26/2023	730	G	S											X	X	X	X	X							
	COMP B-44 (0-57)	7/26/2023	1500	C	S																	X	X	X	X	X	
	COMP B-44 (60-82)	7/27/2023	1445	C	S																	X	X	X	X	X	
Reach 2	B-33 (0-2)	8/10/2023	0734	G	S											X	X	X	X	X							
	B-33 (2-4)	8/10/2023	0741	G	S											X	X	X	X	X							
	B-33 (4-6)	8/10/2023	0747	G	S											X	X	X	X	X							
	B-33 (6-8)	8/10/2023	0758	G	S											X	X	X	X	X							
	B-33 (8-10)	8/10/2023	0800	G	S											X	X	X	X	X							
	B-33 (10-12)	8/10/2023	0805	G	S											X	X	X	X	X							
	B-33 (20-22)																										No sample due to insufficient recovery
	COMP B-33 (0-70)	8/10/2023	1240	C	S																	X	X	X	X	X	
	COMP B-33 (75-85)	8/11/2023	0830	C	S																	X	X	X		X	Inadequate material available for TCLP pesticide sample.

Table 1
Environmental Sample Summary
Battery Park City Authority

						Groundwater Analytes											Soil/Sediment Analytes											
Reach	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	TCL VOCs 8260D	TCL BNAs 8270E	TCL Metals (w/s Hg) 6020B	Dissolved TCL Metals (w/s Hg) 6020B (Field Filtered)	Mercury 7470A	Disolved Mercury 7470A (Field Filtered)	Total Suspended Solids SM 2540D	Solids, Total Disolved 2540C-2015 (Field Filtered)	TCL VOCs 8260D	TCL SVOCs EPA 8270E	TCL PCBs EPA 8082A	TAL Metals 6020B	TCL Pesticides EPA 8081B		TCLP VOCs 8260D	TCLP SVOCs EPA 8270E	TCLP Metals 6020B	TCLP Pesticides EPA 8081B	TCLP Herbicide EPA 8151A	Comments
	B-22 (0-2)	7/17/2023	1125	G	S											X	X	X	X	X							
	B-22 (2-4)	7/17/2023	1130	G	S											X	X	X	X	X							
	B-22 (4-6)	7/17/2023	1135	G	S											X	X	X	X	X							
	B-22 (6-8)	7/17/2023	1220	G	S											X	X	X	X	X							
	B-22 (8-10)	7/17/2023	1235	G	S											X	X	X	X	X							
	B-22 (10-12)	7/17/2023	1255	G	S											X	X	X	X	X							
	B-22 (20-22)	7/17/2023	13:15	G	S											X	X	X	X	X							
	B-22 (59-61)	7/18/2023	945	G	S											X	X	X	X	X							Collected due to some visible impacts/staining and elevated PID readings observed at intervals between 50 and 65 ft bgs.
Reach 3																											
	B-27 (0-2)	6/27/2023	14:00	G	S											X	X	X	X	X							
	B-27 (2-4)	6/27/2023	14:00	G	S											X	X	X	X	X							
	B-27 (4-6)	6/27/2023	14:00	G	S											X	X	X	X	X							
	B-27 (6-8)	6/28/2023	9:10	G	S											X	X	X	X	X							
	B-27 (8-10)	6/28/2023	9:20	G	S											X	X	X	X	X							
	B-27 (10-12)	6/28/2023	9:30	G	S											X	X	X	X	X							
	B-27 (20-22)	6/28/2023	9:50	G	S											X	X	X	X	X							
	COMP-B-27 (0-62)	6/28/2023	14:30	C	S																	X	X	X	X	X	
	COMP-B-27 (65-82)	6/29/2023	10:55	C	S																	X	X	X	X	X	
	B-19 (0-2)	8/14/2023	0900	G	S											X	X	X	X	X							
	B-19 (2-4)	8/14/2023	0910	G	S		X									X	X	X	X	X							
	DUP-Soil-081423	8/14/2023	-	G	S											X	X	X	X	X							Duplicate of B-19 (2-4)
	B-19 (4-6)	8/14/2023	0930	G	S											X	X	X	X	X							
	B-19 (6-8)	8/14/2023	0950	G	S											X	X	X	X	X							
Reach 4	B-19 (8-10)	8/14/2023	1015	G	S											X	X	X	X	X							
	B-19 (10-12)	8/14/2023	1115	G	S											X	X	X	X	X							
	B-19 (20-22)	8/14/2023	1300	G	S											X	X	X	X	X							
	B-19 (65-67)	8/14/2023	1005	G	S											X	X	X	X	X							Discrete Sample collected due to staining, sligtly elevated PID, petr. Odor
	COMP-B-19 (0-35)	8/14/2023	1500	C	S																	X	X	X		X	Inadequate material available for TCLP pesticide sample.
	COMP-B-19 (35-65)	8/15/2023	1500	C	S																	X	X	X		X	Inadequate material available for TCLP pesticide sample.

Table 1
Environmental Sample Summary
Battery Park City Authority

ARCADIS

						Groundwater Analytes											Soil/Sediment Analytes										
Reach	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	TCL VOCs 8260D	TCL BNAs 8270E	TCL Metals (w/s Hg) 6020B	Dissolved TCL Metals (w/s Hg) 6020B (Field Filtered)	Mercury 7470A	Disolved Mercury 7470A (Field Filtered)	Total Suspended Solids SM 2540D	Solids, Total Disolved 2540C-2015 (Field Filtered)	TCL VOCs 8260D	TCL SVOCs EPA 8270E	TCL PCBs EPA 8082A	TAL Metals 6020B	TCL Pesticides EPA 8081B		TCLP VOCs 8260D	TCLP SVOCs EPA 8270E	TCLP Metals 6020B	TCLP Pesticides EPA 8081B	TCLP Herbicide EPA 8151A	Comments
Reach 5	B-14 (0-2)	8/9/2023	9:20	G	S											X	X	X	X	X							
	B-14 (2-4)	8/9/2023	9:20	G	S											X	X	X	X	X							
	B-14 (4-6)	8/9/2023	9:20	G	S											X	X	X	X	X							
	B-14 (6-8)																										Concrete encountered at 6' BGS; attempted at 3 locations; Abandoned Boring location.
	B-14 (8-10)																										
	B-14 (10-12)																										
	B-14 (20-22)																										
	COMP-B-14 ( )																										
Reach 6	B-9 (0-2)	8/30/2023	1140	G	S											X	X	X	X	X							
	B-9 (2-4)	8/30/2023	1200	G	S		X									X	X	X	X	X							
	DUP-Soil-083023	8/30/2023	1200	G	S											X	X	X	X	X							Duplicate of B-9 (2-4)
	B-9 (4-6)	8/30/2023	1220	G	S											X	X	X	X	X							
	B-9 (6-8)	8/30/2023	1240	G	S											X	X	X	X	X							
	B-9 (8-10)	8/30/2023	1300	G	S											X	X	X	X	X							
	B-9 (10-12)																										No sample due to insufficient recovery
	B-9 (20-22)																										No sample due to insufficient recovery
	COMP-B-9 (0-17)	8/30/2023	1450	C	S																	X	X	X	X		Inadequate material available for TCLP herbicide sample.
	COMP-B-9 (20-55)	8/31/2023	1430	C	S																	X	X	X		X	Inadequate material available for TCLP pesticide sample.

DRAFT

Table 1
Environmental Sample Summary
Battery Park City Authority

						Groundwater Analytes											Soil/Sediment Analytes											
Reach	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	TCL VOCs 8260D	TCL BNAs 8270E	TCL Metals (w/s Hg) 6020B	Dissolved TCL Metals (w/s Hg) 6020B (Field Filtered)	Mercury 7470A	Disolved Mercury 7470A (Field Filtered)	Total Suspended Solids SM 2540D	Solids, Total Disolved 2540C-2015 (Field Filtered)	TCL VOCs 8260D	TCL SVOCs EPA 8270E	TCL PCBs EPA 8082A	TAL Metals 6020B	TCL Pesticides EPA 8081B		TCLP VOCs 8260D	TCLP SVOCs EPA 8270E	TCLP Metals 6020B	TCLP Pesticides EPA 8081B	TCLP Herbicide EPA 8151A	Comments
	B-3 (0-2)	6/27/2023	7:40	G	S											X	X	X	X	X							B-3 samples collected in place of B-4 due to geotechnical schedule
	B-3 (2-4)	6/27/2023	8:20	G	S		X									X	X	X	X	X							
	B-3 (4-6)	6/27/2023	9:45	G	S											X	X	X	X	X							
	DUP-Soil-062723	6/27/2023	-	G	S											X	X	X	X	X							Duplicate of B-3 (2-4)
	B-3 (6-8)	6/27/2023	10:40	G	S											X	X	X	X	X							
	B-3 (8-10)	6/27/2023	10:50	G	S											X	X	X	X	X							
	B-3 (10-12)	6/27/2023	11:05	G	S											X	X	X	X	X							
Reach 7	B-3 (35-37)	6/28/2023	9:50	G	S											X	X	X	X	X							Sample interval was changed due to poor recovery and material in previous samples.
	COMP-B-3 (0-17)	6/27/2023	14:00	C	S																	X	X	X	X	X	
	COMP-B-3 (25-47)	6/28/2023	14:30	C	S																	X	X	X	X	X	
	B-5 (40-52)	6/22/2023	13:45	C	S											X	X	X	X								Additional sample due to staining observed during geotechnical sampling
	B-5 (TCLP)	6/22/2023	13:45	C	S																	X	X	X	X	X	Additional sample due to staining observed during geotechnical sampling
	B-6																										Not collected due to conflicts with geotechnical schedule and environmental staffing
	Groundwater																										
Reach 1	B(OW)-26	6/29/2023	13:45	G	W	Y		X	X	X	X	X	X	X	X												
Reach 3	SB-17	6/28/2023	1340	G	W	Y		X	X	X	X	X	X	X	X												
Reach 3	SB-21	6/29/2023	12:00	G	W	Y		X	X	X	X	X	X	X	X												
Reach 5	SB-24	6/29/2023	10:15	G	W	Y		X	X	X	X	X	X	X	X												
Reach 7	SB-26	6/23/2023	1345	G	W	Y		X	X	X	X	X	X	X	X												
Reach 7	SB-29	6/26/2023	9:10	G	W	Y	X	X	X	X	X	X	X	X	X												
Reach 7	DUP-GW-062623	6/26/2023	-	G	W	Y		X	X	X	X	X	X	X	X												Duplicate of SB-29

DRAFT

Table 1
Environmental Sample Summary
Battery Park City Authority

						Groundwater Analytes											Soil/Sediment Analytes											
Reach	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	TCL VOCs 8260D	TCL BNAs 8270E	TCL Metals (w/s Hg) 6020B	Dissolved TCL Metals (w/s Hg) 6020B (Field Filtered)	Mercury 7470A	Disolved Mercury 7470A (Field Filtered)	Total Suspended Solids SM 2540D	Solids, Total Disolved 2540C-2015 (Field Filtered)	TCL VOCs 8260D	TCL SVOCs EPA 8270E	TCL PCBs EPA 8082A	TAL Metals 6020B	TCL Pesticides EPA 8081B		TCLP VOCs 8260D	TCLP SVOCs EPA 8270E	TCLP Metals 6020B	TCLP Pesticides EPA 8081B	TCLP Herbicide EPA 8151A	Comments
	Sediment																										
Reach 1	TE-B-50																										Boring eliminated due to proximity of the barge to nearby moorings
	TE-B-51																										Boring eliminated due to proximity of the barge to nearby moorings
Reach 3	TE-B-49																										Boring eliminated due to access issues with the barge.
Reach 4	TE-B-48 (0-2)	3/2/2024	9:30	G	S											X	X	X	X	X							
	TE-B-48 (5-7)																										Not collected, weathered bedrock hit at 2' below mudline
	TE-B-48 (10-12)																										Not collected, weathered bedrock hit at 2' below mudline
	TE-B-48 (20-22)																										Not collected, weathered bedrock hit at 2' below mudline
	TE-B-48 (0-22)																										Not collected, weathered bedrock hit at 2' below mudline and insuffient material available for TCLP.
Reach 6	TE-B-47 (4.5-6.5)	2/27/2024	8:10	G	S											X	X	X	X	X							
	TE-B-47 (6.5-8.5)	2/27/2024	9:00	G	S											X	X	X	X	X							
	TE-B-47 (9.5-11.3)	2/27/2024	9:30	G	S											X	X	X	X	X							
	TE-B-47 (20-22)																										Not collected, bedrock hit at 14' below mudline
	TE-B-47 (0-22)																										Not collected. Insufficient material available for TCLP
	TE-B-46 (2-4)	2/29/2024	10:45	G	S											X	X	X	X	X							
	TE-B-46 (4-6)	2/29/2024	11:10	G	S											X	X	X	X	X							
	TE-B-46 (10-12)																										Not collected, weathered bedrock hit at 8' below mudline
	TE-B-46 (20-22)																										Not collected, weathered bedrock hit at 8' below mudline
	TE-B-46 (0-8)	2/29/2024	11:45	C	S																	X	X	X	X	X	

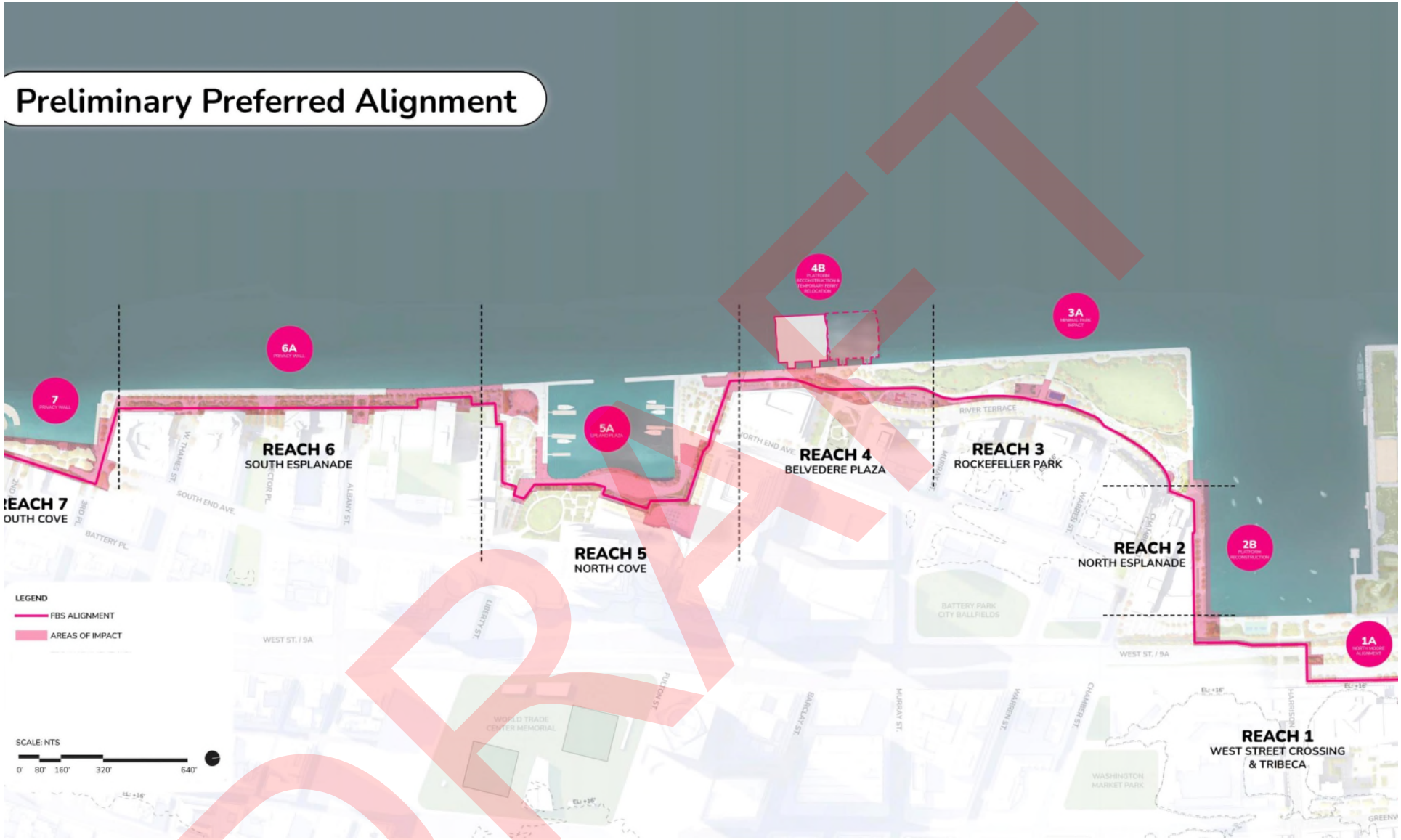
Table 1
Environmental Sample Summary
Battery Park City Authority

						Groundwater Analytes										Soil/Sediment Analytes										
Reach	Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	TCL VOCs 8260D	TCL BNAs 8270E	TCL Metals (w/s Hg) 6020B	Dissolved TCL Metals (w/s Hg) 6020B (Field Filtered)	Mercury 7470A	Disolved Mercury 7470A (Field Filtered)	Total Suspended Solids SM 2540D	Solids, Total Disolved 2540C-2015 (Field Filtered)	TCL VOCs 8260D	TCL SVOCs EPA 8270E	TCL PCBs EPA 8082A	TAL Metals 6020B	TCL Pesticides EPA 8081B		TCLP VOCs 8260D	TCLP SVOCs EPA 8270E	TCLP Metals 6020B	TCLP Pesticides EPA 8081B	TCLP Herbicide EPA 8151A	Comments
	Field Blanks																										
	FB-062223	6/22/23	13:45	G	W											X	X	X	X	X							
	FB-062323	6/23/23	14:35	G	W			X	X	X	X	X	X	X	X												
	FB-062623	6/26/23	11:30	G	W			X	X	X	X	X	X	X	X												
	FB-062723	6/27/23	11:05	G	W											X	X	X	X	X							
	FB-062823	6/28/23	1130	G	W												X	X	X	X							
	FB-071723	7/17/23	1400	G	W											X	X	X	X	X							
	FB-071823	7/18/23	1400	G	W											X	X	X	X	X							
	FB-072523	7/25/23	1445	G	W											X	X	X	X	X							
	FB-072623	7/26/23	1300	G	W											X	X	X	X	X							
	FB-080923	8/9/23	1300	G	W											X	X	X	X	X							
	FB-081023	8/10/23	1100	G	W											X	X	X	X	X							
	FB-081423	8/14/23	1400	G	W											X	X	X	X	X							
	FB-081623	8/16/23	1320	G	W											X	X	X	X	X							
	FB-083023	8/30/23	1440	G	W											X	X	X	X	X							
	FB-090623	9/6/23	0245	G	W											X	X	X	X	X							
	FB-090623	9/6/23	2340	G	W											X	X	X	X	X							
	FB-022724	2/27/24	1500	G	W											X	X	X	X	X							
	FB-022924	2/29/24	1500	G	W											X	X	X	X	X							
	FB-030224	3/2/24	1100	G	W											X	X	X	X	X							

DRAFT

Figures

DRAFT



DRAFT

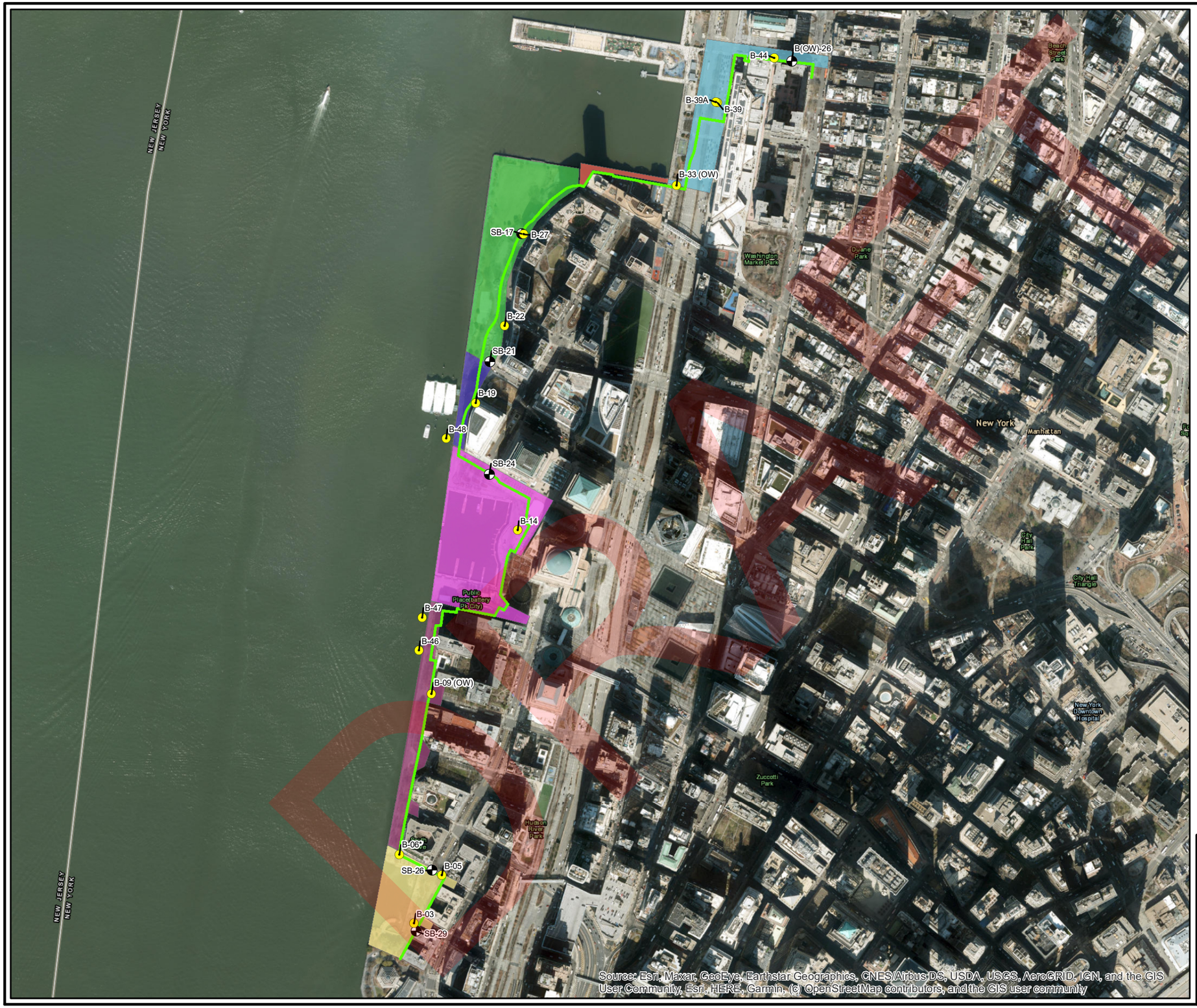
LONG ISLAND, NEW YORK
NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT
ENVIRONMENTAL INVESTIGATION

SITE PLAN

ARCADIS

FIGURE
1

DRAFT



LEGEND

- Borings Surveyed
- Monitoring Well
- Alignment

REACHES

- 1
- 2
- 3
- 4
- 5
- 6
- 7

NOTES

1. * = Not Sampled

0 600 1,200 Feet

GRAPHIC SCALE

Long Island, New York

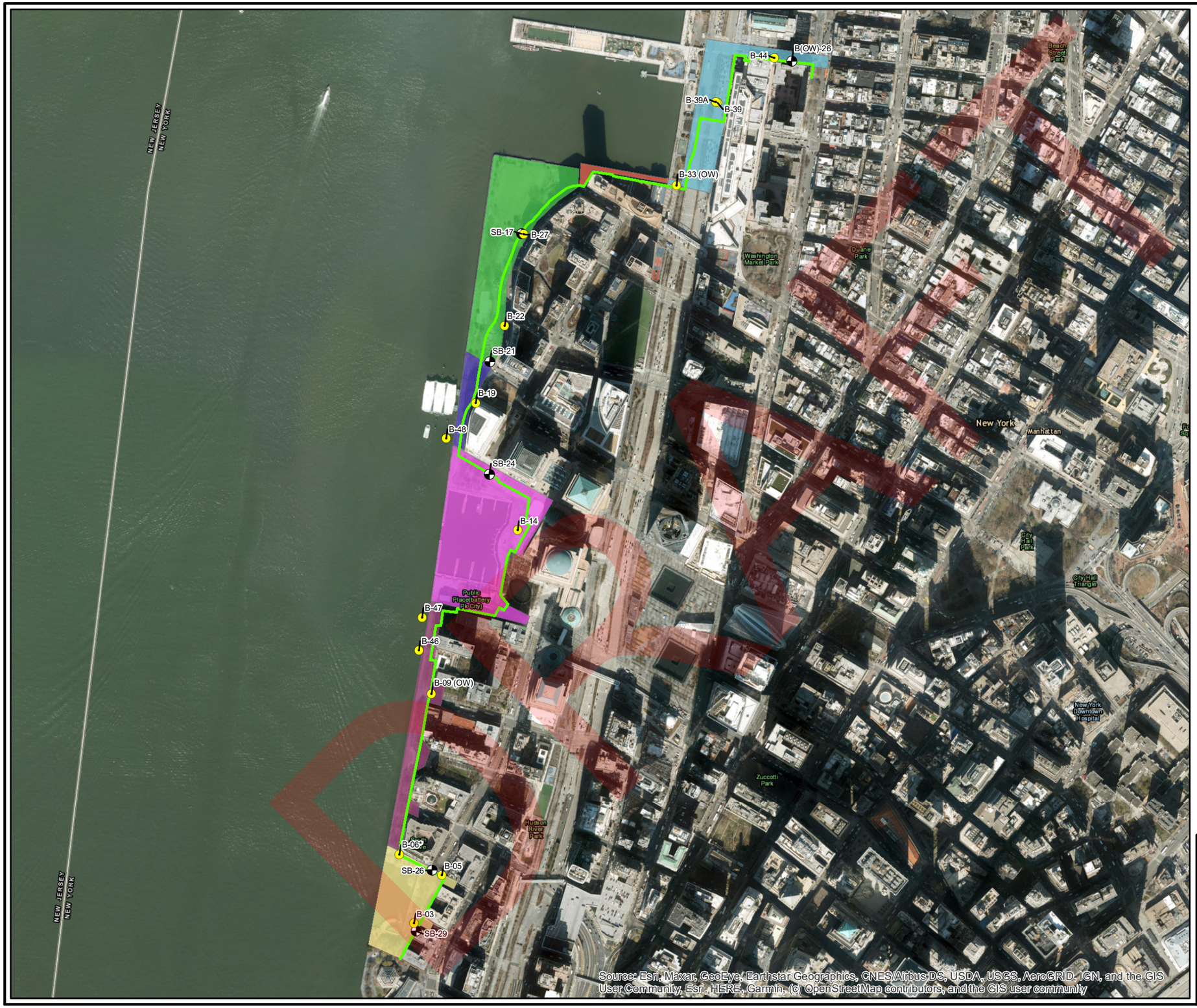
North/West Battery Park City Resiliency Project Geotechnical Investigation

BORING LOCATION MAP SURVEY

ARCADIS | FIGURE 2

PATH: T:_ENV\BPCA Geotechnical Investigation Enviro-Permitting\GIS Data\MXD\Boring Location Map Survey\v3.mxd SAVED: 5/6/2024 BY: MSMiller

DRAFT



LEGEND

- Borings Surveyed
- Monitoring Well
- Alignment

REACHES

- 1
- 2
- 3
- 4
- 5
- 6
- 7

NOTES

1. * = Not Sampled

0 600 1,200 Feet

GRAPHIC SCALE

Long Island, New York

North/West Battery Park City Resiliency Project Geotechnical Investigation

BORING LOCATION MAP SURVEY

ARCADIS | FIGURE 2

PATH: T:_ENV\BPCA Geotechnical Investigation Enviro-Permitting\GIS Data\MXD\Boring Location Map Survey\v3.mxd SAVED: 5/6/2024 BY: MSMiller