205 PARK AVENUE

KINGS COUNTY

BROOKLYN, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C224319

Prepared for:

462 Lexington LLC

89 Bartlett St. Brooklyn, NY 11206

Prepared by:

Goldberg-Zoino Associates of New York P.C. d/b/a GZA GeoEnvironmental of New York (GZA)

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

DECEMBER 2022

CERTIFICATION STATEMENT

I ERNEST HANNA certify that I am currently a NYS registered professional engineer or Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Ernest Hanna, P.E. No. 065440

12/19/2022 DATE

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LIST OF ACRONYMS

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Greenhouse Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision

RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement

ES EXECUTIVE SUMMARY

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

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Site Identification:	Site No.C224319, 205 Park Avenue, Brooklyn, New York

Institutional Controls:	1. The property may be used for restricted residential and commercial use consistent with zoning; use of the groundwater is prohibited.	
	2. An Environmental Easement will be filed with the Kings County Clerk	
	3. All ECs must be inspected at a frequency and in a manner defined in this SMP.	
Engineering Controls:	1. Sub Slab Depressurization System (SSDS).	
Inspections:		Frequency
1. SSDS		Annually
Monitoring:		
1. Monitored Natural Attenuation (MNA) groundwater monitoring program		volatile organic compounds (VOCs) quarterly until another frequency is authorized by the Department
2. SSDS system effluent		quarterly for the first year, semiannually for 2 years; and then annul from the fourth year

Maintenance:	
1. Active SSDS Maintenance	As needed
Reporting:	
1. Periodic Review Report	Annually

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

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for 205 Park Avenue located in Brooklyn, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C224319, which is administered by the New York State Department of Environmental Conservation (NYSDEC or Department).

The BCP Participant, 462 Lexington LLC entered into a Brownfield Cleanup Agreement (BCA) on June 1, 2021, with the NYSDEC to remediate the site. A figure showing the site location and boundaries of this site is provided in Figure 1 and Figure 2. The boundaries of the site are more fully described in the metes and bounds site description provided in Appendix D.

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

This SMP was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the BCA (Index #C224319-05-21; Site #C224319) for the site, and thereby subject to applicable penalties.

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

This SMP was prepared by Goldberg-Zoino Associates of New York P.C. d/b/a GZA GeoEnvironmental of New York (GZA), on behalf of 462 Lexington LLC, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with the Environmental Easement for the site, the NYSDEC project manager will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

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

1. 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6 NYCRR Part 375 and/or Environmental Conservation Law.

2. 7-day advance notice of any field activity associated with the remedial program.

3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.

4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.

5. Notice within 48 hours of any non-routine maintenance activities.

6. Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

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

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

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

The following Table 1 includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix A.

Table 1: Notifications*

Name	**Contact Information**	**Required Notification****
Rafi Alam Project Manager, NYSDEC	Phone: (518) 402-8606 Email: Rafi.Alam@dec.ny.gov	All Notifications
Heidi Dudek, PE Project Manager's Supervisor	Phone: (518) 402-0193 Email: heidi.dudek@dec.ny.gov	All Notifications
Harolyn Hood Project Manager, NYSDOH	Phone: 518-473-4780 Email: harolyn.hood@health.ny.gov	Notifications 4, 6, and 7

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

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

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in Brooklyn, Kings County, New York and is identified as Section Walkabout Block 2033 and Lot 50 on the New York City Tax Map (see Figure 2). The site is an approximately 0.29-acre area and is bounded by two residential buildings to the north, Brooklyn Queens Expressway (BQE) overpass and parking lot followed by residences to the south, Vanderbilt Avenue followed by residences and a motorcycle/motor scooter repair and dealership to the east, and Clermont Avenue followed by residences to the west (see Figure 2 – Site Layout Map). The boundaries of the site are more fully described in Appendix [D] –Environmental Easement. The owner of the site parcel at the time of issuance of this SMP is 462 Lexington LLC, 89 Bartlett Street, Brooklyn 11206

The owner is presumed operator at the time of issuance of this SMP.

2.2 Physical Setting

2.2.1 Land Use

The Site is currently under construction, with the planned finished building be a mixed use commercial residential structure, with below grade floors."

The properties adjoining the Site and, in the neighborhood, surrounding the Site primarily include residential and commercial properties. The properties immediately south of the Site include an expressway; the properties immediately north of the Site include residential properties; the properties immediately east of the Site include commercial and residential properties; and the properties to the west of the Site include residential properties.

2.2.2 Geology

Based on the United States Geological Survey 1994 Bedrock and engineering geologic maps of New York County and parts of Kings and Queens Counties, bedrock near the Site consists of Middle Ordovician to Lower Cambrian interbedded units of muscovite-biotite-quartz schist, gneissic quartz-microcline-muscovite-biotite-plagioclase granite with minor garnet, quartz-biotite hornblende amphibolite, and unevenly foliated sillimanite-plagioclase-muscovite-biotite-microcline-quartz gneissic schist with minor garnet Bedrock was not encountered during our on-site explorations; we anticipate bedrock to be encountered at a depth of 100 feet below ground surface. Soils observed in boring logs advanced on Site indicate that subsurface soil at the Site consisted of construction and demolition debris (C&D), which was primarily comprised of brick, concrete, asphalt, and other debris in a brown silty-sand matrix. The layer of C&D and historic fill extended to a depth ranging from ground surface to approximately 14 to 27 feet below grade. Native soil consisting of brown silty sands is present below the C&D and historic fill material.

A geologic cross section is shown in Figures 3a and 3b. Site specific boring logs are provided in Appendix H.

2.2.3 Hydrogeology

Kings County is part of the Long Island Hydrogeologic System. Groundwater is the sole source of drinking water for Nassau and Suffolk Counties, but in Kings and Queens Counties potable water is supplied by New York City. Based on information obtained from temporary wells installed on-Site, depth to groundwater ranges from approximately 24 to 29 feet below ground surface. Based on USGS geological survey (Water-Table Altitude in Kings and Queens Counties, New York, March 1997) groundwater flow is generally from southwest to northeast although the groundwater gradient is relatively flat beneath the Site.

A groundwater contour map is shown in Figure 4. Groundwater elevation data is provided in Table 2. Groundwater monitoring well construction logs are provided in Appendix J.

2.3 Investigation and Remedial History

The Site has been developed since at least 1887 with two- and three-story dwellings and three-story stores. The Site had multiple tenants and uses throughout the years, including a meat market, drug store/pharmacy, dry cleaners, auto service facility, private residences, and various other commercial establishments. A dry cleaner (known as Park Dollars Cleaners) operated on site in the 1920s and 1930s. An auto service facility (known as Harris Auto Service) operated on site in the 1960s. The site had been owned and operated by the City of New York until 2001. In 2007, title was transferred to 462 Lexington LLC. However, the site has remained vacant since 2001 and all buildings on Site were demolished in April 2017.

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

- Phase I Environmental Site Assessment - GZA (May 2019)
- Remedial Investigation Workplan - GZA (June 2021)
- Remedial Investigation Report - GZA (September 2021)
- Remedial Action Work Plan - GZA (January 2022)

2.3.1 May 2019 - Phase I Environmental Site Assessment (GZA)

GZA's 2019 Phase I Environmental Site Assessment (ESA) Report identified the following Recognized Environmental Conditions (RECs):

- The Site is a NYC E-Designated property with environmental requirements related to air, noise, and hazardous materials that must be investigated and addressed before a building permit can be obtained for the property's redevelopment.
- The Site has been historically identified by city directories as a dry cleaner and auto service facility.

2.3.2 June 2021 - Remedial Investigation Workplan (GZA)

A Remedial Investigation (RI) Workplan was developed by GZA in response to the findings of the Phase I ESA Report and per a May 8, 2019 meeting with the NYC Office of Environmental Remediation (OER) for a proposed development project. The RI Workplan outlines the Phase II Investigation Work Scope including a geophysical survey, investigation of soil, soil vapor, and groundwater to be performed to address both the RECs and historic fill, as well as to provide general horizonal and vertical characterization at selected locations across the site for development purposes.

2.3.3 September 2021 - Remedial Investigation Report (GZA)

A Remedial Investigation (RI) was completed at the Site from January 2020 through June 2021 and documented in a RIR dated July 2021. The goals of the Remedial Investigation were to define the nature and extent of contamination in soil, groundwater and other impacted media; to identify the source(s) of the contamination detected; to assess the impact of the contamination on public health and/or the environment; and to provide information to support the development of a Remedial Action Work Plan to address the contamination. RI activities included the following scope of work: (i) delineation of the horizontal and vertical extent of impacted soils, groundwater, and soil vapor on Site; (ii) assessment of the potential fate and transport of contaminants; and (iii) data collection to allow for evaluation of potential remedial alternatives for exposure mitigation.

Activities completed under the RI included:

- Sampling and analysis for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), pesticides, the emerging contaminants per-and polyfluoroalkyl substances (PFAS) and 1,4 dioxane in soil samples from soil boring locations and groundwater samples from temporary groundwater monitoring wells;
- The collection and analysis of soil vapor samples for VOCs.

The following is a brief presentation of the RI finding:

1. Soil samples collected and analyzed during the RI contained metals including copper, mercury, nickel, lead, and zinc above Unrestricted Use Soil Cleanup Objectives (UUSCOs). Seven semi-volatile organic compounds (SVOCs) including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene were detected at concentrations above their Track 1 UUSCOs and/or Track 2 Restricted Residential Soil Cleanup Objectives (RRSCOs) in the soil samples. The SVOCs detected are all polycyclic aromatic hydrocarbon (PAH) compounds. Pesticides including 4,4'-DDD, 4,4'-DDD, 4,4'-DDT, and Dieldrin were detected above UUSCOs in soil samples. Concentrations and distribution of metals, PAH compounds, and pesticides suggest that they are associated with historic fill material and C&D observed during sampling. It is noted that three soil borings contained PAHs and metals at the depth of 26.5- 30 feet below grade. Since native material was encountered at depths of 17 feet and greater it is unlikely that the deeper SVOC exceedances in soils immediately above the water table are due to placement of fill or C&D. The observation is more likely related to borehole slough from shallower depths into the boring during continuous advancement of the macro-core soil sampler during soil boring installation.

   One soil sample (SRI-4 (1-1.5)) contained xylene and other VOC detections. The concentration of xylene is above its Track 1 UUSCOs, while other VOC detections are below the UUSCOs. This observation may be associated with a release of petroleum at that location.

   Three shallow soil samples contained perfluorooctanesulfonic Acid (PFOS) at concentrations above their respective screening levels.

2. Of the eleven groundwater samples collected from the site (five from temporary wells and six from permanent wells), tetrachloroethene (PCE) was detected above NYSDEC Ambient Water Quality Standards (AWQS) in all groundwater samples and ranged from 5.3 to 22 µg/L. Chloroform was detected in groundwater above its AWQ of 7 µg/L in three of the eleven samples at concentrations ranged from 8.2 to 36 µg/L.

On-Site groundwater samples collected and analyzed from temporary well points during the RI showed dissolved SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene above their respective AWQS. These SVOCs were also detected above AWQS in the one off-site permanent well. One pesticide, dieldrin, was detected above AWQS in seven of the groundwater samples (three from temporary wells and four from permanent wells). The presence of PAH compounds and pesticides in groundwater on Site is most likely due to the presence of C&D material on Site and entrained sediment colloids in the groundwater samples as these contaminants have very low solubilities.

All the groundwater samples (six collected from permanent well and one collected from temporary well) contained PFOA and PFOS at concentrations above their respective screening level of 10 ng/L under NYSDEC's Part 375 Remedial Programs. Groundwater samples exhibited PFOA and PFOS at a combined (total) concentration below its screening level of 500 ng/L under NYSDEC's Part 375 Remedial Programs.

3. Of the eleven soil gas samples collected during the RI, PCE was detected in all of the soil vapor samples and ranged from 25.1 µg/m^3 (SG-2 (5-6')) to 209 µg/m^3 (SG-6 (20-21')). Trichloroethene (TCE) was detected in 10 of 11 samples and ranged in concentration from 1.42 µg/m^3 (SG-8 (5-6')) to 23.8 µg/m^3(SG-3 (20-21')).

2.3.4 January 2022 - Remedial Action Work Plan (GZA)

A Remedial Action Work Plan was developed by GZA with the following proposed remedial actions that achieves protection of public health and the environment for the intended use of the property:

1. Establishment of Conditional Track 1 - Part 375 Unrestricted Use SCOs;
2. Excavation and removal of soils above Unrestricted Use SCOs, to a depth of approximately 18 feet below grade. It is noted that three soil borings contained PAHs and metals at the depth of 27.5- 30 feet below grade; therefore, these areas will be excavated to the depth of 27.5 to 30 ft bgs.

3. A Permeable Reactive Barrier will be installed along the upgradient of the site along Clermont Avenue and at the corner of Park Avenue to mitigates the impact of off-site cVOCs entering the site. GZA planned to inject up to 9,200 pounds (lbs) of PlumeStop mixed with approximately 21,000 gallons of water via GeoProbe® Direct Push Technology DPT to form an in-situ upgradient barrier along Clermont Street. The upgradient barrier will be 106 feet long, with a targeted injection interval of 25 to 45 feet bgs. Injection points will be spaced 6 feet apart, for a total of approximately 18 PlumeStop injection points.
4. Periodic groundwater monitoring of cVOCs will be performed to evaluate the groundwater treatment effectiveness through the PlumeStop Barrier.
5. Installation of a vapor barrier system consisting of a vapor barrier beneath the building slab and on the outside wall of the subgrade foundation sidewalls to mitigate soil vapor migration into the building. The vapor barrier will consist of a 20-mil VaporBlock® PlusTM 20 (or equivalent) below the slab under the full building area and outside the sub-grade foundation sidewalls. The remedial engineer will certify in the FER that the vapor barrier system was installed to mitigate soil vapor migration into the building.
6. Piping for an active sub-slab depressurization system (SSDS) will be installed in the case that an active engineering control for the mitigation of detected soil vapors on the Site is necessary. A soil vapor intrusion evaluation will be conducted following completion of remedial actions to evaluate if the operation of the SSDS is needed. The VI evaluation will include the collection of samples from the sub-slab of the proposed building and the indoor air in accordance with the NYSDOH "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006) and the May 2017: Updates to Soil Vapor / Indoor Air Decision Matrices. If the results of the VI evaluation indicate that "mitigaton" is required, then the SSDS will be activated. If within 5-years, the sub-slab vapor concentrations reach a point where "no further action" is required, then the SSDS will not be considered an EC anymore and that condition on the Track 1 remedy will be removed. The monitoring will be described in a Site Management Plan (SMP). If soil vapors and/or indoor air

concentrations exceed the matrix values that require mitigation or monitoring, then the SSDS will become a permanent EC and the remedy will be considered a Tracks 2 or 4, as described below.

7. A small portion of the cellar will be constructed and operated as a parking garage with high volume air exchange in conformance with the NYC Building Code.
8. If a Track 1 or 2 Cleanup cannot be achieved, a SMP for long term management of residual contamination, as required by the Environmental Easement, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance and (4) reporting will be established;
9. If a Track 1 or 2 Cleanup cannot be achieved, an Environmental Easement, including Institutional and Engineering Controls, to prevent future exposure to residual contamination remaining at the Site will be recorded. The recorded Easement is provided in Appendix D.
10. Submittal of a Final Engineering Report (FER) that describes the remedial activities, certifies that the remedial requirements have been achieved, describes Engineering and Institutional Controls to be implemented at the site, and describes any deviation from the RAWP.
11. Responsibilities associated with the Remedial Action, including permitting requirements, would be addressed in accordance with applicable Federal, State and local rules and regulations.

There were a few deviations from the RAWP proposed remedial actions outlined above.

1. The remedial alternative selected for the Site is now Track 2 instead of Track 1 cleanup as originally planned. Consequently, the area containing the three soil boring locations that contained PAHs and metals was not excavated to a depth of 30 ft bgs. The Track 2 alternative will allow restricted residential use of the property.
2. In addition, the NYSDEC determined that the RI groundwater data does not indicate any off-site impacts in groundwater related to the site, therefore no

groundwater remediation was implemented at the Site. An active sub-slab depressurization system (SSDS) will be completed under this SMP.

2.4 Remedial Action Objectives

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

Groundwater

RAOs for Public Health Protection

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

Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.

Soil

RAOs for Public Health Protection

Prevent ingestion/direct contact with contaminated soil.

RAOs for Environmental Protection

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

Soil Vapor

RAOs for Public Health Protection

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

2.5 Remaining Contamination

This section provides a summary of contamination remaining at the Site following remediation and redevelopment. This information is presented for informational purposes should future excavations or development be performed at the Site and the disclosed environmental conditions encountered. Please note that temporal changes in concentrations and distributions of contaminants can occur; the user should verify existing and current Site conditions prior to performing any work that disturbs such soil.

2.5.1 Soil

During the RI phase of work (see Figure 5A), the predominant classes of contamination found in Site soils consisted of the following:

- Metals: mercury;
- SVOCs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene; and
- PFAS: PFOS.

Several SVOCs were detected at concentrations that exceed their applicable protection of groundwater soil cleanup objectives (PGSCOs) and/or unrestricted use soil cleanup objectives (UUSCOs) including: benzo(a)anthracene up to 12 parts per million, or ppm (PGSCO is 1 ppm); benzo(a)pyrene up to 9.2 ppm (UUSCO is 1 ppm); benzo(k)fluoranthene up to 3.9 ppm (UUSCO is 0.8 ppm); benzo(b)fluoranthene up to 11 ppm (UUSCO is 1 ppm); chrysene up to 10 ppm (PGSCO is 1 ppm) and indeno(1,2,3-c,d)pyrene up to 6.1 ppm (UUSCO is 0.5 ppm). Several metals were detected at concentrations that exceed their respective UUSCOs, including mercury up to 0.82 ppm (UUSCO is 0.18 ppm); nickel up to 33 ppm (UUSCO is (30 ppm) and lead up to 338 ppm (UUSCO is 63 ppm). Several pesticides were detected at concentrations that exceed their respective UUSCOs including dieldrin up to 0.00655 ppm (UUSCO is 0.005 ppm); 4 ,4'-DDD up to 0.0183 ppm (UUSCO is 0.0033 ppm) and 4 ,4'-DDT up to 0.0464 ppm

(UUSCO is 0.0033 ppm). Perfluorooctanoic Acid (PFOA) was detected at a maximum concentration of 0.00344 ppm (UUSCO is 0.00088 ppm) and perfluorooctanesulfonic acid (PFOS) was detected at a maximum concentration of 0.000213 ppm (UUSCO is 0.00066 ppm). Data does not indicate any off-site impacts in soil related to the site.

The remediation of the Site consisted of excavation and off-site disposal of all subsurface materials within the property boundary of the Site to a depth of approximately 15 feet bgs to accommodate foundation elements. Excavation was extended to 18 feet bgs in the vicinity of the elevator pit. It is noted that the three soil borings contained SVOCs and metals at the depth of 26.5- 30 feet below grade and are likely related to boring slough and therefore are not a site contaminant and will not be excavated. Any backfill materials used in the site will consist of quarry stone imported to the Site which meets unrestricted SCOs.

Tables 3A to 3E summarize the results of all soil samples collected that exceed the Unrestricted Use SCOs and the restricted residential Use SCOs at the site after completion of remedial action.

2.5.2 Groundwater

Tetrachloroethene (PCE) was detected in on-site groundwater at concentrations of up to 22 parts per billion (ppb) which exceeds its respective Ambient Water Quality Standard (AWQS) of 5 ppb. Chloroform was detected up to 36 ppb (AWQS is 7 ppb). Several SVOCs were also detected including benzo(a)anthracene up to 0.08 ppb (AWQS is 0.002 ppb); benzo(b)fluoranthene up to 0.09 ppb (AWQS is 0.002 ppb); benzo(k)fluoranthene up to 0.04 ppb (AWQS is 0.002 ppb); chrysene up to 0.06 ppb (AWQS is 0.002 ppb) and indeno (1,2,3-cd) pyrene up to 0.06 ppb (AWQS is 0.002 ppb). Perfluorooctanoic Acid (PFOA) was detected in groundwater samples at a maximum concentration of 137 parts per trillion, or ppt (maximum contaminant level (MCL) is 10 ppt) and perfluorooctanesulfonic acid (PFOS) was detected in groundwater samples at a maximum concentration of 32.4 ppt (MCL is 10 ppt).

Additionally, an off-site groundwater sample was collected from an upgradient monitoring well located on the western side of the sidewalk adjoining the site. PCE was

detected at concentration up to 11 ppb (AWQS is 5 ppb). Several SVOCs were also detected in off-site groundwater including benzo(a)anthracene up to 0.05 ppb (AWQS is 0.002 ppb); benzo(b)fluoranthene up to 0.09 ppb (AWQS is 0.002 ppb); benzo(k)fluoranthene up to 0.04 ppb (AWQS is 0.002 ppb); chrysene up to 0.35 ppb (AWQS is 0.002 ppb). PFOA was detected in off-site groundwater samples at a maximum concentration of 84 ppt (MCL is 10 ppt) and PFOS was detected in off-site groundwater samples at a maximum concentration of 14.6 ppt (MCL is 10 ppt).

Based on the on-site and off-site groundwater sampling results, the NYSDEC determined that the data does not indicate any off-site impacts from the Site in groundwater that are related to site activity. Since the remedial element 5 of the Decision Document (In-situ treatment using activate carbon) will not be required as the site is not a contributing source to the CVOC groundwater contamination, post-remediation groundwater sampling has not been completed to date. Figure 6B shows the locations of the installed monitoring wells that were planned after the remedial action.

2.5.3 Soil Vapor

The results of the soil vapor intrusion sampling conducted during the RI which exceeded NYSDOH guidance values are illustrated in Figure 7.

Contaminants of concern identified in soil vapor during the RI at the site are VOCs including TCE and PCE. PCE was detected in all soil vapor samples at concentrations ranging from 25.1 micrograms per cubic meter ($\mu g/m^3$) to 209 $\mu g/m^3$, and trichloroethene (TCE) was detected in all soil vapor samples ranging in concentration from 1.42 $\mu g/m^3$to 23.8 $\mu g/m^3$. Chloroform was also detected in all soil vapor locations at a maximum concentration of 288 $\mu g/m^3$. Petroleum-related VOCs such as benzene, toluene, ethylbenzene, and xylenes (BTEX) were detected in soil vapor ranging from 16.97 $\mu g/m^3$ to 43.37 $\mu g/m^3$.

Additionally, an off-site soil vapor sample was collected from the western side of the sidewalk adjoining the site. PCE was detected at concentration up to 119 $\mu g/m^3$and TCE was detected up to 5.54 $\mu g/m^3$. Chloroform was also detected up to 227 $\mu g/m^3$. Petroleum-related VOCs such as benzene, toluene, ethylbenzene, and xylenes (BTEX) were detected in soil vapor ranging up to 29.79 $\mu g/m^3$.

Based on the on-site and off-site soil vapor sampling results, data does not indicate any off-site impacts in soil vapor from the Site that are related to site activity.

Although the building was demolished and existing soil was removed to 15 feet bgs, as a precaution**,** SSDS piping and a vapor barrier was installed beneath the slab of the new building being constructed on the Site to address the concern of potential soil vapor intrusion on-Site. An active SSDS will be completed with a blower under the SMP program.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site specific to the remaining contamination. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC project manager.

This plan provides:

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

3.2 Institutional Controls

A series of ICs is required by the RAWP and Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to restricted residential, commercial and industrial uses only. Adherence to these ICs on the site is

required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on Figure 8. These ICs are:

- The property may be used for: restricted residential;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the NYSDEC;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 8, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the site are prohibited; and

- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 Engineering Controls

3.3.1 Sub-slab Depressurization Systems

Since remaining CVOC contaminated groundwater exists beneath the entire Site as a result of the upgradient, off-site contaminated water continuing to migrate onto, through and beneath the Site, an active SSDS will be completed on the Site to ensure conditions will be protective of human health and the environment.

The building already under construction onsite has had piping for a SSDS (without the blower) and a vapor barrier installed beneath its basement floor slab. A blower has not been installed to the system yet. The active SSDS, with a blower, will be completed and operated under this SMP program. The piping, placed for a SSDS installed beneath the vapor barrier will intercept any potential residual vapors from contaminants remaining in the groundwater before entering the building. Specifically, slotted schedule 40 PVC pipe was installed in a minimum 10-inch thick gas permeable aggregate layer beneath the respective building's basement floor slab. A cushion geotextile and then a vapor barrier was placed on top of the aggregate layer. Then vertical riser pipes and suction fan will be installed under the SMP program before the building is occupied.

A pressure field extension test will be performed to document that the full extent of the building slab is depressurized by the SSDS. Post-mitigation indoor air samples (typically collected no sooner than 30 days after system start-up/continuous operation) will also be collected to verify indoor air concentrations are within background levels.

Procedures for periodically monitoring, operating and maintaining an activated SSDS are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). Record (as built) drawings, signed and sealed by a professional engineer, will be included

in Appendix K – Operations and Maintenance Manual. Figure 10 shows the boundary applicable to the SVI Abatement plan EC for the Site.

3.4 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

3.4.1 - Sub-Slab Depressurization (SSD) System

The active SSD system will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH. In the event that monitoring data indicates that the SSD system may no longer be required, a proposal to discontinue the SSD system will be submitted by the remedial party to the NYSDEC and NYSDOH.

3.4.2 - Monitoring Wells associated with Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the monitoring will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager. If groundwater

contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

3.5 The Excavation Work Plan

Since the site has been excavated to 15 ft bgs, a site cover system is not required. The site foundation slab system is illustrated in Figure 9. This foundation slab, comprised of a six-inch thick concrete slab and a minimum 8-inch thick, clean granular sub-base, was installed on this site.

The Excavation Work Plan (EWP) provided in Appendix B outlines the procedures required to be implemented in the event the foundation slab is breached, penetrated or temporarily removed.

Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP), provided as Appendix F, and associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in Appendix I. Any disturbance of the site's foundation slab must be overseen by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State (NYS), or a qualified person who directly reports to a NYS licensed/registered PE.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

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

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

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

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

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

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site – wide Inspection

Site-wide inspections will be performed at a minimum of once per year. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a NYS licensed/registered PE. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix G – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;

- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC project manager must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by either a qualified environmental professional, as defined in 6 NYCCR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a NYS licensed/registered PE. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Treatment System Monitoring and Sampling

4.3.1 Remedial System Monitoring

Performance monitoring of any activated SSDS in a building on the Site as identified in Table 4 Remedial System Monitoring Requirements and Schedule (see below). Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure has been reported or an emergency occurs that is deemed likely to affect the operation of the system. The system components to be monitored include, but are not limited to, the components included in Table 4 below.

Table 4 – Remedial System Monitoring Requirements and Schedule

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
Activated SSDS	Blower operation and sub-slab vacuum, and visible penetrations, openings or consequential cracks in basement floor slab	Manometer readings and differential pressure measurements	Annually

A complete list of components to be inspected is provided in the Inspection Checklist, provided in Appendix G - Site Management Forms. If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications; maintenance and repair, as per the Operation and Maintenance Plan, is required immediately.

4.3.2 Sub-Slab Depressurization System Sampling

The SSDS system effluent will be sampled quarterly for the first year, then semiannually thereafter to monitor effluent levels. Should the PCE concentrations in the SSDS effluent appear to be below NYSDOH AGVs, grab soil gas samples will be collected while the system is operating. In the event that the soil gas samples are below mitigation levels, as presented in the NYSDOH Decision Matrices I and II, the system will be turned off after written approval by the NYSDEC and NYSDOH. After which, soil gas will be sampled quarterly to assess rebound for one year; sampling will be conducted semiannually for three years, biannually for two years, then once every four years thereafter, or as determined by NYSDEC and/or NYSDOH.

Samples shall be collected from the SSDS on a routine basis. Sampling locations, required analytical parameters and schedule are provided in Table 5 – Remedial System

Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table 5 – Remedial System Sampling Requirements and Schedule

Sampling Location	Analytical Parameters				Schedule
	VOCs (EPA Method 624)	TAL Metals (EPA Method 6010B)	pH (EPA Method 9040)	VOC (EPA Method TO-15)	
SSDS System Effluent				X	quarterly for the first year, semiannually for 2 years; and then annul from the fourth year

Detailed sample collection and analytical procedures and protocols are provided in Appendix E– Field Activities Plan and Quality Assurance Project Plan.

4.4 Groundwater Monitoring and Sampling

Four monitoring wells were originally remained/reinstalled to evaluate the groundwater quality beneath the Site. However, as mentioned in subsection 2.5.2 above. the NYSDEC determined that the data does not indicate any off-site impacts from the Site in groundwater that are related to site activity; therefore, post-remediation groundwater sampling has not been completed to date.

Samples shall be collected from the monitoring wells on a routine basis as part of an annual Monitored Natural Attenuation groundwater monitoring program. Sampling locations required analytical parameters and schedule are provided in Table 6 – Groundwater Monitoring Sampling Requirements and Schedule below. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Table 6 – Groundwater Monitoring Sampling Requirements and Schedule in accordance with DEC's Emerging Contaminant Sampling Guidance

Sampling Location	Analytical Parameters	Schedule
	VOCs including 1-4 Dioxane (EPA Method 8260C)	
Monitoring Well # MW-5	X	Quarterly, until NYSDEC determines a different frequency is appropriate
Monitoring Well # PT-1	X	Quarterly, until NYSDEC determines a different frequency is appropriate
Monitoring Well # PT-2	X	Quarterly, until NYSDEC determines a different frequency is appropriate
Monitoring Well # PT-3	X	Quarterly, until NYSDEC determines a different frequency is appropriate

Detailed sample collection and analytical procedures and protocols are provided in Appendix E – Quality Assurance Project Plan. Monitoring well locations are shown on Figure 6B.

Samples will be collected from the three (3) on-Site (PT-1 through PT-3) and one off-Site (MW-5) wells. Groundwater samples will be collected from each monitoring well by utilizing a low-flow submersible stainless steel pump with dedicated Teflon® or Teflon®-lined polyethylene tubing connected to a transparent flow cell. The samples will be collected in laboratory prepared sample bottles (pre-preserved, if appropriate), placed in iced coolers and removed from light immediately after collection. In addition, all sample bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter. All samples will be analyzed by a NYSDOH ELAP certified environmental laboratory certified in the appropriate category. Results of the groundwater monitoring will be used to determine whether MNA is effective or not.

4.4.1 Groundwater Sampling

Three monitoring wells were installed within the footprint of the building to evaluate whether the contamination migrating onto the Site from an upgradient source is attenuating over time. One well was installed on the upgradient portion of the Site. The wells were installed with 20 feet of screen to span the water table. Five feet of screen was installed above the water table and 15 feet below the water table. The wells were constructed to be consistent with the remedial investigation wells. Monitoring well construction logs are included in Appendix J of this document

Table 7 summarizes the wells identification number, as well as the purpose, location, depths, diameter and screened intervals of the wells. The remedial party will measure depth to the water table for each monitoring well in the network before sampling.

Table 7 – Monitoring Well Construction Details

Monitoring Well ID	Well Location	Coordinates (longitude/ latitude)	Well Diameter (inches)	Elevation (above mean sea level)			
				Casing	Surface	Screen Top	Screen Bottom
Monitoring Well # MW-5	Upgradient	TBD	2	TBD	TBD	TBD	TBD
Monitoring Well # PT-1	Downgradient	TBD	2	TBD	TBD	TBD	TBD
Monitoring Well # PT-2	Downgradient	TBD	2	TBD	TBD	TBD	TBD
Monitoring Well # PT-3	Downgradient	TBD	2	TBD	TBD	TBD	TBD

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC project manager.

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

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

4.5 Monitoring and Sampling Protocol

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

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the Site to operate and maintain the active SSDS systems;
- Will be updated periodically to reflect changes in site conditions or the manner in which the active SSDS systems are operated and maintained.

Further detail regarding the Operation and Maintenance of the active SSDS is provided in Appendix K - Operation and Maintenance Manual. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the Site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Remedial System (or other Engineering Control) Performance Criteria

The building under construction onsite has had piping for a SSDS (without the blower) and a vapor barrier installed beneath its basement floor slab. A blower has not been installed to the system yet. The active SSDS, with a blower, will be completed and operated under the SMP program.

The intended design criteria of the system is to maintain a sub slab vacuum level of -0.004 inches of water column ("wc). The design purpose of system is to create a negative pressure envelope under the ground floor concrete floor slab. The details are discussed further below.

5.3 Operation and Maintenance of Sub-slab Depressurization System

The following sections provide a description of the operations and maintenance of the active SSDS. Cut-sheets and record drawings for the SSDS will be provided in an Operations and Maintenance Manual.

5.3.1 System Start-Up and Testing

After the SSDS is completed, a start-up test will be performed to evaluate the effectiveness of the SSDS. The sub slab aggregate at this site was highly permeable and produced high air flow yields and large radii of influence. The design objective is to create a negative pressure field with a minimum performance of -0.004 inches of water column ("wc). A pressure field extension test will be performed to document that the full extent of the building slab is depressurized by the SSDS. Post mitigation exhaust airflow, system vacuum, and sub slab vacuum will be measured and recorded in a SSDS Installation and Startup Report.

A Site visit will be performed after startup to collect system performance information and laboratory effluent sampling of the SSDS system effluent. A summa canister will be deployed to collect an air sample for TO-15 VOC laboratory analysis at a NYSDOH Environmental Laboratory Accreditation Program (ELAP) laboratory. The sampling results will be compared to compound specific average-annual guidance criteria (AGCs). The system testing described above will be conducted if, in the course of the SSDS system lifetime, the system goes down or significant changes are made to the system and the system must be restarted.

In addition, post-mitigation indoor air sampling (typically collected no sooner than 30 days after system start-up/continuous operation) to verify indoor air concentrations are within background levels.

A startup report and the shakedown report will be submitted to NYSDEC and NYSDOH with or before the first Periodic Review Report (PRR).

5.3.2 Routine System Operation and Maintenance

All manufacturers' product data, manuals, and drawings related to the SSDS components will be provided in an Operations and Maintenance Manual. Copies of these materials will be maintained on-site and available for reference in the event of troubleshooting, adjustments or repairs are necessary. Following startup and balance of the SSDS, all gauges and flow settings will be recorded for future comparison purposes if the system is malfunctioning. The SSDS will be routinely maintained semiannually. All maintenance on mitigation system will be performed by qualified maintenance personnel.

Table 8 provides a summary and schedule of routine maintenance.

Table 8. Routine Maintenance Annual Checklist

System component	Date	Condition/readings	
Sealing			
Pipe			
	Date	Average airflow (cfm)	Average Static Vacuum ("W.C.)
Blower			
Sub Slab Vacuum Port	Date	Gate Valve Position (% open)	Average Vacuum ("W.C.)
Riser#1			
Riser#2			
	Date	Average Vacuum ("W.C.)	
MP-1			
MP-2			
MP-3			
MP-4			
MP-5			
MP-6			
MP-7			
MP-8			

5.3.3 Non-Routine Operation and Maintenance

In the event of unusual fan noise, failure to start, physical damage or repeated circuit breaker trip, turn fan off and service or replace. Any changes in the structure, SSDS systems, slab conditions, etc. will require a re-evaluation of the SSDS.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

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

A vulnerability assessment will not be performed for the Site for the following reasons:

- According to Federal Emergency Management Agency Flood Map Service, the Site is not located in a flood plain, low-lying or low-groundwater recharge area;
- Site Drainage and Storm Water Management is and will be connected to the New York City municipal system;
- There are no exposed soils on the Site; therefore, the Site is not susceptible to erosion during severe rain events;
- Because the remaining contaminants at the Site are located at depth and because there are no active remedial systems, the Site is not susceptible to a spill or contaminant release due to storm-related damage caused by flooding, erosion, high winds, loss of power etc.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

The Green Remediation Evaluation will include the following items:

Fuel usage associated with travel to and from the Site for sampling and monitoring activities.

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

6.2.1 Frequency of System Checks, Sampling and Other Periodic Activities

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

6.2.2 Metrics and Reporting

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

6.3 Remedial System Optimization

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

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

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

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

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

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

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 9 and summarized in the Periodic Review Report.

Table 9: Schedule of Interim Monitoring/Inspection Reports

Task/Report	**Reporting Frequency***
Inspection Report	Annually
Periodic Review Report	Annually, or as otherwise determined by the NYSDEC
Performance Groundwater Monitoring Report	Quarterly
SSDS Sampling Report	Quarterly

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

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

- Date of event or reporting period;

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

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

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

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

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

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at the following link: http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

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

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections, fire inspections and severe condition inspections, if applicable.

- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.

- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.

- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.

- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends.

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:

  – The compliance of the remedy with the requirements of the site-specific Remedial Action Work Plan (RAWP) or Decision Document;

  – The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;

  – Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;

  – Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;

  – The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice and registered in New York State will prepare, and include in the

Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

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

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*
- *No new information has come to my attention, including groundwater monitoring data from wells located at the Site boundary, if any, to indicate that the assumptions made in the qualitative exposure assessment of off-site contamination are no longer valid; and*
- *The assumptions made in the qualitative exposure assessment remain valid.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Ernest Hanna, of 104 West 29th Street 10th Floor New York, NY 10001, am certifying as Owner's/Remedial Party's Designated Site Representative: *I have been authorized and designated by all site owners/remedial parties to sign this certification for the site."*

The signed certification will be included in the Periodic Review Report.

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

7.3 Corrective Measures Work Plan

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

7.4 Remedial Site Optimization Report

If an RSO is to be performed (see Section 6.3), upon completion of an RSO, an RSO report must be submitted to the NYSDEC project manager for approval. A general outline for the RSO report is provided in Appendix L. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO

recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

8.0 REFERENCES

Phase I Environmental Site Assessment, 205 Park Avenue, Brooklyn New York, Prepared by GZA (January 2019)

Remedial Investigation Workplan, 205 Park Avenue, Brooklyn New York, Prepared by GZA (January 2021)

Remedial Investigation Report, 205 Park Avenue, Brooklyn New York, Prepared by GZA (July 2021)

Remedial Action Work Plan, 205 Park Avenue, Brooklyn New York, Prepared by GZA (October 2021)

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

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

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

TABLES

Table 2- Groundwater Elevations
Site Management Plan
205 Park Avenue
Brooklyn, New York

Well ID	Well Diameter (inches)	Total Depth, BTOC (feet)[1]	Well Screen Interval (feet)	Ground Elevation	TOC Elevation[2] (feet)	Depth to Water[3] (feet)	Groundwater Elevation[3] (feet)
MW-1	2	35	25 to 35	29.69	29.29	24.79	4.5
MW-2	2	35	25 to 35	29.35	28.9	24.37	4.53
MW-3	2	35	25 to 35	29.33	29.01	24.53	4.48
MW-4	2	35	25 to 35	30.04	29.83	25.29	4.54
MW-5	1	40	30 to 40	34.1	33.8	29.29	4.51
MW-6	2	35	25 to 35	28.78	28.41	23.98	4.43

Notes

1 - Below Top of Casing (BTOC), Top of Casing (TOC)

2 - Elevations Are Based Upon NAVD 88 (GEOID 12A) Derived Using LEICA GZ1230 GPS Receivers and KEYNET

3 - Groundwater measurements collected on July 2, 2021 by GZA

Table 3A - Volatile Organic Compounds in Soil
End Point Samples
205 Park Avenue
Brooklyn, New York

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-13		EP-11		EP-14 (VOC)		EP-9		EP-10		EP-7	
LAB SAMPLE ID				L2222452-02		L2222452-03		L2223523-01		L2223523-02		L2223523-03		L2224226-01	
DATE				4/28/2022		4/28/2022		5/4/2022		5/4/2022		5/4/2022		5/6/2022	
SAMPLE DEPTH (ft.)				18		18		18		18		18		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Volatile Organic Compounds (VOC) BY EPA 5035 (mg/kg)															
1,1,1-Trichloroethane	100	100	0.68	0.00084	U	0.0006	U	0.00058	U	0.00072	U	0.00075	U	0.00064	U
1,1-Dichloroethane	19	26	0.27	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
1,1-Dichloroethene	100	100	0.33	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
1,2,3-Trichlorobenzene	--	--	--	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
1,2,3-Trichloropropane	--	--	--	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
1,2,4,5-Tetramethylbenzene	--	--	--	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
1,2,4-Trimethylbenzene	47	52	3.6	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
1,2-Dichlorobenzene	100	100	1.1	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
1,2-Dichloroethane	2.3	3.1	0.02	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
1,2-Dichloropropane	--	--	--	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
1,3,5-Trimethylbenzene	47	52	8.4	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
1,3-Dichlorobenzene	17	49	2.4	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
1,3-Dichloropropane	--	--	--	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
1,4-Dichlorobenzene	9.8	13	1.8	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
1,4-Dioxane	9.8	13	0.1	0.13	U	0.097	U	0.092	U	0.12	U	0.12	U	0.1	U
2-Butanone	100	100	0.12	0.017	U	0.012	U	0.012	U	0.014	U	0.015	U	0.013	U
Acetone	100	100	0.05	0.017	U	0.012	U	0.012	U	0.014	U	0.015	U	0.013	U
Benzene	2.9	4.8	0.06	0.00084	U	0.0006	U	0.00058	U	0.00072	U	0.00075	U	0.00064	U
Carbon disulfide	--	--	--	0.017	U	0.012	U	0.012	U	0.014	U	0.015	U	0.013	U
Carbon tetrachloride	1.4	2.4	0.76	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
Chlorobenzene	100	100	1.1	0.00084	U	0.0006	U	0.00058	U	0.00072	U	0.00075	U	0.00064	U
Chloroform	10	49	0.37	0.0025	U	0.0018	U	0.0017	U	0.0022	U	0.0022	U	0.0019	U
cis-1,2-Dichloroethene	59	100	0.25	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
Dibromochloromethane	--	--	--	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
Ethyl Acetate	--	--	--	0.017	U	0.012	U	0.012	U	0.014	U	0.015	U	0.013	U
Ethylbenzene	30	41	1	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.00026	J
Freon-113	--	--	--	0.0067	U	0.0048	U	0.0046	U	0.0058	U	0.006	U	0.0052	U
Isopropylbenzene	--	--	--	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
Methyl tert butyl ether	62	100	0.93	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
Methylene chloride	51	100	0.05	0.0084	U	0.006	U	0.0058	U	0.0072	U	0.0075	U	0.0064	U
n-Butylbenzene	100	100	12	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
n-Propylbenzene	100	100	3.9	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
Naphthalene	100	100	12	0.0067	U	0.0048	U	0.0046	U	0.0058	U	0.006	U	0.0052	U
o-Xylene	--	--	--	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
p-Isopropyltoluene	--	--	--	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
p/m-Xylene	--	--	--	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.00099	J
sec-Butylbenzene	100	100	11	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
Styrene	--	--	--	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
tert-Butylbenzene	100	100	5.9	0.0033	U	0.0024	U	0.0023	U	0.0029	U	0.003	U	0.0026	U
Tetrachloroethene	5.5	19	1.3	0.00084	U	0.0006	U	0.00058	U	0.00072	U	0.00075	U	0.00064	U
Toluene	100	100	0.7	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U
trans-1,2-Dichloroethene	100	100	0.19	0.0025	U	0.0018	U	0.0017	U	0.0022	U	0.0022	U	0.0019	U
Trichloroethene	10	21	0.47	0.00084	U	0.0006	U	0.00058	U	0.00072	U	0.00075	U	0.00064	U
Vinyl chloride	0.21	0.9	0.02	0.0017	U	0.0012	U	0.0012	U	0.0014	U	0.0015	U	0.0013	U

Table Notes:

--: No guidance value
mg/kg: Milligrams per Kilogram
U: Not detected at the reported detection limit for the sample.
J: Estimated Value. The target analyte concentration is below the reporting limit (RL), but above the method detection limit (MDL).
New York Part 375 SCOs: Samples are compated to the New York State Department of Environmental Conservation Part 375 Residential, Restricted-Residential, and Protection of Groundwater Soil Cleanup Objectives.

Table 3A- Volatile Organic Compounds in Soil
End Point Sanples
205 Park Avenue
Brooklyn, New York

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-5		EP-12		EP-4		EP-8		EP-02		EP-03		EP-1		DUPE 52422	
LAB SAMPLE ID				L2225456-01		L2225456-02		L2225915-02		L2225915-01		L2226475-02		L2226475-01		L2227571-01		L2227572-02	
DATE				5/12/2022		5/12/2022		5/16/2022		5/16/2022		5/18/2022		5/18/2022		5/24/2022		5/24/2022	
SAMPLE DEPTH (ft.)				14		18		14		14		14		14		14		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Volatile Organic Compounds (VOC) BY EPA 5035 (mg/kg)																			
1,1,1-Trichloroethane	100	100	0.68	0.00073	U	0.00063	U	0.00055	U	0.00056	U	0.00049	U	0.00074	U	0.00087	U	0.00068	U
1,1-Dichloroethane	19	26	0.27	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
1,1-Dichloroethene	100	100	0.33	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
1,2,3-Trichlorobenzene	--	--	--	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
1,2,3-Trichloropropane	--	--	--	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
1,2,4,5-Tetramethylbenzene	--	--	--	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
1,2,4-Trimethylbenzene	47	52	3.6	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
1,2-Dichlorobenzene	100	100	1.1	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
1,2-Dichloroethane	2.3	3.1	0.02	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
1,2-Dichloropropane	--	--	--	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
1,3,5-Trimethylbenzene	47	52	8.4	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
1,3-Dichlorobenzene	17	49	2.4	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
1,3-Dichloropropane	--	--	--	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
1,4-Dichlorobenzene	9.8	13	1.8	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
1,4-Dioxane	9.8	13	0.1	0.12	U	0.1	U	0.088	U	0.089	U	0.078	U	0.12	U	0.14	U	0.11	U
2-Butanone	100	100	0.12	0.015	U	0.012	U	0.011	U	0.011	U	0.0098	U	0.015	U	0.017	U	0.014	U
Acetone	100	100	0.05	0.0074	J	0.012	U	0.011	U	0.011	U	0.0098	U	0.015	U	0.017	U	0.014	U
Benzene	2.9	4.8	0.06	0.00073	U	0.00063	U	0.00055	U	0.00056	U	0.00049	U	0.00074	U	0.00087	U	0.00068	U
Carbon disulfide	--	--	--	0.015	U	0.012	U	0.011	U	0.011	U	0.0098	U	0.015	U	0.017	U	0.014	U
Carbon tetrachloride	1.4	2.4	0.76	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
Chlorobenzene	100	100	1.1	0.00073	U	0.00063	U	0.00055	U	0.00056	U	0.00049	U	0.00074	U	0.00087	U	0.00068	U
Chloroform	10	49	0.37	0.0022	U	0.0019	U	0.0016	U	0.0017	U	0.0015	U	0.0022	U	0.0026	U	0.002	U
cis-1,2-Dichloroethene	59	100	0.25	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
Dibromochloromethane	--	--	--	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
Ethyl Acetate	--	--	--	0.015	U	0.012	U	0.011	U	0.011	U	0.0098	U	0.015	U	0.017	U	0.014	U
Ethylbenzene	30	41	1	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00032	J	0.00025	J	0.0017	U	0.0014	U
Freon-113	--	--	--	0.0059	U	0.005	U	0.0044	U	0.0045	U	0.0039	U	0.0059	U	0.0069	U	0.0054	U
Isopropylbenzene	--	--	--	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
Methyl tert butyl ether	62	100	0.93	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
Methylene chloride	51	100	0.05	0.0073	U	0.0063	U	0.0055	U	0.0056	U	0.0049	U	0.0074	U	0.0087	U	0.0068	U
n-Butylbenzene	100	100	12	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
n-Propylbenzene	100	100	3.9	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
Naphthalene	100	100	12	0.0059	U	0.005	U	0.0044	U	0.0045	U	0.001	J	0.0059	U	0.0069	U	0.0054	U
o-Xylene	--	--	--	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
p-Isopropyltoluene	--	--	--	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
p/m-Xylene	--	--	--	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.00064	J	0.003	U	0.0035	U	0.0027	U
sec-Butylbenzene	100	100	11	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
Styrene	--	--	--	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
tert-Butylbenzene	100	100	5.9	0.0029	U	0.0025	U	0.0022	U	0.0022	U	0.002	U	0.003	U	0.0035	U	0.0027	U
Tetrachloroethene	5.5	19	1.3	0.00073	U	0.00063	U	0.00055	U	0.00056	U	0.00049	U	0.00074	U	0.00087	U	0.00068	U
Toluene	100	100	0.7	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U
trans-1,2-Dichloroethene	100	100	0.19	0.0022	U	0.0019	U	0.0016	U	0.0017	U	0.0015	U	0.0022	U	0.0026	U	0.002	U
Trichloroethene	10	21	0.47	0.00073	U	0.00063	U	0.00055	U	0.00056	U	0.00049	U	0.00074	U	0.00087	U	0.00068	U
Vinyl chloride	0.21	0.9	0.02	0.0015	U	0.0012	U	0.0011	U	0.0011	U	0.00098	U	0.0015	U	0.0017	U	0.0014	U

Table Notes:

--: No guidance value
mg/kg: Milligrams per Kilogram
U: Not detected at the reported detection limit for the sample.
J: Estimated Value. The target analyte concentration is below the re
New York Part 375 SCOs: Samples are compated to the New York State Department of Envi

Table 3B - Semivolatile Organic Compounds in Soil
End Point Sanples
205 Park Avenue
Brooklyn, New York

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-14		EP-13		EP-11		EP-9		EP-10		EP-7	
LAB SAMPLE ID				L2222452-01		L2222452-02		L2222452-03		L2223523-02		L2223523-03		L2224226-01	
DATE				4/27/2022		4/28/2022		4/28/2022		5/4/2022		5/4/2022		5/6/2022	
SAMPLE DEPTH (ft.)				18		18		18		18		18		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Semivolatile Organic Compounds (SVOC) BY EPA 5035 (mg/kg)															
1,2,4,5-Tetrachlorobenzene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
1,2,4-Trichlorobenzene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
1,2-Dichlorobenzene	100	100	1.1	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
1,3-Dichlorobenzene	17	49	2.4	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
1,4-Dichlorobenzene	9.8	13	1.8	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
2,4,5-Trichlorophenol	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
2,4,6-Trichlorophenol	--	--	--	0.1	U	0.1	U	0.11	U	0.11	U	0.1	U	0.12	U
2,4-Dinitrotoluene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
2,6-Dinitrotoluene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
2-Chloronaphthalene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
2-Methylnaphthalene	--	--	--	0.21	U	0.2	U	0.21	U	0.22	U	0.079	J	0.24	U
2-Methylphenol	100	100	0.33	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
2-Nitroaniline	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
3,3'-Dichlorobenzidine	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
3-Methylphenol/4-Methylphenol	34	100	0.33	0.25	U	0.24	U	0.26	U	0.26	U	0.25	U	0.29	U
3-Nitroaniline	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
4-Bromophenyl phenyl ether	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
4-Chloroaniline	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
4-Chlorophenyl phenyl ether	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
4-Nitroaniline	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Acenaphthene	100	100	98	0.14	U	0.13	U	0.14	U	0.14	U	0.16		0.16	U
Acenaphthylene	100	100	107	0.14	U	0.13	U	0.14	U	0.14	U	0.048	J	0.16	U
Acetophenone	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Aniline	--	--	--	0.21	U	0.2	U	0.21	U	0.22	U	0.21	U	0.24	U
Anthracene	100	100	1000	0.1	U	0.1	U	0.11	U	0.11	U	0.23		0.12	U
Benzo(a)anthracene	1	1	1	0.041	J	0.021	J	0.025	J	0.024	J	0.41		0.033	J
Benzo(a)pyrene	1	1	22	0.14	U	0.13	U	0.14	U	0.14	U	0.34		0.16	U
Benzo(b)fluoranthene	1	1	1.7	0.034	J	0.1	U	0.11	U	0.11	U	0.4		0.12	U
Benzo(ghi)perylene	100	100	1000	0.14	U	0.13	U	0.14	U	0.14	U	0.21		0.16	U
Benzo(k)fluoranthene	1	3.9	1.7	0.1	U	0.1	U	0.11	U	0.11	U	0.11		0.12	U
Benzoic Acid	--	--	--	0.56	U	0.54	U	0.58	U	0.58	U	0.56	U	0.66	U
Benzyl Alcohol	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Biphenyl	--	--	--	0.4	U	0.38	U	0.41	U	0.41	U	0.4	U	0.46	U
Bis(2-chloroethoxy)methane	--	--	--	0.19	U	0.18	U	0.19	U	0.19	U	0.19	U	0.22	U
Bis(2-chloroethyl)ether	--	--	--	0.16	U	0.15	U	0.16	U	0.16	U	0.16	U	0.18	U
Bis(2-chloroisopropyl)ether	--	--	--	0.21	U	0.2	U	0.21	U	0.22	U	0.21	U	0.24	U
Bis(2-ethylhexyl)phthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Butyl benzyl phthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Carbazole	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.11	J	0.2	U
Chrysene	1	3.9	1	0.037	J	0.019	J	0.021	J	0.11	U	0.34		0.026	J
Di-n-butylphthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Di-n-octylphthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.1	U	0.1	U	0.11	U	0.11	U	0.035	J	0.12	U
Dibenzofuran	14	59	210	0.17	U	0.17	U	0.18	U	0.18	U	0.11	J	0.2	U
Diethyl phthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Dimethyl phthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Fluoranthene	100	100	1000	0.074	J	0.035	J	0.044	J	0.039	J	1.1		0.052	J
Fluorene	100	100	386	0.17	U	0.17	U	0.18	U	0.18	U	0.11	J	0.2	U
Hexachlorobenzene	0.33	1.2	3.2	0.1	U	0.1	U	0.11	U	0.11	U	0.1	U	0.12	U
Hexachlorobutadiene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Hexachlorocyclopentadiene	--	--	--	0.5	U	0.48	U	0.51	U	0.52	U	0.5	U	0.58	U
Hexachloroethane	--	--	--	0.14	U	0.13	U	0.14	U	0.14	U	0.14	U	0.16	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.14	U	0.13	U	0.14	U	0.14	U	0.22		0.16	U
Isophorone	--	--	--	0.16	U	0.15	U	0.16	U	0.16	U	0.16	U	0.18	U
n-Nitrosodi-n-propylamine	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
n-Nitrosodimethylamine	--	--	--	0.35	U	0.33	U	0.36	U	0.36	U	0.35	U	0.41	U
Naphthalene	100	100	12	0.17	U	0.17	U	0.18	U	0.18	U	0.26		0.2	U
Nitrobenzene	--	--	--	0.16	U	0.15	U	0.16	U	0.16	U	0.16	U	0.18	U
Pentachlorophenol	2.4	6.7	0.8	0.14	U	0.13	U	0.14	U	0.14	U	0.14	U	0.16	U
Phenanthrene	100	100	1000	0.084	J	0.022	J	0.039	J	0.031	J	1.2		0.048	J
Phenol	100	100	0.33	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.2	U
Pyrene	100	100	1000	0.073	J	0.032	J	0.039	J	0.033	J	0.9		0.048	J

Table Notes:

--: No guidance value
mg/kg: Milligrams per Kilogram
U: Not detected at the reported detection limit for the sample.
J: Estimated Value. The target analyte concentration is below the reporting limit (RL), but above the method detection limit (MDL).
New York Part 375 SCOs: Samples are compated to the New York State Department of Environmental Conservation Part 375 Residential, Restricted-Residential, and Protection of Groundwater Soil Cleanup Objectives.

Table 3B - Semivolatile Organic Compounds in Soil
End Point Sanples
205 Park Avenue
Brooklyn, New York

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-5		EP-12		EP-4		EP-8		EP-02		EP-03		EP-1		DUPE 52422		EP-6	
LAB SAMPLE ID				L2225456-01		L2225456-02		L2225915-02		L2225915-01		L2226475-02		L2226475-01		L2227572-01		L2227572-02		L2230358-01	
DATE				5/12/2022		5/12/2022		5/16/2022		5/16/2022		5/18/2022		5/18/2022		5/24/2022		5/24/2022		6/9/2022	
SAMPLE DEPTH (ft.)				14		18		14		14		14		14		14		14		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Semivolatile Organic Compounds (SVOC) BY EPA 5035 (mg/kg)																					
1,2,4,5-Tetrachlorobenzene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
1,2,4-Trichlorobenzene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
1,2-Dichlorobenzene	100	100	1.1	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
1,3-Dichlorobenzene	17	49	2.4	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
1,4-Dichlorobenzene	9.8	13	1.8	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
2,4,5-Trichlorophenol	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
2,4,6-Trichlorophenol	--	--	--	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.099	U	0.12	U	0.1	U	0.11	U
2,4-Dinitrotoluene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
2,6-Dinitrotoluene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
2-Chloronaphthalene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
2-Methylnaphthalene	--	--	--	0.2	U	0.21	U	0.21	U	0.21	U	0.2	U	0.026	J	0.23	U	0.21	U	0.22	U
2-Methylphenol	100	100	0.33	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
2-Nitroaniline	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
3,3'-Dichlorobenzidine	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
3-Methylphenol/4-Methylphenol	34	100	0.33	0.24	U	0.25	U	0.25	U	0.25	U	0.24	U	0.24	U	0.28	U	0.25	U	0.26	U
3-Nitroaniline	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
4-Bromophenyl phenyl ether	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
4-Chloroaniline	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
4-Chlorophenyl phenyl ether	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
4-Nitroaniline	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Acenaphthene	100	100	98	0.14	U	0.14	U	0.14	U	0.14	U	0.03	J	0.1	J	0.16	U	0.14	U	0.14	U
Acenaphthylene	100	100	107	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.16	U	0.14	U	0.14	U
Acetophenone	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Aniline	--	--	--	0.2	U	0.21	U	0.21	U	0.21	U	0.2	U	0.2	U	0.23	U	0.21	U	0.22	U
Anthracene	100	100	1000	0.1	U	0.1	U	0.1	U	0.1	U	0.049	J	0.13		0.12	U	0.1	U	0.11	U
Benzo(a)anthracene	1	1	1	0.1	U	0.1	U	0.1	U	0.1	U	0.1		0.19		0.12	U	0.038	J	0.02	J
Benzo(a)pyrene	1	1	22	0.14	U	0.14	U	0.14	U	0.14	U	0.085	J	0.16		0.16	U	0.14	U	0.14	U
Benzo(b)fluoranthene	1	1	1.7	0.1	U	0.1	U	0.1	U	0.1	U	0.1		0.17		0.12	U	0.039	J	0.11	U
Benzo(ghi)perylene	100	100	1000	0.14	U	0.14	U	0.14	U	0.14	U	0.046	J	0.078	J	0.16	U	0.14	U	0.14	U
Benzo(k)fluoranthene	1	3.9	1.7	0.1	U	0.1	U	0.1	U	0.1	U	0.034	J	0.067	J	0.12	U	0.1	U	0.11	U
Benzoic Acid	--	--	--	0.55	U	0.56	U	0.57	U	0.57	U	0.55	U	0.54	U	0.63	U	0.57	U	0.58	U
Benzyl Alcohol	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Biphenyl	--	--	--	0.39	U	0.39	U	0.4	U	0.4	U	0.39	U	0.38	U	0.44	U	0.4	U	0.41	U
Bis(2-chloroethoxy)methane	--	--	--	0.18	U	0.19	U	0.19	U	0.19	U	0.18	U	0.18	U	0.21	U	0.19	U	0.19	U
Bis(2-chloroethyl)ether	--	--	--	0.15	U	0.16	U	0.16	U	0.16	U	0.15	U	0.15	U	0.18	U	0.16	U	0.16	U
Bis(2-chloroisopropyl)ether	--	--	--	0.2	U	0.21	U	0.21	U	0.21	U	0.2	U	0.2	U	0.23	U	0.21	U	0.22	U
Bis(2-ethylhexyl)phthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Butyl benzyl phthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Carbazole	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.024	J	0.06	J	0.19	U	0.18	U	0.18	U
Chrysene	1	3.9	1	0.1	U	0.1	U	0.1	U	0.1	U	0.094	J	0.15		0.12	U	0.032	J	0.11	U
Di-n-butylphthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Di-n-octylphthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Dibenzo(a,h)anthracene	0.33	0.33	1000	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.023	J	0.12	U	0.1	U	0.11	U
Dibenzofuran	14	59	210	0.17	U	0.17	U	0.18	U	0.18	U	0.017	J	0.044	J	0.19	U	0.18	U	0.18	U
Diethyl phthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Dimethyl phthalate	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Fluoranthene	100	100	1000	0.1	U	0.1	U	0.1	U	0.022	J	0.23		0.38		0.025	J	0.064	J	0.024	J
Fluorene	100	100	386	0.17	U	0.17	U	0.18	U	0.18	U	0.021	J	0.074	J	0.19	U	0.18	U	0.18	U
Hexachlorobenzene	0.33	1.2	3.2	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.099	U	0.12	U	0.1	U	0.11	U
Hexachlorobutadiene	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Hexachlorocyclopentadiene	--	--	--	0.49	U	0.49	U	0.5	U	0.5	U	0.49	U	0.47	U	0.56	U	0.5	U	0.52	U
Hexachloroethane	--	--	--	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.16	U	0.14	U	0.14	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2	0.14	U	0.14	U	0.14	U	0.14	U	0.059	J	0.098	J	0.16	U	0.14	U	0.14	U
Isophorone	--	--	--	0.15	U	0.16	U	0.16	U	0.16	U	0.15	U	0.15	U	0.18	U	0.16	U	0.16	U
n-Nitrosodi-n-propylamine	--	--	--	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
n-Nitrosodimethylamine	--	--	--	0.34	U	0.34	U	0.35	U	0.35	U	0.34	U	0.33	U	0.39	U	0.35	U	0.36	U
Naphthalene	100	100	12	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.1	J	0.19	U	0.18	U	0.18	U
Nitrobenzene	--	--	--	0.15	U	0.16	U	0.16	U	0.16	U	0.15	U	0.15	U	0.18	U	0.16	U	0.16	U
Pentachlorophenol	2.4	6.7	0.8	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.16	U	0.14	U	0.14	U
Phenanthrene	100	100	1000	0.1	U	0.1	U	0.1	U	0.1	U	0.2		0.39		0.12	U	0.046	J	0.11	U
Phenol	100	100	0.33	0.17	U	0.17	U	0.18	U	0.18	U	0.17	U	0.16	U	0.19	U	0.18	U	0.18	U
Pyrene	100	100	1000	0.1	U	0.1	U	0.1	U	0.02	J	0.19		0.32		0.026	J	0.058	J	0.023	J

Table Notes:

--: No guidance value
mg/kg: Milligrams per Kilogram
U: Not detected at the reported detection limit for the sample.
J: Estimated Value. The target analyte concentration is below the r
New York Part 375 SCOs: Samples are compated to the New York State Department of Envi

Table 3C - Total Metals in Soil End Point Samples
205 Park Avenue
Brooklyn, New York

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-1		DUPE 52422		EP-02		EP-03		EP-4		EP-5		EP-6		EP-7		EP-8		EP-9		EP-10		EP-11	
LAB SAMPLE ID				L2227572-01		L2227572-02		L2226475-02		L2226475-01		L2225915-02		L2225456-01		L2230358-01		L2224226-01		L2225915-01		L2223523-02		L2223523-03		L2222452-03	
DATE				5/24/2022		5/24/2022		5/18/2022		5/18/2022		5/16/2022		5/12/2022		6/9/2022		5/6/2022		5/16/2022		5/4/2022		5/4/2022		4/28/2022	
SAMPLE DEPTH (ft.)				14		14		14		14		14		14		14		14		14		18		18		18	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Total Metals BY EPA 6010D/7471B (mg/kg)																											
Aluminum, Total	--	--	--	5600		3340		3350		2330		3200		3280		2250		3850		3230		2660		3260		2980	
Antimony, Total	--	--	--	0.182	J	2.05	U	2.04	U	0.178	J	0.169	J	0.295	J	2.09	U	2.31	U	2.08	U	2.1	U	2.02	U	4.16	U
Arsenic, Total	16	16	16	1.33		0.782		1.07		0.95		1.17		0.843		1.24		1.86		1.1		1.41		1.65		1.74	
Barium, Total	350	400	820	51.1		26.8		28.8		24.1		27.6		27.7		19.8		30.1		30.9		24.6		34		27.7	
Beryllium, Total	14	72	47	0.282		0.184	J	0.179	J	0.159	J	0.251		0.191	J	0.168	J	0.263		0.224		0.189	J	0.202		0.2	J
Boron, Total	--	--	--	1.1	J	0.676	J	0.746	J	0.593	J	0.716	J	0.557	J	0.478	J	0.891	J	0.756	J	0.626	J	0.614	J	0.708	J
Cadmium, Total	2.5	4.3	7.5	0.373	J	0.27	J	0.224	J	0.256	J	0.37	J	0.054	J	0.092	J	0.12	J	0.295	J	0.294	J	0.311	J	0.2	J
Calcium, Total	--	--	--	1230		830		2710		630		947		1020		603		779		864		838		746		1000	
Chromium, Total	--	--	--	11.8		8.05		8.83		6.72		9.91		10.5		6.07		9.55		9.52		7.29		9.16		8.72	
Cobalt, Total	--	--	--	5.57		3.6		4.03		4.96		4.85		4.76		3.42		4.48		4.87		4.1		4.22		4.44	
Copper, Total	270	270	1720	13.3		8.84		10.4		15.4		15.3		15.7		8.04		11.9		11.2		11.5		11.2		11.8	
Iron, Total	--	--	--	10300		7650		8410		8360		12700		11200		7180		9880		10100		8920		9700		9700	
Lead, Total	400	400	450	30.4		12.7		15.1		10.7		5.35		4.96		8.99		9.06		11.1		9.53		7.12		10.1	
Manganese, Total	2000	2000	2000	306		196		191		252		240		227		164		231		269		214		205		245	
Mercury, Total	0.81	0.81	0.73	0.261		0.067	U	0.048	J	0.064	U	0.067	U	0.066	U	0.08	U	0.079	U	0.068	U	0.069	U	0.068	U	0.075	U
Molybdenum, Total	--	--	--	0.073	J	2.05	U	0.086	J	0.105	J	0.099	J	2.08	U	2.09	U	0.157	J	0.083	J	0.08	J	2.02	U	4.16	U
Nickel, Total	140	310	130	18.5		12.1		14.1		16.1		16.8		20		10.6		14.3		16.1		14.6		15.7		16.5	
Selenium, Total	36	180	4	0.911	U	0.819	U	0.816	U	0.775	U	0.823	U	0.831	U	0.838	U	0.923	U	0.831	U	0.841	U	0.807	U	1.66	U
Silver, Total	36	180	8.3	0.455	U	0.41	U	0.408	U	0.388	U	0.411	U	0.416	U	0.419	U	0.462	U	0.415	U	0.42	U	0.404	U	0.832	U
Thallium, Total	--	--	--	0.911	U	0.819	U	0.816	U	0.775	U	0.823	U	0.831	U	0.838	U	0.923	U	0.831	U	0.841	U	0.807	U	1.66	U
Tin, Total	--	--	--	1.59	J	0.459	J	0.477	J	0.384	J	0.308	J	0.548	J	4.19	U	0.318	J	0.494	J	0.656	J	0.343	J	8.32	U
Vanadium, Total	--	--	--	14.9		11.2		12.8		12.3		19.5		12.9		11		15.2		14.3		11.8		14.3		12.5	
Zinc, Total	2200	10000	2480	39.4		21.5		23.5		20.7		24.5		29.4		19		23.1		25.6		21.2		21.4		23.5	

Table Notes:

--: No guidance value
mg/kg: Milligrams per Kilogram
U: Not detected at the reported detection limit for the sample.
J: Estimated Value. The target analyte concentration is below the reporting limit (RL), but above the method detection limit (MDL).

New York Part 375 SCOs: Samples are compated to the New York State Department of Environmental Conservation Part 375 Residential, Restricted-Residential, and Protection of Groundwater Soil Cleanup Objectives.

Table 3D - PCBs, Pesticides, and Herbicides in Soil
End Point Sanples
205 Park AVenue
Brooklyn, New York

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-14		EP-13		EP-11		EP-9		EP-10		EP-7	
LAB SAMPLE ID				L2222452-01		L2222452-02		L2222452-03		L2223523-02		L2223523-03		L2224226-01	
DATE				4/27/2022		4/28/2022		4/28/2022		5/4/2022		5/4/2022		5/6/2022	
SAMPLE DEPTH (ft.)				18		18		18		18		18		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Polychlorinated Biphenyls (PCBs) by EPA 8082A (mg/kg)															
Aroclor 1016	1	1	3.2	0.0351	U	0.0338	U	0.035	U	0.0351	U	0.0337	U	0.0402	U
Aroclor 1221	1	1	3.2	0.0351	U	0.0338	U	0.035	U	0.0351	U	0.0337	U	0.0402	U
Aroclor 1232	1	1	3.2	0.0351	U	0.0338	U	0.035	U	0.0351	U	0.0337	U	0.0402	U
Aroclor 1242	1	1	3.2	0.0351	U	0.0338	U	0.035	U	0.0351	U	0.0337	U	0.0402	U
Aroclor 1248	1	1	3.2	0.0351	U	0.0338	U	0.035	U	0.0351	U	0.0337	U	0.0402	U
Aroclor 1254	1	1	3.2	0.0351	U	0.0338	U	0.035	U	0.0351	U	0.0337	U	0.0402	U
Aroclor 1260	1	1	3.2	0.0351	U	0.0338	U	0.035	U	0.011	J	0.00969	J	0.0402	U
Aroclor 1262	1	1	3.2	0.0351	U	0.0338	U	0.035	U	0.0351	U	0.0337	U	0.0402	U
Aroclor 1268	1	1	3.2	0.0351	U	0.0338	U	0.035	U	0.0351	U	0.0337	U	0.0402	U
PCBs, Total	1	1	3.2	0.0351	U	0.0338	U	0.035	U	0.011	J	0.00969	J	0.0402	U

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-14		EP-13		EP-11		EP-9		EP-10		EP-7	
LAB SAMPLE ID				L2222452-01		L2222452-02		L2222452-03		L2223523-02		L2223523-03		L2224226-01	
DATE				4/27/2022		4/28/2022		4/28/2022		5/4/2022		5/4/2022		5/6/2022	
SAMPLE DEPTH (ft.)				18		18		18		18		18		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Organochlorine Pesticides by EPA 8081B (mg/kg)															
4,4'-DDD	2.6	13	14	0.00161	U	0.00161	U	0.00175	U	0.00167	U	0.00166	U	0.00188	U
4,4'-DDE	1.8	8.9	17	0.00161	U	0.00161	U	0.00175	U	0.00167	U	0.00166	U	0.00188	U
4,4'-DDT	1.7	7.9	136	0.00302	U	0.00302	U	0.00328	U	0.00312	U	0.00312	U	0.00353	U
Aldrin	0.019	0.097	0.19	0.00161	U	0.00161	U	0.00175	U	0.00167	U	0.00166	U	0.00188	U
Alpha-BHC	0.097	0.48	0.02	0.000671	U	0.000672	U	0.00073	U	0.000694	U	0.000692	U	0.000785	U
Beta-BHC	0.072	0.36	0.09	0.00161	U	0.00161	U	0.00175	U	0.00167	U	0.00166	U	0.00188	U
cis-Chlordane	0.91	4.2	2.9	0.00201	U	0.00202	U	0.00219	U	0.00208	U	0.00208	U	0.00236	U
Delta-BHC	100	100	0.25	0.00161	U	0.00161	U	0.00175	U	0.00167	U	0.00166	U	0.00188	U
Dieldrin	0.039	0.2	0.1	0.00101	U	0.00101	U	0.00109	U	0.00104	U	0.00104	U	0.00118	U
Endosulfan I	4.8	24	102	0.00161	U	0.00161	U	0.00175	U	0.00167	U	0.00166	U	0.00188	U
Endosulfan II	4.8	24	102	0.00161	U	0.00161	U	0.00175	U	0.00167	U	0.00166	U	0.00188	U
Endosulfan sulfate	4.8	24	1000	0.000671	U	0.000672	U	0.00073	U	0.000694	U	0.000692	U	0.000785	U
Endrin	2.2	11	0.06	0.000671	U	0.000672	U	0.00073	U	0.000694	U	0.000692	U	0.000785	U
Heptachlor	0.42	2.1	0.38	0.000805	U	0.000806	U	0.000876	U	0.000833	U	0.000831	U	0.000942	U
Heptachlor epoxide	--	--	--	0.00302	U	0.00302	U	0.00328	U	0.00312	U	0.00312	U	0.00353	U
Lindane	0.28	1.3	0.1	0.000671	U	0.000672	U	0.00073	U	0.000694	U	0.000692	U	0.000785	U
Methoxychlor	--	--	--	0.00302	U	0.00302	U	0.00328	U	0.00312	U	0.00312	U	0.00353	U

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-14		EP-13		EP-11		EP-9		EP-10		EP-7	
LAB SAMPLE ID				L2222452-01		L2222452-02		L2222452-03		L2223523-02		L2223523-03		L2224226-01	
DATE				4/27/2022		4/28/2022		4/28/2022		5/4/2022		5/4/2022		5/6/2022	
SAMPLE DEPTH (ft.)				18		18		18		18		18		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Chlorinated Herbicides by EPA 8151A (mg/kg)															
2,4,5-T	--	--	--	0.173	U	0.168	U	0.183	U	0.179	U	0.175	U	0.204	U
2,4,5-TP (Silvex)	58	100	3.8	0.173	U	0.168	U	0.183	U	0.179	U	0.175	U	0.204	U
2,4-D	--	--	--	0.173	U	0.168	U	0.183	U	0.179	U	0.175	U	0.204	U

Table Notes:

--: No guidance value
mg/kg: Milligrams per Kilogram
U: Not detected at the reported detection limit for the sample.
J: Estimated Value. The target analyte concentration is below the reporting limit (RL), but above the method detection limit (MDL).
New York Part 375 SCOs: Samples are compated to the New York State Department of Environmental Conservation Part 375 Residential, Restricted-Residential, and Protection of Groundwater Soil Cleanup Objectives.

Table 3D - PCBs, Pesticides, and Herbicides in Soil
End Point Sanples
205 Park AVenue
Brooklyn, New York

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-5		EP-12		EP-4		EP-8		EP-02		EP-03		EP-1	
LAB SAMPLE ID				L2225456-01		L2225456-02		L2225915-02		L2225915-01		L2226475-02		L2226475-01		L2227572-01	
DATE				5/12/2022		5/12/2022		5/16/2022		5/16/2022		5/18/2022		5/18/2022		5/24/2022	
SAMPLE DEPTH (ft.)				14		18		14		14		14		14		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Polychlorinated Biphenyls (PCBs) by EPA 8082A (mg/kg)																	
Aroclor 1016	1	1	3.2	0.0336	U	0.0335	U	0.0333	U	0.0342	U	0.0341	U	0.0323	U	0.0388	U
Aroclor 1221	1	1	3.2	0.0336	U	0.0335	U	0.0333	U	0.0342	U	0.0341	U	0.0323	U	0.0388	U
Aroclor 1232	1	1	3.2	0.0336	U	0.0335	U	0.0333	U	0.0342	U	0.0341	U	0.0323	U	0.0388	U
Aroclor 1242	1	1	3.2	0.0336	U	0.0335	U	0.0333	U	0.0342	U	0.0341	U	0.0323	U	0.0388	U
Aroclor 1248	1	1	3.2	0.0336	U	0.0335	U	0.0333	U	0.0342	U	0.0341	U	0.0323	U	0.0388	U
Aroclor 1254	1	1	3.2	0.0336	U	0.0335	U	0.0333	U	0.0342	U	0.0341	U	0.0323	U	0.0388	U
Aroclor 1260	1	1	3.2	0.0336	U	0.0335	U	0.0333	U	0.0342	U	0.0341	U	0.0323	U	0.0388	U
Aroclor 1262	1	1	3.2	0.0336	U	0.0335	U	0.0333	U	0.0342	U	0.0341	U	0.0323	U	0.0388	U
Aroclor 1268	1	1	3.2	0.0336	U	0.0335	U	0.0333	U	0.0342	U	0.0341	U	0.0323	U	0.0388	U
PCBs, Total	1	1	3.2	0.0336	U	0.0335	U	0.0333	U	0.0342	U	0.0341	U	0.0323	U	0.0388	U

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-5		EP-12		EP-4		EP-8		EP-02		EP-03		EP-1	
LAB SAMPLE ID				L2225456-01		L2225456-02		L2225915-02		L2225915-01		L2226475-02		L2226475-01		L2227572-01	
DATE				5/12/2022		5/12/2022		5/16/2022		5/16/2022		5/18/2022		5/18/2022		5/24/2022	
SAMPLE DEPTH (ft.)				14		18		14		14		14		14		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Organochlorine Pesticides by EPA 8081B (mg/kg)																	
4,4'-DDD	2.6	13	14	0.00165	U	0.00158	U	0.00166	U	0.00163	U	0.00162	U	0.00154	U	0.00188	U
4,4'-DDE	1.8	8.9	17	0.00165	U	0.000418	J	0.00166	U	0.00163	U	0.00162	U	0.00154	U	0.00188	U
4,4'-DDT	1.7	7.9	136	0.00309	U	0.00296	U	0.00311	U	0.00306	U	0.00304	U	0.00289	U	0.00353	U
Aldrin	0.019	0.097	0.19	0.00165	U	0.00158	U	0.00166	U	0.00163	U	0.00162	U	0.00154	U	0.00188	U
Alpha-BHC	0.097	0.48	0.02	0.000686	U	0.000657	U	0.000692	U	0.000679	U	0.000675	U	0.000643	U	0.000785	U
Beta-BHC	0.072	0.36	0.09	0.00165	U	0.00158	U	0.00166	U	0.00163	U	0.00162	U	0.00154	U	0.00188	U
cis-Chlordane	0.91	4.2	2.9	0.00206	U	0.00197	U	0.00208	U	0.00204	U	0.00202	U	0.00193	U	0.00235	U
Delta-BHC	100	100	0.25	0.00165	U	0.00158	U	0.00166	U	0.00163	U	0.00162	U	0.00154	U	0.00188	U
Dieldrin	0.039	0.2	0.1	0.00103	U	0.000985	U	0.00104	U	0.00102	U	0.00101	U	0.000964	U	0.00118	U
Endosulfan I	4.8	24	102	0.00165	U	0.00158	U	0.00166	U	0.00163	U	0.00162	U	0.00154	U	0.00188	U
Endosulfan II	4.8	24	102	0.00165	U	0.00158	U	0.00166	U	0.00163	U	0.00162	U	0.00154	U	0.00188	U
Endosulfan sulfate	4.8	24	1000	0.000686	U	0.000657	U	0.000692	U	0.000679	U	0.000675	U	0.000643	U	0.000785	U
Endrin	2.2	11	0.06	0.000686	U	0.000657	U	0.000692	U	0.000679	U	0.000675	U	0.000643	U	0.000785	U
Heptachlor	0.42	2.1	0.38	0.000823	U	0.000788	U	0.00083	U	0.000815	U	0.00081	U	0.000772	U	0.000942	U
Heptachlor epoxide	--	--	--	0.00309	U	0.00296	U	0.00311	U	0.00306	U	0.00304	U	0.00289	U	0.00353	U
Lindane	0.28	1.3	0.1	0.000686	U	0.000657	U	0.000692	U	0.000679	U	0.000675	U	0.000643	U	0.000785	U
Methoxychlor	--	--	--	0.00309	U	0.00296	U	0.00311	U	0.00306	U	0.00304	U	0.00289	U	0.00353	U

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-5		EP-12		EP-4		EP-8		EP-02		EP-03		EP-1	
LAB SAMPLE ID				L2225456-01		L2225456-02		L2225915-02		L2225915-01		L2226475-02		L2226475-01		L2227572-01	
DATE				5/12/2022		5/12/2022		5/16/2022		5/16/2022		5/18/2022		5/18/2022		5/24/2022	
SAMPLE DEPTH (ft.)				14		18		14		14		14		14		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Chlorinated Herbicides by EPA 8151A (mg/kg)																	
2,4,5-T	--	--	--	0.172	U	0.172	U	0.173	U	0.172	U	0.171	U	0.17	U	0.194	U
2,4,5-TP (Silvex)	58	100	3.8	0.172	U	0.172	U	0.173	U	0.172	U	0.171	U	0.17	U	0.194	U
2,4-D	--	--	--	0.172	U	0.172	U	0.173	U	0.172	U	0.171	U	0.17	U	0.194	U

Table Notes:

--: No guidance value
mg/kg: Milligrams per Kilogram
U: Not detected at the reported detection limit for the sample.
J: Estimated Value. The target analyte concentration is below the re
New York Part 375 SCOs: Samples are compated to the New York State Department of Envir

Table 3D - PCBs, Pesticides, and Herbicides in Soil
End Point Sanples
205 Park AVenue
Brooklyn, New York

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	DUPE 52422		EP-6	
LAB SAMPLE ID				L2227572-02		L2230358-01	
DATE				5/24/2022		6/9/2022	
SAMPLE DEPTH (ft.)				14		14	
				Results	Qual	Results	Qual
Polychlorinated Biphenyls (PCBs) by EPA 8082A (mg/kg)							
Aroclor 1016	1	1	3.2	0.0346	U	0.0357	U
Aroclor 1221	1	1	3.2	0.0346	U	0.0357	U
Aroclor 1232	1	1	3.2	0.0346	U	0.0357	U
Aroclor 1242	1	1	3.2	0.0346	U	0.0357	U
Aroclor 1248	1	1	3.2	0.0346	U	0.0357	U
Aroclor 1254	1	1	3.2	0.0346	U	0.0357	U
Aroclor 1260	1	1	3.2	0.0346	U	0.0357	U
Aroclor 1262	1	1	3.2	0.0346	U	0.0357	U
Aroclor 1268	1	1	3.2	0.0346	U	0.0357	U
PCBs, Total	1	1	3.2	0.0346	U	0.0357	U

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	DUPE 52422		EP-6	
LAB SAMPLE ID				L2227572-02		L2230358-01	
DATE				5/24/2022		6/9/2022	
SAMPLE DEPTH (ft.)				14		14	
				Results	Qual	Results	Qual
Organochlorine Pesticides by EPA 8081B (mg/kg)							
4,4'-DDD	2.6	13	14	0.00162	U	0.00167	U
4,4'-DDE	1.8	8.9	17	0.00162	U	0.00167	U
4,4'-DDT	1.7	7.9	136	0.00304	U	0.00167	U
Aldrin	0.019	0.097	0.19	0.00162	U	0.00167	U
Alpha-BHC	0.097	0.48	0.02	0.000675	U	0.000696	U
Beta-BHC	0.072	0.36	0.09	0.00162	U	0.00167	U
cis-Chlordane	0.91	4.2	2.9	0.00202	U	0.00209	U
Delta-BHC	100	100	0.25	0.00162	U	0.00167	U
Dieldrin	0.039	0.2	0.1	0.00101	U	0.00104	U
Endosulfan I	4.8	24	102	0.00162	U	0.00167	U
Endosulfan II	4.8	24	102	0.00162	U	0.00167	U
Endosulfan sulfate	4.8	24	1000	0.000675	U	0.000696	U
Endrin	2.2	11	0.06	0.000675	U	0.000696	U
Heptachlor	0.42	2.1	0.38	0.00081	U	0.000836	U
Heptachlor epoxide	--	--	--	0.00304	U	0.00313	U
Lindane	0.28	1.3	0.1	0.000675	U	0.000696	U
Methoxychlor	--	--	--	0.00304	U	0.00313	U

LOCATION	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	DUPE 52422		EP-6	
LAB SAMPLE ID				L2227572-02		L2230358-01	
DATE				5/24/2022		6/9/2022	
SAMPLE DEPTH (ft.)				14		14	
				Results	Qual	Results	Qual
Chlorinated Herbicides by EPA 8151A (mg/kg)							
2,4,5-T	--	--	--	0.171	U	0.18	U
2,4,5-TP (Silvex)	58	100	3.8	0.171	U	0.18	U
2,4-D	--	--	--	0.171	U	0.18	U

Table Notes:

--: No guidance value
mg/kg: Milligrams per Kilogram
U: Not detected at the reported detection limit for the sample.
J: Estimated Value. The target analyte concentration is below the re
New York Part 375 SCOs: Samples are compated to the New York State Department of Envir

Table 3E - General Chemistry in Soil
End Point Samples
205 Park Avenue
Brooklyn, New York

LOCATION	Unit	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	NY Part 375 Protection of Groundwater SCOs	EP-14		EP-13		EP-11		EP-9		EP-10		EP-7		EP-5		EP-12	
LAB SAMPLE ID					L2222452-01		L2222452-02		L2222452-03		L2223523-02		L2223523-03		L2224226-01		L2225456-01		L2225456-02	
DATE					4/27/2022		4/28/2022		4/28/2022		5/4/2022		5/4/2022		5/6/2022		5/12/2022		5/12/2022	
SAMPLE DEPTH (ft.)					18		18		18		18		18		14		14		18	
					Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
General Chemistry																				
Chromium, Hexavalent	mg/kg	22	110	110	0.223	J	0.164	J	0.231	J	0.352	J	0.907		0.394	J	0.84	U	0.835	U
Chromium, Trivalent	mg/kg	36	180	180	6.5	J	7	J	8.5	J	6.9	J	8.2		9.2	J	10		7.1	
Cyanide, Total	mg/kg	27	27	27	1	U	1	U	1	U	1	U	0.99	U	1.1	U	0.98	U	0.97	U
Solids, Total	%	--	--	--	94		97.5		90.8		90.9		93.7		81.3		95.2		95.8	

Table Notes:

--: No guidance value
mg/kg: Milligrams per Kilogram

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

J: Estimated Value. The target analyte concentration is below the reporting limit (RL), but above the method detection limit (MDL).

New York Part 375 SCOs: Samples are compated to the New York State Department of Environmental Conservation Part 375 Residential, Restricted-Residential, and Protection of Groundwater Soil Cleanup Objectives.

Table 3E - General Chemistry in Soil
End Point Samples
205 Park Avenue
Brooklyn, New York

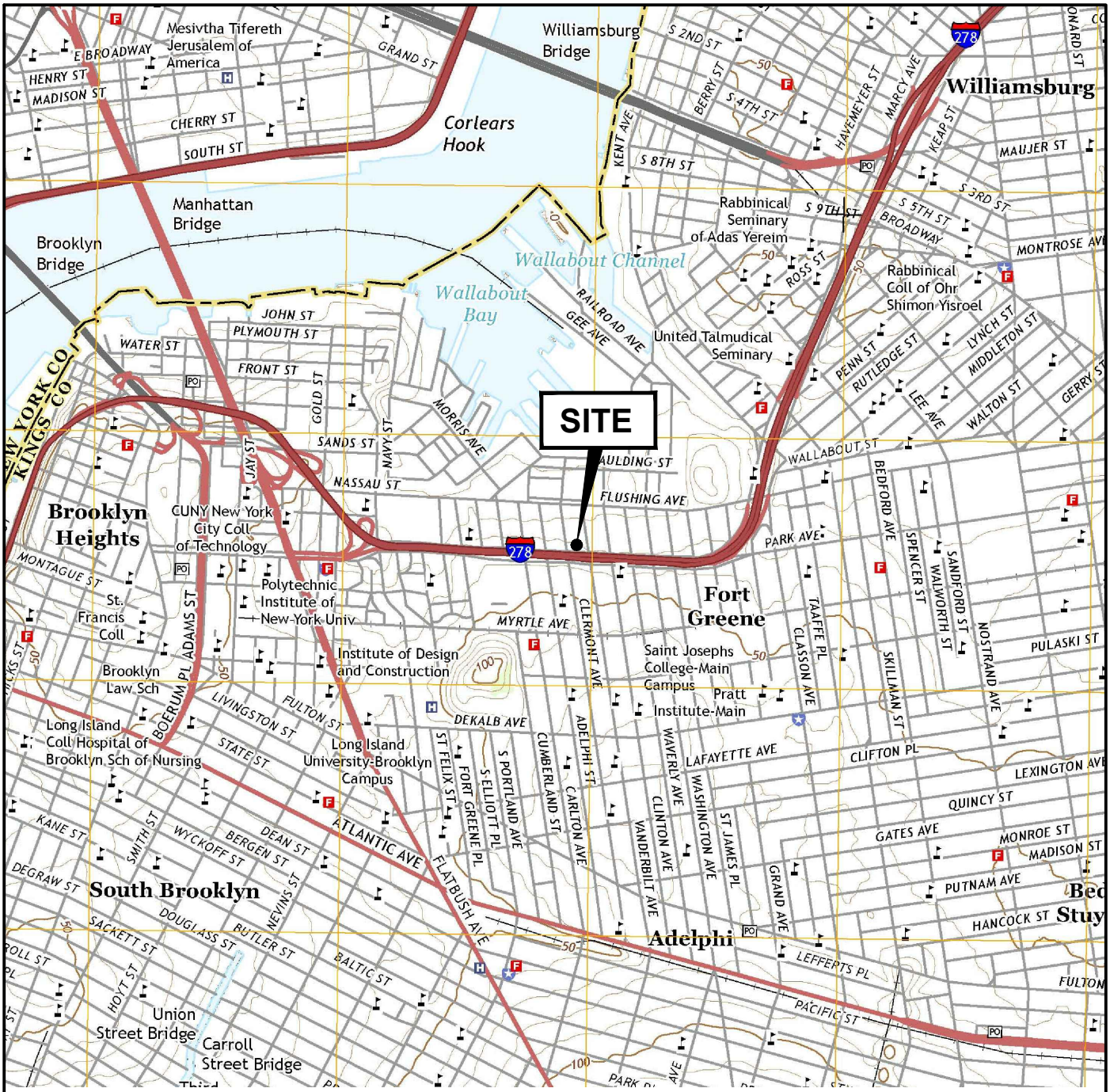
LOCATION	Unit	NY Part 375 Residential Use SCOs	NY Part 375 Restricted-Residential Use SCOs	EP-4		EP-8		EP-02		EP-03		EP-1		DUPE 52422		EP-6	
LAB SAMPLE ID				L2225915-02		L2225915-01		L2226475-02		L2226475-01		L2227572-01		L2227572-02		L2230358-01	
DATE				5/16/2022		5/16/2022		5/18/2022		5/18/2022		5/24/2022		5/24/2022		5/24/2022	
SAMPLE DEPTH (ft.)				14		14		14		14		14		14		14	
				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
General Chemistry																	
Chromium, Hexavalent	mg/kg	22	110	0.851	U	0.852	U	0.84	U	0.164	J	0.311	J	0.847	U	0.231	J
Chromium, Trivalent	mg/kg	36	180	9.9		9.5		8.8		6.6	J	11	J	8		5.8	J
Cyanide, Total	mg/kg	27	27	1	U	1	U	1	U	0.95	U	1.2	U	0.97	U	1	U
Solids, Total	%	--	--	94		93.9		95.2		97.5		83.5		94.4		90.9	

Table Notes:

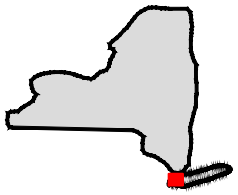
--: No guidance value
mg/kg: Milligrams per Kilogram
U: Not detected at the reported detection limit for the sample
J: Estimated Value. The target analyte concentration is below (RL), but above the method detection limit (MDL).

New York Part 375 SCOs: Samples are compated to the New York State Department of Conservation Part 375 Residential, Restricted-Residential, and Groundwater Soil Cleanup Objectives.

FIGURES



NEW YORK



QUADRANGLE LOCATION

SOURCE:

BASE MAP FROM THE FOLLOWING USGS QUADRANGLE MAP:
BROOKLYN, NY (2016)

DIGITAL TOPOGRAPHIC MAPS PROVIDED BY USGSSTORE.GOV.

CONTOUR ELEVATIONS REFERENCE NAVD 88,
CONTOURS ARE SHOWN IN FEET AT 10' INTERVALS

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205 PARK AVENUE
BROOKLYN, NEW YORK

SITE LOCATION MAP

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
PREFERRED BUILDERS

PROJ MGR: DW	REVIEWED BY: DW	CHECKED BY: DW	FIGURE 1
DESIGNED BY: SW	DRAWN BY: MT	SCALE: 1" = 2,000'	
DATE: AUGUST 2022	PROJECT NO. 12.0076834.00	REVISION NO.	SHEET NO.

© 2019 – GZA GeoEnvironmental, Inc. GZA–J:\76800's\12.0076834.00\FIGURES\CAD\76834.00.F1.DWG 1 SEPTEMBER 2, 2016 MIGUEL TORRES

LEGEND:

SITE BOUNDARY

NOTES:

1. BASE MAP DEVELOPED FROM 2019 GOOGLE EARTH PROFESSIONAL WITH AN IMAGERY DATE OF 6/15/2018.

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0 20' 40' 80'

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

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205 PARK AVENUE
BROOKLYN, NEW YORK

SITE LAYOUT MAP

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		462 LEXINGTON, LLC.	
PROJ MGR: ZS	REVIEWED BY: ZS	CHECKED BY: DW	FIGURE
DESIGNED BY: ZS	DRAWN BY: PB/MT	SCALE: 1" = 40'	2
DATE: AUGUST 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2019 – GZA GeoEnvironmental, Inc. GZA–\\GZAHAM1\JOBS\76800'S\12.0076834.00\FIGURES\CAD\RIR\76834.00.F2.DWG 2 – SMP JULY 21, 2022 JACKSON BOGACH

LEGEND:

- SITE BOUNDARY
- SOIL BORING LOCATION
- SOIL VAPOR IMPLANT LOCATION
- SOIL BORING LOCATION CONVERTED TO TEMPORARY WELL POINT
- SUPPLEMENTAL SOIL BORINGS

NOTES:

1. BASE MAP DEVELOPED FROM 2019 GOOGLE EARTH PROFESSIONAL WITH AN IMAGERY DATE OF 6/15/2018.

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0 20' 40' 80'

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

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205 PARK AVENUE
BROOKLYN, NEW YORK

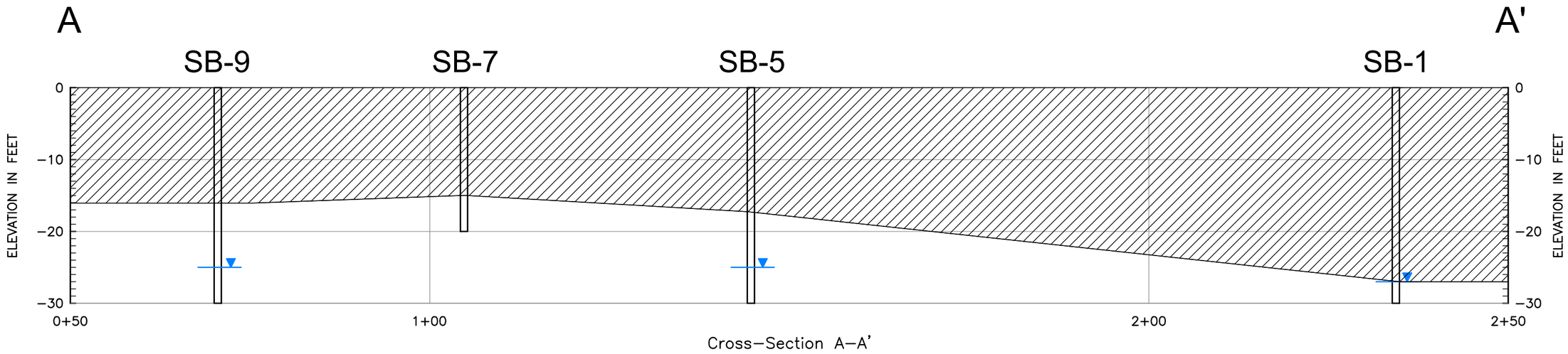
CROSS-SECTION LOCATIONS

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

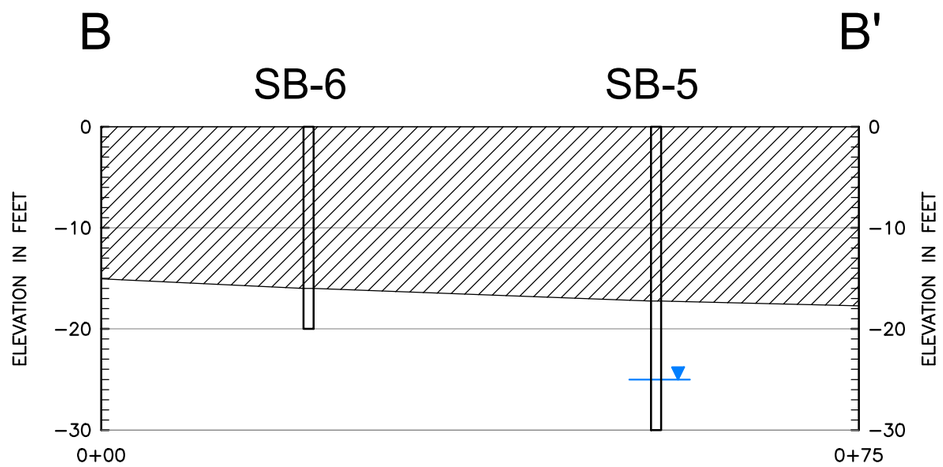
PREPARED FOR:
462 LEXINGTON, LLC.

PROJ MGR: ZS	REVIEWED BY: ZS	CHECKED BY: DW	FIGURE 3A
DESIGNED BY: ZS	DRAWN BY: MT	SCALE: 1" = 40'	
DATE: AUGUST 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2020 – GZA GeoEnvironmental, Inc. GZA–C:\USERS\MIGUEL.TORRES\DESKTOP\WORK FROM HOME\BCP APPLICATION\76834.00.F5.DWG CROSS–SECTION LOCATIONS JANUARY 13, 2021 MIGUEL TORRES



Cross–Section A–A'



Cross–Section B–B'

LEGEND:

- FILL MATERIAL
- SAND AND GRAVEL
- GROUNDWATER TABLE

0 7.5' 15' 30'

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

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205 PARK AVENUE
BROOKLYN, NEW YORK

CONCEPTUAL CROSS-SECTIONS

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		462 LEXINGTON, LLC.	
PROJ MGR: ZS	REVIEWED BY: ZS	CHECKED BY: DW	FIGURE 3B
DESIGNED BY: ZS	DRAWN BY: CJB	SCALE: 1" = 15'	
DATE: AUGUST 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2020 – GZA GeoEnvironmental, Inc. G:\ZA–\\GZAHAM1\JOBS\76800'S\12.0076834.00\FIGURES\CAD\RAWP\76834.10.F3B.DWG CROSS–SECTION JULY 28, 2022 JACKSON BOGACH

LEGEND:

- SITE BOUNDARY
- PERMANENT WELL LOCATIONS
- 4.46 GROUNDWATER CONTOUR
- (4.53) GROUNDWATER ELEVATION
- GROUNDWATER FLOW DIRECTION

NOTES:

1. BASE MAP DEVELOPED FROM 2019 GOOGLE EARTH PROFESSIONAL WITH AN IMAGERY DATE OF 6/15/2018.
2. ALL ELEVATIONS REFER TO NAVD 88.

N W E S

0 20' 40' 80'

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

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205 PARK AVENUE
BROOKLYN, NEW YORK

GROUNDWATER CONTOUR MAP
JULY 2, 2021

PREPARED BY:
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www.gza.com

PREPARED FOR:
462 LEXINGTON, LLC.

PROJ MGR: ZS	REVIEWED BY: ZS	CHECKED BY: DW	FIGURE 4
DESIGNED BY: ZS	DRAWN BY: MT	SCALE: 1" = 40'	
DATE: AUGUST 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2019 – GZA GeoEnvironmental, Inc. GZA–\\GZAHAM1\JOBS\76800's\12.0076834.00\FIGURES\CAD\RAWP\DECEMBER 2021\76834.00.F7.DWG 4 – SMP JULY 21, 2022 JACKSON BOGACH

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SB-8 1/6/2020	
			5.5'-6' bgs	15.5'-16' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	ND
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			NE	NE
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Metals			NE	NE

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SB-6 1/7/2020	
			5.5'-6' bgs	15.5'-16' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	ND
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			ND	ND
Organochlorine Pesticides				
4,4'-DDE	8.9	0.0033	0.0215	ND
4,4'-DDD	13	0.0033	0.00938	ND
4,4'-DDT	7.9	0.0033	0.0464	ND
PCBs				
PCBs			ND	ND
Metals				
Metals			NE	NE

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SRI-3 (2-2.5) 6/15/2021	SRI-3 (28-28.5) 6/15/2021
			2-2.5' bgs	28-28.5' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	ND
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			NE	ND
Perfluorinated Alkyl Acids				
PFOA	0.33	0.00066	ND	ND
PFOS	0.44	0.00088	ND	ND
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Mercury	0.81	0.18	ND	ND

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SB-4 1/6/2020	
			3'-3.5' bgs	15'-15.5' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	ND
Semivolatile Organics				
SVOCs			ND	ND
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Metals			NE	NE

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SRI-7 (1.5-2) 6/15/2021	SRI-7 (24.5-25) 6/15/2021
			1.5-2' bgs	24.5-25' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	ND
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			NE	ND
Perfluorinated Alkyl Acids				
PFOA	0.33	0.00066	ND	**0.000146 J**
PFOS	0.44	0.00088	ND	ND
Pesticides				
4,4'-DDE	8.9	0.0033	**0.00399**	ND
4,4'-DDT	7.9	0.0033	**0.0158**	ND
PCBs				
PCBs			NE	ND
Metals				
Mercury	0.81	0.18	ND	ND

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SRI-4 (1-1.5) 6/15/2021	SRI-4 (26.5-27) 6/15/2021
			1-1.5' bgs	26.5-27' bgs
			mg/kg	mg/kg
Volatile Organics				
Xylenes (total)	100	0.26	**2.4**	NA
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			NE	ND
Perfluorinated Alkyl Acids				
PFOA	0.33	0.00066	**0.000213 J**	**0.000134 J**
PFOS	0.44	0.00088	**0.00293**	**0.000644**
Pesticides				
Dieldrin	0.2	0.005	**0.00655 P**	ND
4,4'-DDD	13	0.0033	**0.0183 P**	ND
4,4'-DDT	7.9	0.0033	**0.0203 P**	ND
PCBs				
PCBs			ND	NE
Metals				
Mercury	0.81	0.18	0.211	ND

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SB-2 1/7/2020	
			3.5'-4' bgs	16'-16.5' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	ND
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			ND	ND
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Metals			NE	NE

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SB-10 1/7/2020	
			2'-2.5' bgs	15'-15.5' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	NE
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			NE	ND
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Metals			NE	NE

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	PARK AVE 3 12/11/2020
			2.5'-3' bgs
			mg/kg
Volatile Organics			
VOCs			NA
Semivolatile Organics			
SVOCs			NE
Pesticides			
Pesticides			NA
PCBs			
PCBs			NA
Total Metal			
Mercury, Total	0.81	0.18	0.822
Nickel, Total	310	30	31.6

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SRI-8 (3.5-4) 6/15/2021	SRI-8 (29.5-30) 6/15/2021	DUP-2 SRI-8 (29.5-30) 6/15/2021
			3.5-4' bgs	29-29.5' bgs	29-29.5' bgs
			mg/kg	mg/kg	mg/kg
Volatile Organics					
VOCs			NE	NE	NE
1,4-Dioxane	13	0.1	ND	ND	ND
Semivolatile Organics					
Benzo(a)anthracene	1	1	**12**	**0.059 J**	**0.036 J**
Benzo(a)pyrene	1	1	**9.2**	ND	ND
Benzo(b)fluoranthene	1	1	**11**	**0.057 J**	**0.032 J**
Benzo(k)fluoranthene	3.9	0.8	**3.9**	ND	ND
Chrysene	3.9	1	**10**	**0.052 J**	**0.033 J**
Dibenzo(a,h)anthracene	0.33	0.33	**1.4**	ND	ND
Indeno(1,2,3-cd)pyrene	0.5	0.5	**6.1**	**0.024 J**	ND
Perfluorinated Alkyl Acids					
PFOA	0.33	0.00066	**0.000081 J**	ND	ND
PFOS	0.44	0.00088	**0.000648**	ND	ND
Pesticides					
Pesticides			ND	ND	ND
PCBs					
PCBs			ND	ND	ND
Metals					
Lead	400	63	**338**	**15.2**	**13.5**
Mercury	0.81	0.18	**0.406**	**0.142**	ND
Nickel	310	30	**10**	**31.5**	**16.3**
Zinc	10000	109	**118**	**24.1**	**22.4**

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SRI-6 (2-2.5) 6/15/2021	SRI-6 (26.5-27) 6/15/2021
			2-2.5' bgs	26.5-27' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	NE
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
Benzo(a)anthracene	1	1	**1.1**	ND
Benzo(a)pyrene	1	1	**0.8**	ND
Benzo(b)fluoranthene	1	1	**1**	ND
Benzo(k)fluoranthene	3.9	0.8	**0.37**	ND
Chrysene	3.9	1	**1**	ND
Indeno(1,2,3-cd)pyrene	0.5	0.5	**0.51**	ND
Perfluorinated Alkyl Acids				
PFOA	0.33	0.00066	**0.000066 J**	ND
PFOS	0.44	0.00088	**0.000132 J**	ND
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Mercury	0.81	0.18	**0.386**	**0.486**

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SB-1 1/6/2020	
			6.5'-7' bgs	15.5'-16' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	NE
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			ND	NE
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Metals			NE	NE

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SB-9 1/7/2020	
			3.5'-4' bgs	15'-15.5' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	NE
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			ND	NE
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Metals			NE	NE

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SRI-5 (1.5-2) 6/15/2021	SRI-5 (27-27.5) 6/15/2021
			1.5-2' bgs	27-27.5' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	NE
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
Benzo(a)anthracene	1	1	**2.2**	**2.8**
Benzo(a)pyrene	1	1	**1.6**	**2.1**
Benzo(b)fluoranthene	1	1	**2.2**	**2.6**
Benzo(k)fluoranthene	3.9	0.8	**0.79**	**0.85**
Chrysene	3.9	1	**1.8**	**2.5**
Indeno(1,2,3-cd)pyrene	0.5	0.5	**1.1**	**1.2**
Perfluorinated Alkyl Acids				
PFOA	0.33	0.00066	**0.00016 J**	**0.000126 J**
PFOS	0.44	0.00088	**0.00344**	ND
Pesticides				
4,4'-DDE	8.9	0.0033	0.00373	ND
4,4'-DDD	13	0.0033	0.00643	ND
4,4'-DDT	7.9	0.0033	0.0185	ND
PCBs				
PCBs			NE	ND
Metals				
Mercury	0.81	0.18	NE	ND

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	PARK AVE 5 12/11/2020
			2.5'-3' bgs
			mg/kg
Volatile Organics			
VOCs			NA
Pesticides			
Pesticides			NA
PCBs			
PCBs			NA
Semivolatile Organics			
Benzo(b)fluoranthene	1	1	1.2
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.67
Total Metal			
Lead, Total	400	63	118
Mercury, Total	0.81	0.18	0.208
Zinc, Total	10000	109	124

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SB-3 1/7/2020	
			7'-7.5' bgs	15'-15.5' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	NE
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			NE	ND
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Copper, Total	270	50	11.2	78.1

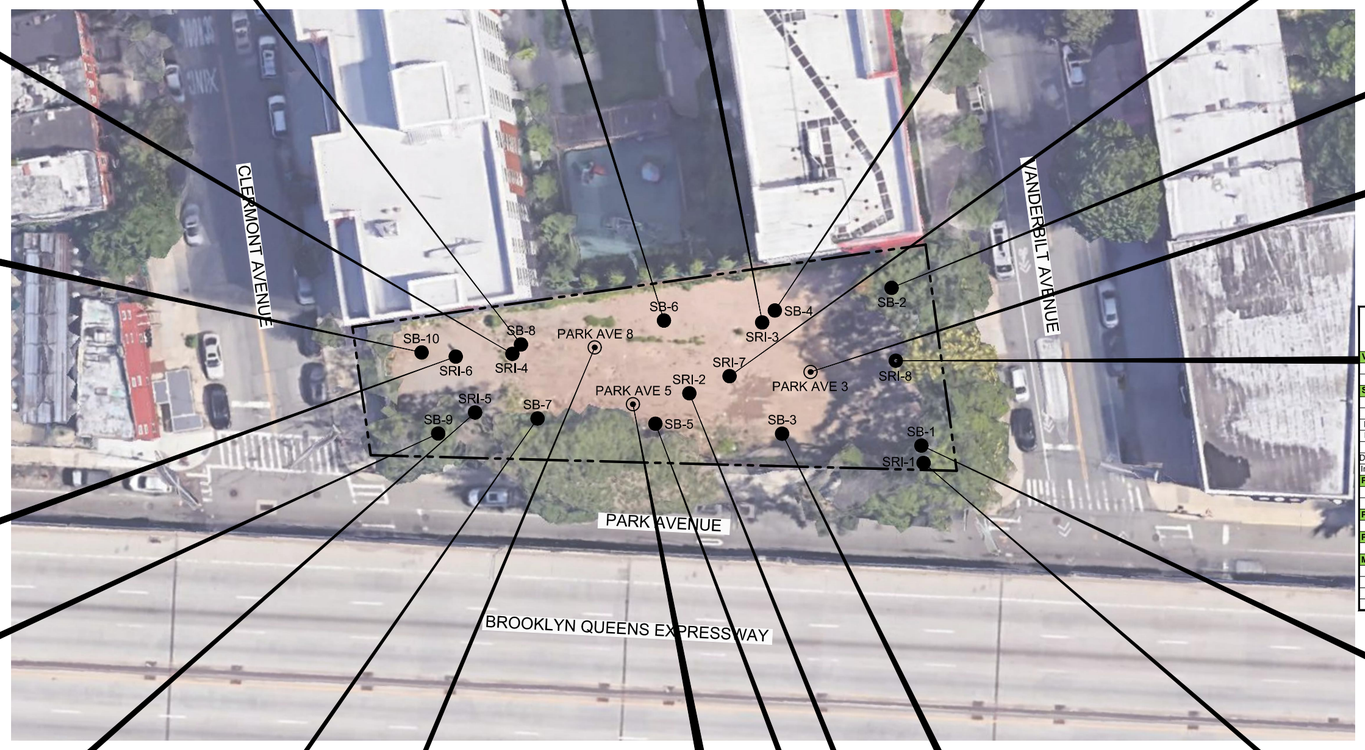
	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SRI-1 (3-3.5) 6/15/2021	SRI-1 (25-25.5) 6/15/2021	DUP-1 SRI-1 (25-25.5) 6/15/2021
			3-3.5' bgs	25-25.5' bgs	25-25.5' bgs
			mg/kg	mg/kg	mg/kg
Volatile Organics					
VOCs			ND	NE	ND
1,4-Dioxane	13	0.1	ND	ND	ND
Semivolatile Organics					
SVOCs			ND	ND	ND
Perfluorinated Alkyl Acids					
PFOA	0.33	0.00066	**0.000056 J**	**0.000062 J**	**0.000085 J**
PFOS	0.44	0.00088	ND	**0.000154 J**	**0.000303**
Pesticides					
Pesticides			ND	ND	ND
PCBs					
PCBs			ND	ND	ND
Metals					
Metals			NE	NE	NE

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	PARK AVE 8 12/11/2020
			2.5'-3' bgs
			mg/kg
Volatile Organics			
VOCs			NA
Semivolatile Organics			
SVOCs			NE
Pesticides			
Pesticides			NA
PCBs			
PCBs			NA
Total Metal			
Lead, Total	400	63	103
Mercury, Total	0.81	0.18	0.183
Nickel, Total	310	30	33
Zinc, Total	10000	109	120

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SB-7 1/7/2020	
			6'-6.5' bgs	15'-15.5' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	NE
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			ND	NE
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	NE
Metals				
Metals			NE	NE

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SB-5 1/6/2020	
			5.5'-6' bgs	15.5'-16' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	NE
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
Benzo(a)anthracene	1	1	ND	1.9
Benzo(a)pyrene	1	1	ND	1.9
Benzo(b)fluoranthene	1	1	ND	2.5
Benzo(k)fluoranthene	3.9	0.8	ND	0.9
Chrysene	3.9	1	ND	1.5
Indeno(1,2,3-cd)pyrene	0.5	0.5	ND	1.3
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Metals			NE	NE

	NYS Part 375 Restricted-Residential SCOs	NYS Part 375 Unrestricted Use SCOs	SRI-2 (0-0.5) 6/15/2021	SRI-2 (30-30.5) 6/15/2021
			0-0.5' bgs	30-30.5' bgs
			mg/kg	mg/kg
Volatile Organics				
VOCs			ND	NE
1,4-Dioxane	13	0.1	ND	ND
Semivolatile Organics				
SVOCs			NE	ND
Perfluorinated Alkyl Acids				
PFOA	0.33	0.00066	**0.0001 J**	**0.000124 J**
PFOS	0.44	0.00088	**0.00326**	**0.000189 JF**
Pesticides				
Pesticides			ND	ND
PCBs				
PCBs			ND	ND
Metals				
Lead	400	63	**163**	**8.68**
Mercury	0.81	0.18	**0.253**	ND
Nickel	310	30	**169**	**37.5**
Zinc	10000	109		



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0 20' 40' 80'

SCALE IN FEET

LEGEND:

- SITE BOUNDARY
- SOIL BORING LOCATION
- SUPPLEMENTAL SOIL BORING LOCATION
- THIS VALUE EXCEEDS NYS UNRESTRICTED USE SOIL CLEANUP OBJECTIVES (SCOS)
- THIS VALUE EXCEEDS BOTH NYS UNRESTRICTED USE SOIL CLEANUP OBJECTIVES AND RESTRICTED-RESIDENTIAL SOIL CLEANUP OBJECTIVES

bgs BELOW GROUND SURFACE

mg/kg MILLIGRAM PER KILOGRAM

ND NOT DETECTED AT A CONCENTRATION ABOVE SCO AND/OR LABORATORY REPORTING LIMIT

NE NOT EXCEEDED THE SCO

NOTES:

1. BASE MAP DEVELOPED FROM 2019 GOOGLE EARTH PROFESSIONAL WITH AN IMAGERY DATE OF 6/15/2018.

NO.	ISSUE/DESCRIPTION	BY	DATE

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205 PARK AVENUE
BROOKLYN, NEW YORK

SOIL BORING ANALYTICAL RESULTS SUMMARY

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
462 LEXINGTON, LLC.

PROJ MGR: ZS	REVIEWED BY: ZS	CHECKED BY: DW	FIGURE 5A
DESIGNED BY: ZS	DRAWN BY: MT	SCALE: 1" = 40'	
DATE: AUGUST 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2020 – GZA GeoEnvironmental, Inc. GZA–J:\76800'S\12.0076834.00\FIGURES\CAD\BCP APPLICATION\76834.00.F4.DWG 4 SEPTEMBER 10, 2021 MIGUEL TORRES

LEGEND:

- SITE BOUNDARY
- END POINT SAMPLE LOCATION
- TRACK 1 ARCHIVED AREA
- TRACK 2 ARCHIVED AREA

NOTES:

1. BASE MAP DEVELOPED FROM 2019 GOOGLE EARTH PROFESSIONAL WITH AN IMAGERY DATE OF 6/15/2018.
2. ENDPOINT SOIL SAMPLES DID NOT EXCEED THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION PART 375 RESTRICTED-RESIDENTIAL OR PROTECTION OF GROUNDWATER SOIL CLEANUP OBJECTIVES AT ANY LOCATION.
3. DUE TO THE ONSITE STRUCTURAL LIMITATION OF THE SUPPORT OF EXCAVATION INSTALLED, HOT SPOT EXCAVATION IS NOT PERFORMED. THEREFORE, THE TRACK 2 ACHIEVED FOR THE AREA.
4. ENDPOINT SAMPLING RESULTS ARE PROVIDED IN TABLE 2.
5. THE ENDPOINTS ARE RECORDED BY TRIMBLE GEO 7X USING DATUM NAVD88.

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0 20' 40' 80'

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

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ERNEST R. HANNA

STATE OF NEW YORK ERNEST ROYAL HANNA No. 65440 LICENSED PROFESSIONAL ENGINEER

NY PROFESSIONAL ENGINEER
LICENSE #: 065440

205 PARK AVENUE
BROOKLYN, NEW YORK

END POINT LOCATION PLAN

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		462 LEXINGTON, LLC.	
PROJ MGR: ZS	REVIEWED BY: ZS	CHECKED BY: DW	FIGURE 5B
DESIGNED BY: ZS	DRAWN BY: MT/CJB	SCALE: 1" = 40'	
DATE: AUGUST 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2020 – GZA GeoEnvironmental, Inc. GZA–J:\76800'S\12.0076834.00\FIGURES\CAD\RAWP\DECEMBER 2021\76834.10.F5.DWG 8 DECEMBER 19, 2022 MIGUEL TORRES

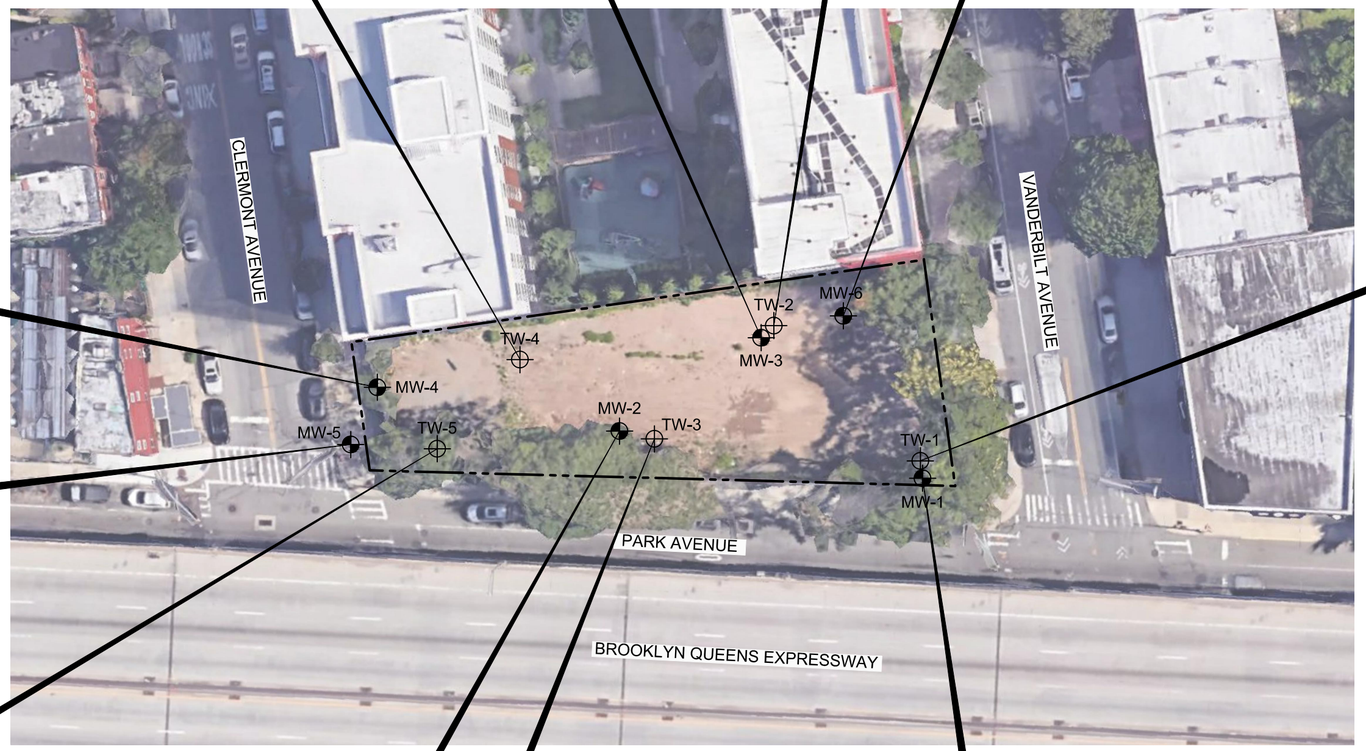
LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	TW-4
SAMPLING DATE		1/7/2020
LAB SAMPLE ID		L2000635-01
SAMPLE DEPTH (ft.)		33 ft bgs
		µg/l
Volatile Organics		
Tetrachloroethene	5	**8.7**
Chloroform	7	**34**
Semivolatile Organics		
Benzo(a)anthracene	0.002	**0.05J**
Benzo(a)pyrene	0	**0.03J**
Benzo(b)fluoranthene	0.002	**0.04J**
Benzo(k)fluoranthene	0.002	**0.02J**
Chrysene	0.002	**0.03J**
Indeno(1,2,3-cd)pyrene	0.002	**0.03J**
Total Metals		
Aluminum, Total	2000	**2,960**
Iron, Total	600	**5,320**
Manganese, Total	600	**676.8**
1,4-Dioxane		
1,4-Dioxane		NA

LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	MW-3
SAMPLING DATE		6/18/2021
LAB SAMPLE ID		L2133428-05
SAMPLE DEPTH (ft.)		
		µg/l
Volatile Organics		
Tetrachloroethene	5	**17**
Semivolatile Organics		
Benzo(b)fluoranthene	0.002	**0.01J**
Organochlorine Pesticides		
Dieldrin	0.004	**0.007J**
Perfluorinated Alkyl Acids		
Perfluorooctanoic Acid (PFOA)	0.01	**0.137**
Perfluorooctanesulfonic Acid (PFOS)	0.01	**0.0156**
PFOA/PFOS, Total	0.5	0.153
1,4-Dioxane		
1,4-Dioxane		0.0861

LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	TW-2
SAMPLING DATE		1/8/2020
LAB SAMPLE ID		L2000844-02
SAMPLE DEPTH (ft.)		33 ft bgs
		µg/l
Volatile Organics		
Tetrachloroethene	5	**10**
Semivolatile Organics		
Benzo(a)anthracene	0.002	**0.03J**
Benzo(a)pyrene	0	**0.02J**
Benzo(b)fluoranthene	0.002	**0.03J**
Benzo(k)fluoranthene	0.002	**0.01J**
Chrysene	0.002	**0.02J**
Indeno(1,2,3-cd)pyrene	0.002	**0.02J**
Total Metals		
Iron, Total	600	**1,640**
Manganese, Total	600	**640.3**
Organochlorine Pesticides		
Dieldrin	0.004	**0.009J**
1,4-Dioxane		
1,4-Dioxane		NA

LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	MW-6	DUP-1
SAMPLING DATE		6/22/2021	6/22/2021
LAB SAMPLE ID		L2133901-03	L2133901-04
SAMPLE DEPTH (ft.)			
		µg/l	µg/l
Volatile Organics			
Tetrachloroethene	5	**18**	**18**
Organochlorine Pesticides			
Dieldrin	0.004	**0.016J**	**0.013J**
Total Metals			
Iron	600	**696**	**626**
Perfluorinated Alkyl Acids			
Perfluorooctanoic Acid (PFOA)	0.01	**0.0738**	**0.0737**
Perfluorooctanesulfonic Acid (PFOS)	0.01	**0.0143**	**0.0144**
PFOA/PFOS, Total	0.5	0.0881	0.0881
1,4-Dioxane			
1,4-Dioxane		0.0952	0.107

LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	TW-1
SAMPLING DATE		1/6/2020, 1/8/2020
LAB SAMPLE ID		L2000844-01,L2000463-09
SAMPLE DEPTH (ft.)		28 ft bgs
		µg/l
Volatile Organics		
Tetrachloroethene	5	**18**
Semivolatile Organics		
Benzo(a)anthracene	0.002	**0.08J**
Benzo(a)pyrene	0	**0.06J**
Benzo(b)fluoranthene	0.002	**0.09J**
Benzo(k)fluoranthene	0.002	**0.04J**
Chrysene	0.002	**0.06J**
Indeno(1,2,3-cd)pyrene	0.002	**0.06J**
Total Metals		
Aluminum, Total	2000	**29,100**
Barium, Total	2000	**3,059**
Beryllium, Total	3	**6.89**
Chromium, Total	100	**254.2**
Iron, Total	600	**36,400**
Lead, Total	50	**335.9**
Magnesium, Total	35000	**70,600**
Manganese, Total	600	**29,450**
Nickel, Total	200	**316.7**
Selenium, Total	20	**37.5**
Dissolved Metals		
Manganese, Dissolved	600	**888**
Organochlorine Pesticides		
Dieldrin	0.004	**0.022J**
Perfluorinated Alkyl Acids		
Perfluorooctanoic Acid (PFOA)	0.001	**0.093**
Perfluorooctanesulfonic Acid (PFOS)	0.001	**0.032**
PFOA/PFOS, Total	0.5	0.126
1,4-Dioxane		
1,4-Dioxane		0.097



LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	MW-4
SAMPLING DATE		6/22/2021
LAB SAMPLE ID		L2133901-01
SAMPLE DEPTH (ft.)		
		µg/l
Volatile Organics		
Chloroform	7	**8.2**
Tetrachloroethene	5	**5.3**
Perfluorinated Alkyl Acids		
Perfluorooctanoic Acid (PFOA)	0.01	**0.0775**
Perfluorooctanesulfonic Acid (PFOS)	0.01	**0.0278**
PFOA/PFOS, Total	0.5	0.105
1,4-Dioxane		
1,4-Dioxane		0.0613

LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	MW-5
SAMPLING DATE		6/22/2021
LAB SAMPLE ID		L2133901-02
SAMPLE DEPTH (ft.)		
		µg/l
Volatile Organics		
Tetrachloroethene	5	**11**
Semivolatile Organics		
Benzo(a)anthracene	0.002	**0.05J**
Benzo(a)pyrene	0	**0.07J**
Benzo(b)fluoranthene	0.002	**0.09J**
Benzo(k)fluoranthene	0.002	**0.04J**
Chrysene	0.002	**0.04J**
Indeno(1,2,3-cd)pyrene	0.002	**0.09J**
Perfluorinated Alkyl Acids		
Perfluorooctanoic Acid (PFOA)	0.01	**0.084**
Perfluorooctanesulfonic Acid (PFOS)	0.01	**0.0146**
PFOA/PFOS, Total	0.5	0.0986
1,4-Dioxane		
1,4-Dioxane		ND

LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	TW-5
SAMPLING DATE		1/7/2020
LAB SAMPLE ID		L2000635-02
SAMPLE DEPTH (ft.)		28 ft bgs
		µg/l
Volatile Organics		
Tetrachloroethene	5	**6**
Chloroform	7	**36**
Semivolatile Organics		
Benzo(a)anthracene	0.002	**0.39**
Benzo(a)pyrene	0	**0.36**
Benzo(b)fluoranthene	0.002	**0.43**
Benzo(k)fluoranthene	0.002	**0.15**
Chrysene	0.002	**0.35**
Indeno(1,2,3-cd)pyrene	0.002	**0.24**
Total Metals		
Aluminum, Total	2000	**13,800**
Iron, Total	600	**26,800**
Lead, Total	50	**81.89**
Manganese, Total	600	**2,121**
1,4-Dioxane		
1,4-Dioxane		NA

LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	MW-2
SAMPLING DATE		6/18/2021
LAB SAMPLE ID		L2133428-04
SAMPLE DEPTH (ft.)		
		µg/l
Volatile Organics		
Tetrachloroethene	5	**15**
Organochlorine Pesticides		
Dieldrin	0.004	**0.015J**
Perfluorinated Alkyl Acids		
Perfluorooctanoic Acid (PFOA)	0.01	**0.0988**
Perfluorooctanesulfonic Acid (PFOS)	0.01	**0.0167**
PFOA/PFOS, Total	0.5	0.0116
1,4-Dioxane		
1,4-Dioxane		0.0892

LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	TW-3
SAMPLING DATE		1/8/2020
LAB SAMPLE ID		L2000844-03
SAMPLE DEPTH (ft.)		33 ft bgs
		µg/l
Volatile Organics		
Tetrachloroethene	5	**20**
Semivolatile Organics		
Benzo(a)anthracene	0.002	**0.1J**
Benzo(a)pyrene	0	**0.08J**
Benzo(b)fluoranthene	0.002	**0.11**
Benzo(k)fluoranthene	0.002	**0.04J**
Chrysene	0.002	**0.07J**
Indeno(1,2,3-cd)pyrene	0.002	**0.05J**
Total Metals		
Aluminum, Total	2000	**3,320**
Iron, Total	600	**6,860**
Manganese, Total	600	**917**
Thallium, Total	0.5	**0.95J**
Organochlorine Pesticides		
Dieldrin	0.004	**0.018J**
1,4-Dioxane		
1,4-Dioxane		NA

LOCATION	NYSDEC TOGS Standards and Guidance Values-GA	MW-1
SAMPLING DATE		6/18/2021
LAB SAMPLE ID		L2133428-03
SAMPLE DEPTH (ft.)		
		µg/l
Volatile Organics		
Tetrachloroethene	5	**22**
Organochlorine Pesticides		
Dieldrin	0.004	**0.015J**
Perfluorinated Alkyl Acids		
Perfluorooctanoic Acid (PFOA)	0.01	**0.039**
Perfluorooctanesulfonic Acid (PFOS)	0.01	**0.011**
PFOA/PFOS, Total	0.5	0.0504
1,4-Dioxane		
1,4-Dioxane		0.288

LEGEND:

- SITE BOUNDARY
- PERMANENT WELL LOCATIONS
- TEMPORARY WELL POINT

NOTES:

1. BASE MAP DEVELOPED FROM 2019 GOOGLE EARTH PROFESSIONAL WITH AN IMAGERY DATE OF 6/15/2018.
2. GROUNDWATER SAMPLE ANALYTICAL RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TECHNICAL AND OPERATIONAL GUIDANCE SERIES (TOGS) 1.1.1 AMBIENT WATER QUALITY STANDARDS (AWQS) AND GUIDANCE VALUES FOR DRINKING WATER (CLASS GA) AND TO THE NYSDEC PER-AND POLYFLUOROALKYL SUBSTANCE (PFAS) SCREENING LEVELS, JANUARY 2021. HIGHLIGHTED INDICATES THE VALUE EXCEEDING ONE OR MORE CRITERIA.
3. µg/L = MICROGRAM PER LITER
4. ONLY EXCEEDANCES/DETECTED COMPOUNDS ARE SHOWN ON THE FIGURE.

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SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

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205 PARK AVENUE
BROOKLYN, NEW YORK

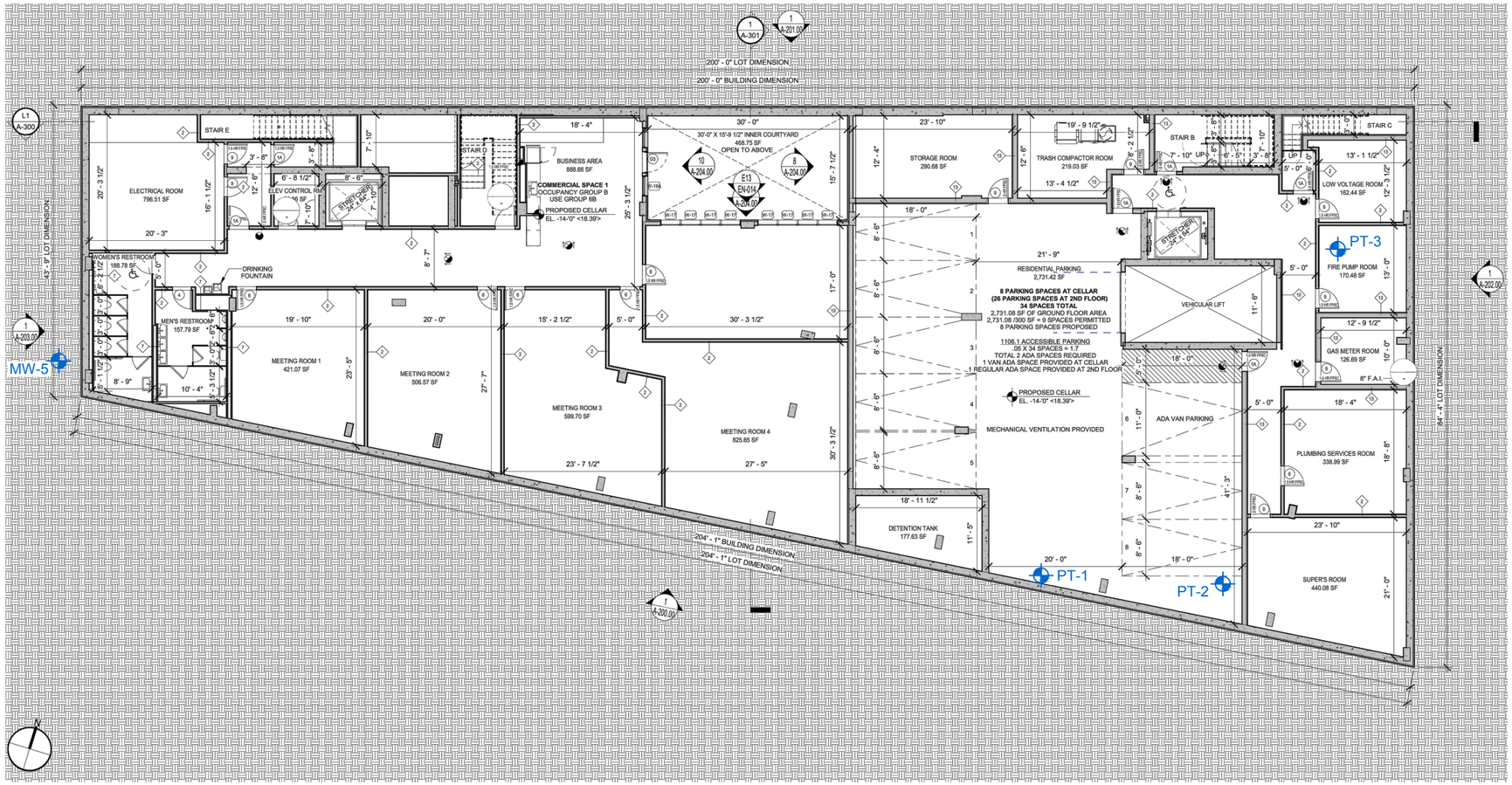
GROUNDWATER ANALYTICAL RESULTS SUMMARY

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
462 LEXINGTON, LLC.

PROJ MGR: ZS	REVIEWED BY: ZS	CHECKED BY: DW	FIGURE 6A
DESIGNED BY: ZS	DRAWN BY: MT	SCALE: 1" = 40'	
DATE: AUGUST 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2019 – GZA GeoEnvironmental, Inc. GZA–J:\76800'S\12.0076834.00\FIGURES\CAD\BCP APPLICATION\76834.00.F5_V2.DWG 5 JULY 30, 2021 MIGUEL TORRES



LEGEND:

MONITORING WELL LOCATION

NOTES:

1. THE BASE MAP WAS DEVELOPED FROM AN ELECTRONIC FILE PROVIDED BY: J FRANKL C MALLEA ASSOCIATES ARCHITECTS & ENGINEERS, ENTITLED: PROPOSED CELLAR PLAN, DATED: 10/24/2019, ORIGINAL SCALE: ⅛" = 1', DRAWING NUMBER: A-100.00.

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0 10' 20' 40'

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

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205 PARK AVENUE
BROOKLYN, NEW YORK

MONITORING WELL LOCATIONS

ERNEST R. HANNA

NY PROFESSIONAL ENGINEER
LICENSE #: 065440

PREPARED BY: GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		PREPARED FOR: 462 LEXINGTON, LLC.	
PROJ MGR: ZS	REVIEWED BY: ZS	CHECKED BY: DW	FIGURE 6B
DESIGNED BY: ZS	DRAWN BY: MT	SCALE: 1" = 20'	
DATE: AUGUST 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2020 – GZA GeoEnvironmental, Inc. G:\ZA–ji:\76800'S\12.0076834.00\FIGURES\CAD\FER\76834.10.F3.DWG 3 SEPTEMBER 29, 2022 MIGUEL TORRES

LOCATION	SG-8 (5-6')	SG-8 (20-21')
SAMPLING DATE	1/8/2020	1/9/2020
LAB SAMPLE ID	L2000840-06	L2001065-03
Volatile Organics in Air	ug/m3	
Dichlorodifluoromethane	1.9	2.73
1,3-Butadiene	2.57	3.85
Acetone	109	309
Trichlorofluoromethane	ND	1.98
Isopropanol	3.71	ND
Tertiary butyl Alcohol	1.69	ND
Carbon disulfide	2.98	1.42
1,1-Dichloroethane	ND	1.41
2-Butanone	5.84	9.59
Chloroform	19.8	288
Tetrahydrofuran	5.84	2.28
n-Hexane	4.72	5.57
1,1,1-Trichloroethane	2.48	2.55
Benzene	2.97	3.26
Carbon tetrachloride	3.48	5.25
Cyclohexane	0.733	0.919
Trichloroethene	1.42	11.3
Heptane	2.86	3.33
Toluene	11	12.9
2-Hexanone	ND	0.84
Tetrachloroethene	55.4	181
Ethylbenzene	2.44	3.08
p/m-Xylene	8.9	10.9
o-Xylene	2.88	3.45
1,3,5-Trimethylbenzene	0.988	ND
1,2,4-Trimethylbenzene	4.58	2.62

LOCATION	SG-5 (20-21')
SAMPLING DATE	1/8/2020
LAB SAMPLE ID	L2000840-03
Volatile Organics in Air	ug/m3
Dichlorodifluoromethane	2.62
1,3-Butadiene	13.1
Ethanol	10.5
Acetone	59.9
Isopropanol	3.61
Tertiary butyl Alcohol	2.38
Carbon disulfide	31
2-Butanone	8.76
cis-1,2-Dichloroethene	2.45
Chloroform	54.7
Tetrahydrofuran	5.43
n-Hexane	9.13
Benzene	14.6
Carbon tetrachloride	1.43
Cyclohexane	5.47
Trichloroethene	18.3
Heptane	6.48
4-Methyl-2-pentanone	2.09
Toluene	14.7
2-Hexanone	1.05
Tetrachloroethene	174
Ethylbenzene	2.57
p/m-Xylene	8.82
o-Xylene	2.68
1,2,4-Trimethylbenzene	3.89

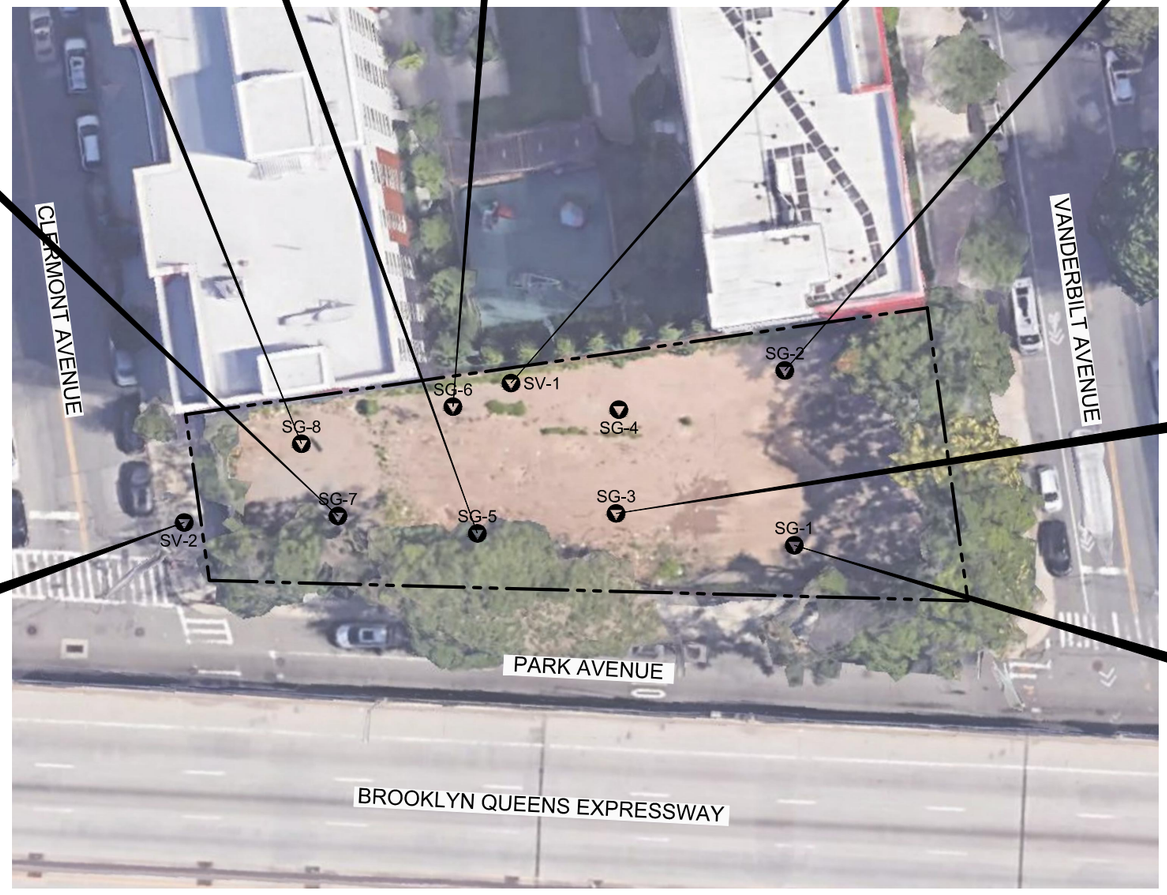
LOCATION	SG-6 (20-21')	SG-6 (20-21') DUP
SAMPLING DATE	1/8/2020	1/8/2020
LAB SAMPLE ID	L2000840-04	L2001065-04
Volatile Organics in Air	ug/m3	
Dichlorodifluoromethane	2.52	3.09
1,3-Butadiene	1.12	0.832
Ethanol	20.9	18.2
Acetone	138	144
Trichlorofluoromethane	1.42	2.11
Isopropanol	4.57	3
Tertiary butyl Alcohol	4.61	4.79
Carbon disulfide	1.82	1.4
2-Butanone	5.96	5.19
Chloroform	11.5	15.9
Tetrahydrofuran	6.31	4.78
n-Hexane	4.05	2.66
1,1,1-Trichloroethane	ND	1.12
Benzene	2.42	1.84
Carbon tetrachloride	ND	1.39
Cyclohexane	0.833	ND
Trichloroethene	8.6	11.4
2,2,4-Trimethylpentane	1.18	ND
Heptane	2.48	1.84
Toluene	11.4	8.89
Tetrachloroethene	88.8	209
Ethylbenzene	1.82	2.22
p/m-Xylene	6.25	7.38
o-Xylene	2.07	2.21
1,2,4-Trimethylbenzene	4.61	3.07
1,3-Dichlorobenzene	1.73	1.88

LOCATION	SV-1	DUP-1
SAMPLING DATE	6/15/2021	6/15/2021
LAB SAMPLE ID	L2132447-01	L2132447-02
Volatile Organics in Air	ug/m3	
Dichlorodifluoromethane	5.04	2.27
Chloromethane	1.88	0.818
1,3-Butadiene	2.48	1.36
Ethanol	243	116
Acetone	119	123
Trichlorofluoromethane	1.53	1.62
Isopropanol	7.28	5.33
Tertiary butyl Alcohol	110	90.3
Carbon disulfide	1.4	0.856
2-Butanone	16.2	14.2
Chloroform	6.93	8.11
Tetrahydrofuran	4.1	2.92
n-Hexane	11.8	5.32
Benzene	4.25	2.46
Cyclohexane	12.7	3.75
Trichloroethene	5.8	8.06
2,2,4-Trimethylpentane	2.26	1.06
Heptane	9.84	6.52
4-Methyl-2-pentanone	3.05	2.19
Toluene	18.8	11.2
Tetrachloroethene	102	180
Chlorobenzene	0.949	0.972
Ethylbenzene	2.62	2.4
p/m-Xylene	8.25	6.34
o-Xylene	4.56	3.08
1,3,5-Trimethylbenzene	1.61	1.02
1,3-Dichlorobenzene	10.7	16.1

LOCATION	SG-2 (5-6')	SG-2 (20-21')
SAMPLING DATE	1/8/2020	1/9/2020
LAB SAMPLE ID	L2000840-01	L2001065-02
Volatile Organics in Air	ug/m3	
Dichlorodifluoromethane	1.65	2.24
1,3-Butadiene	ND	0.794
Ethanol	ND	9.93
Acetone	62	161
Trichlorofluoromethane	ND	1.69
Isopropanol	3.07	2.16
Tertiary butyl Alcohol	ND	3.55
Methylene chloride	1.8	ND
Carbon disulfide	ND	1.14
2-Butanone	3.13	3.86
Chloroform	ND	3.22
Tetrahydrofuran	4.36	3.51
n-Hexane	1.6	3.45
Benzene	1.11	2.06
Trichloroethene	ND	1.6
Heptane	1.08	2.03
Toluene	7.99	7.99
Tetrachloroethene	25.1	41.8
Ethylbenzene	1.84	1.27
p/m-Xylene	7.43	4.34
o-Xylene	2.42	1.31
1,2,4-Trimethylbenzene	4.51	1.9

LOCATION	SG-7 (20-21')
SAMPLING DATE	1/8/2020
LAB SAMPLE ID	L2000840-05
Volatile Organics in Air	ug/m3
Dichlorodifluoromethane	1.93
1,3-Butadiene	1.05
Acetone	105
Trichlorofluoromethane	1.2
Isopropanol	3.24
Carbon disulfide	1.82
2-Butanone	6.43
Chloroform	133
Tetrahydrofuran	5.22
n-Hexane	3.48
1,1,1-Trichloroethane	1.37
Benzene	2.58
Carbon tetrachloride	2.07
Cyclohexane	1.1
Bromodichloromethane	1.45
Trichloroethene	12.6
2,2,4-Trimethylpentane	1.02
Heptane	2.7
Toluene	15.4
Tetrachloroethene	134
Ethylbenzene	3.65
p/m-Xylene	11.6
o-Xylene	3.71
1,2,4-Trimethylbenzene	4.53

LOCATION	SV-2
SAMPLING DATE	6/15/2021
LAB SAMPLE ID	L2133448-02
Volatile Organics in Air	ug/m3
Dichlorodifluoromethane	1.9
Chloromethane	0.415
1,3-Butadiene	1.84
Ethanol	146
Acetone	70.3
Trichlorofluoromethane	70.3
Isopropanol	3.29
Tertiary butyl Alcohol	72.1
Carbon disulfide	1.46
2-Butanone	9.2
Chloroform	227
Tetrahydrofuran	2.91
n-Hexane	78.2
1,1,1-Trichloroethane	1.21
Benzene	5.65
Cyclohexane	5.13
Trichloroethene	5.54
Heptane	13.3
4-Methyl-2-pentanone	2.96
Toluene	12.2
Tetrachloroethene	119
Ethylbenzene	3.51
p/m-Xylene	8.43
1,3,5-Trimethylbenzene	1.44
1,2,4-Trimethylbenzene	6.54
1,3-Dichlorobenzene	14.3



LOCATION	SG-3 (20-21')
SAMPLING DATE	1/8/2020
LAB SAMPLE ID	L2000840-02
Volatile Organics in Air	Result
Dichlorodifluoromethane	2.13
1,3-Butadiene	5.75
Acetone	76.7
Isopropanol	2.14
Carbon disulfide	10.3
2-Butanone	4.6
cis-1,2-Dichloroethene	1.8
Chloroform	58.6
Tetrahydrofuran	5.99
n-Hexane	6.45
1,1,1-Trichloroethane	3.13
Benzene	6.01
Carbon tetrachloride	2.56
Cyclohexane	1.42
Trichloroethene	23.8
Heptane	3.78
Toluene	15.9
Tetrachloroethene	182
Ethylbenzene	3.25
p/m-Xylene	11.4
o-Xylene	3.51
1,2,4-Trimethylbenzene	4

LOCATION	SG-1 (20-21')
SAMPLING DATE	1/9/2020
LAB SAMPLE ID	L2001065-01
Volatile Organics in Air	ug/m3
Dichlorodifluoromethane	2.38
1,3-Butadiene	1.72
Acetone	94.8
Trichlorofluoromethane	1.43
Carbon disulfide	2.11
2-Butanone	2.88
Chloroform	33.2
Tetrahydrofuran	2.85
n-Hexane	3.7
Benzene	2.3
Cyclohexane	0.812
Trichloroethene	9.46
Heptane	2.25
Toluene	10.2
Tetrachloroethene	113
Ethylbenzene	2.02
p/m-Xylene	6.73
o-Xylene	1.95
1,2,4-Trimethylbenzene	1.47

LEGEND:

- SITE BOUNDARY
- SOIL VAPOR IMPLANT LOCATION
- ND — INDICATES COMPOUND ANALYZED FOR BUT NOT DETECTED
- BOLD — COMPOUND DETECTED IN SAMPLE
- ug/m3 — MICROGRAM PER CUBIC METER OR AIR

NOTES:

1. BASE MAP DEVELOPED FROM 2019 GOOGLE EARTH PROFESSIONAL WITH AN IMAGERY DATE OF 6/15/2018.

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0 20' 40' 80'

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

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205 PARK AVENUE
BROOKLYN, NEW YORK

SOIL GAS ANALYTICAL RESULTS SUMMARY

PREPARED BY:
GZA GeoEnvironmental of NY
Engineers and Scientists
www.gza.com

PREPARED FOR:
462 LEXINGTON, LLC.

PROJ MGR: ZS	REVIEWED BY: ZS	CHECKED BY: DW	FIGURE 7
DESIGNED BY: ZS	DRAWN BY: MT	SCALE: 1" = 40'	
DATE: AUGUST 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

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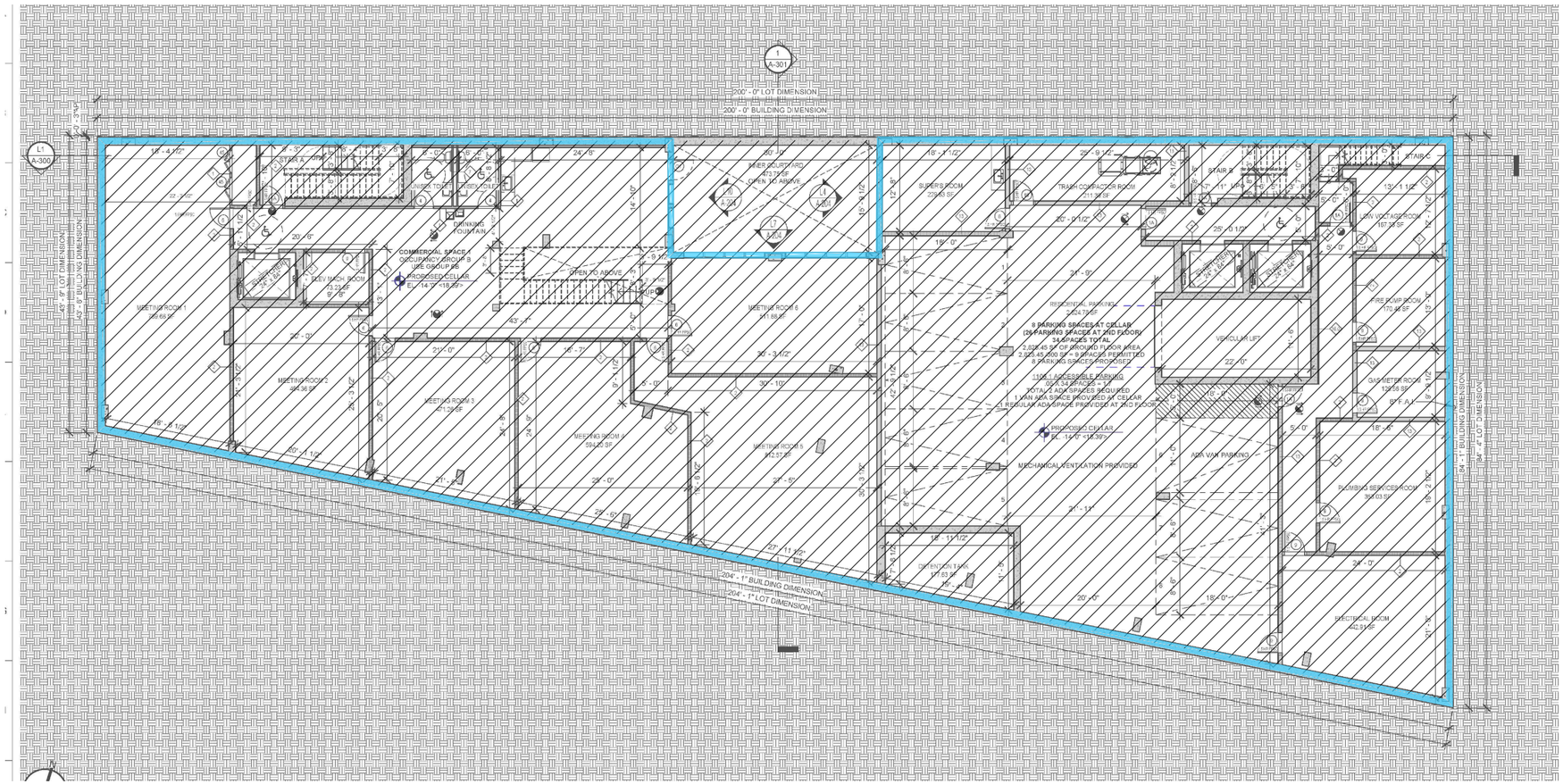

LEGEND:

EXTENT OF ENGINEERING CONTROLS: HORIZONTAL VAPOR BARRIER SYSTEM AND SUB-SLAB DEPRESSURIZATION SYSTEM

EXTENT OF INSTITUTIONAL CONTROLS

NOTES:

1. THE BASE MAP WAS DEVELOPED FROM AN ELECTRONIC FILE PROVIDED BY: J FRANKL C MALLEA ASSOCIATES ARCHITECTS & ENGINEERS, ENTITLED: PROPOSED CELLAR PLAN, DATED: 10/24/2019, ORIGINAL SCALE: ⅛" = 1', DRAWING NUMBER: A-100.00.

2. A PASSIVE SUB-SLAB DEPRESSURIZATION SYSTEM IS DESIGNED FOR THE SITE. THE SUB-SLAB DEPRESSURIZATION SYSTEM WILL BE ACTIVATED AND CONSIDERED AN ENGINEERING CONTROL IF VAPOR INTRUSION INVESTIGATION WARRANTS ITS USE.

3. TYPICAL FOUNDATION SLAB DETAIL IS SHOWN ON FIGURE 9.

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SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

ERNEST R. HANNA

STATE OF NEW YORK ERNEST ROYAL HANNA No. 65440 LICENSED PROFESSIONAL ENGINEER

NY PROFESSIONAL ENGINEER
LICENSE #: 065440

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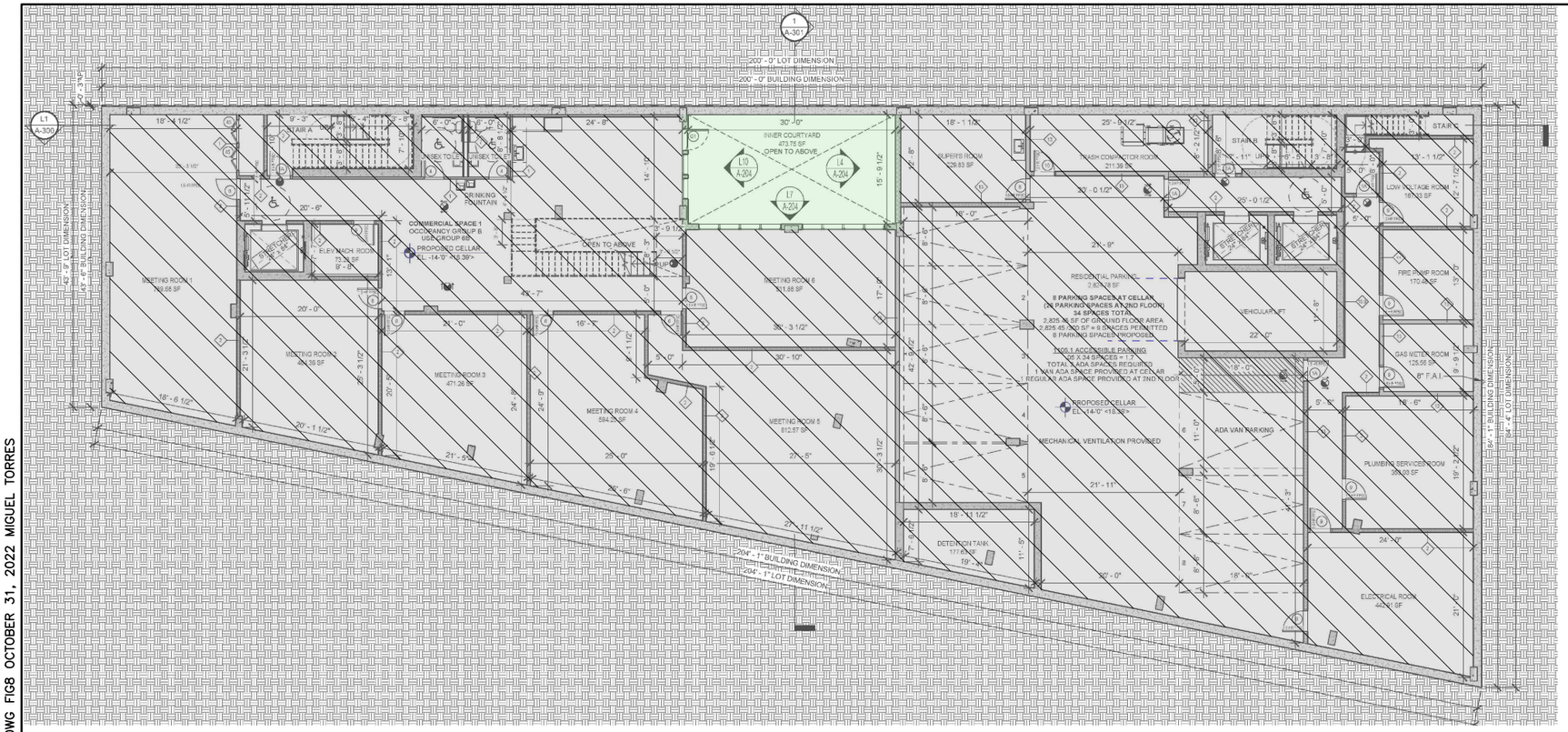
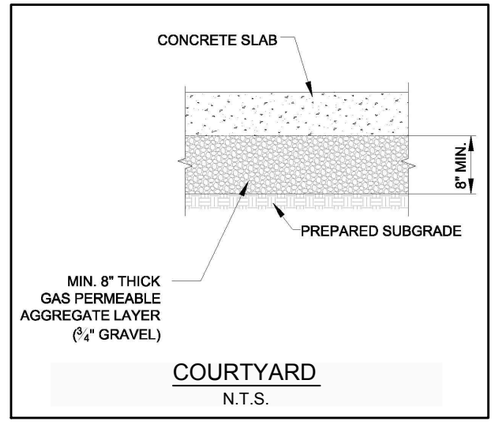
BROOKLYN, NEW YORK

INSTITUTIONAL AND ENGINEERING CONTROL BOUNDARIES

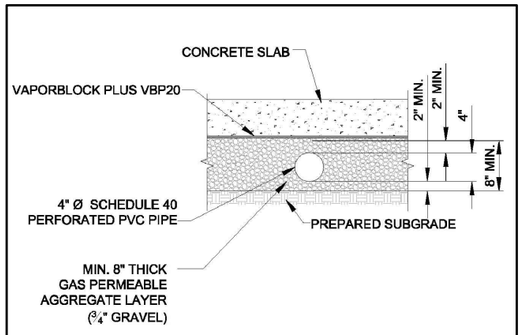
PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		462 LEXINGTON, LLC.	
PROJ MGR: ZS	REVIEWED BY: ZS	CHECKED BY: DW	FIGURE
DESIGNED BY: ZS	DRAWN BY: MT/JB	SCALE: 1" = 20'	8
DATE: AUGUST 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2020 – GZA GeoEnvironmental, Inc. GZA–J:\76800'S\12.0076834.00\FIGURES\CAD\RAWP\76834.10.F8.DWG F8 – IC_EC OCTOBER 31, 2022 MIGUEL TORRES

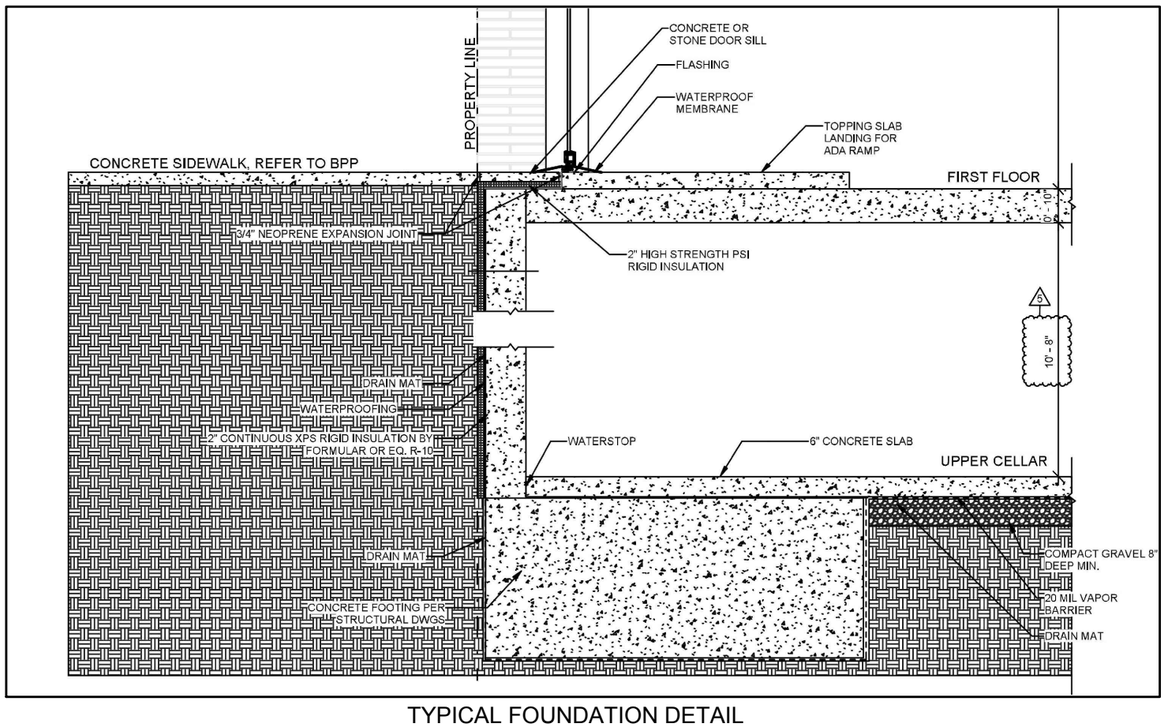




COURTYARD
N.T.S.



TYPICAL SUB-SLAB LOOP PIPING DETAIL
N.T.S.



TYPICAL FOUNDATION DETAIL

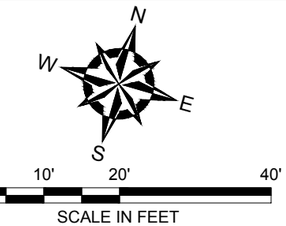
LEGEND:

FOUNDATION SLAB CONSISTING OF A COMPOSITE FOUNDATION SLAB LAYER AND A VAPOR BARRIER LAYER

CONCRETE SLAB (INNER COURTYARD)

NOTES:

1. THE BASE MAP WAS DEVELOPED FROM AN ELECTRONIC FILE PROVIDED BY: J FRANKL C MALLEA ASSOCIATES ARCHITECTS & ENGINEERS, ENTITLED: PROPOSED CELLAR PLAN, DATED: 10/24/2019, ORIGINAL SCALE: ⅛" = 1', DRAWING NUMBER: A-100.00.



SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

ERNEST R. HANNA

STATE OF NEW YORK
ERNEST ROYAL HANNA
LICENSED
No. 65440
PROFESSIONAL ENGINEER

NY PROFESSIONAL ENGINEER
LICENSE #: 065440

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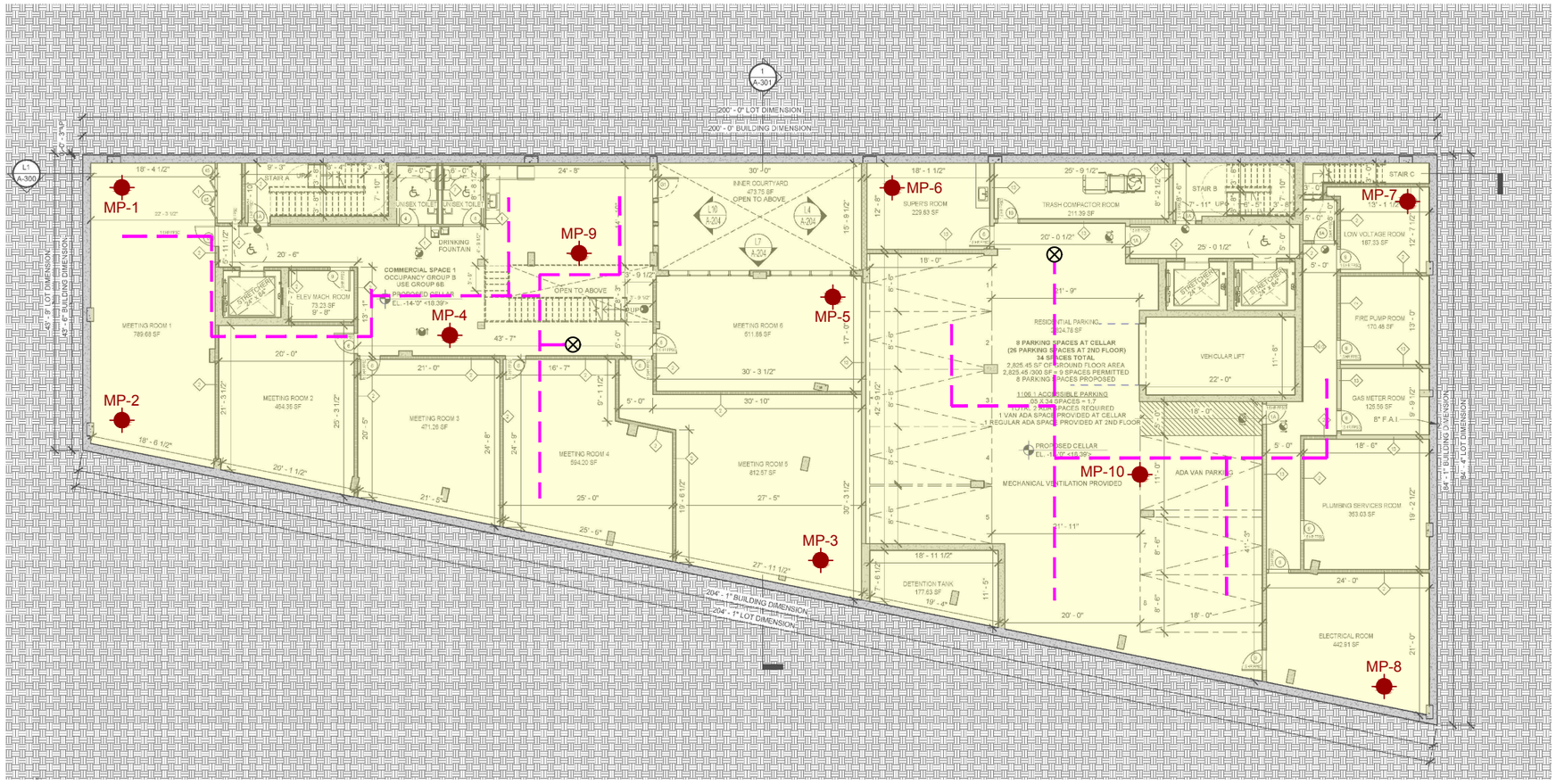
205 PARK AVENUE
BROOKLYN, NEW YORK

EXTENT OF FOUNDATION SLAB AND FOUNDATION SLAB CROSS-SECTION

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		462 LEXINGTON, LLC.	
PROJ MGR: ZS	REVIEWED BY: LD	CHECKED BY: DW	FIGURE 9
DESIGNED BY: LD	DRAWN BY: MT	SCALE: 1" = 20'	
DATE: SEPT. 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2020 – GZA GeoEnvironmental, Inc. GZA–J:\76800'S\12.0076834.00\FIGURES\CAD\FER\76834.10.F8.DWG FIG8 OCTOBER 31, 2022 MIGUEL TORRES



LEGEND:

- VAPOR BARRIER EXTENT
- 4-INCH SCH. 40 PERFORATED PVC VENT PIPING
- 4" CAST IRON RISER TO ROOF -
- APPROXIMATE MONITORING POINT

NOTES:

1. THE BASE MAP WAS DEVELOPED FROM AN ELECTRONIC FILE PROVIDED BY: J FRANKL C MALLEA ASSOCIATES ARCHITECTS & ENGINEERS, ENTITLED: PROPOSED CELLAR PLAN, DATED: 10/24/2019, ORIGINAL SCALE: ⅛" = 1', DRAWING NUMBER: A-100.00.

N W E S

0 10' 20' 40'

SCALE IN FEET

NO.	ISSUE/DESCRIPTION	BY	DATE

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ERNEST R. HANNA

STATE OF NEW YORK
ERNEST ROYAL HANNA
No. 065440
LICENSED PROFESSIONAL ENGINEER

NY PROFESSIONAL ENGINEER
LICENSE #: 065440

205 PARK AVENUE
BROOKLYN, NEW YORK

SUB-SLAB DEPRESSURIZATIONSYSTEM AND LINER SYSTEM PLAN

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental of NY Engineers and Scientists www.gza.com		462 LEXINGTON, LLC.	
PROJ MGR: ZS	REVIEWED BY: LD	CHECKED BY: DW	FIGURE 10
DESIGNED BY: LD	DRAWN BY: MT	SCALE: 1" = 20'	
DATE: OCTOBER 2022	PROJECT NO. 12.0076834.10	REVISION NO.	SHEET NO.

©2020 – GZA GeoEnvironmental, Inc. GZA–J:\76800'S\12.0076834.00\FIGURES\CAD\FER\76834.10.F10.DWG FIG7 OCTOBER 31, 2022 MIGUEL TORRES

APPENDIX A – LIST OF SITE CONTACTS

APPENDIX B – EXCAVATION WORK PLAN (EWP)

B-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's foundation Slab, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table B-1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix A.

Table B-1: Notifications*

Rafi Alam Project Manager, NYSDEC	Phone: (581) 402-8606 Email: Rafi.Alam@dec.ny.gov
Heidi Dudek, PE Project Manager's Supervisor, NYSDEC	Phone: (518) 402-0193 Email: heidi.dudek@dec.ny.gov

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

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the foundation, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work;

- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix F of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP.

B-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the foundation slab. A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a NYS licensed/registered PE will perform the screening. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

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

B-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales or sediment socks, as appropriate, will be used as needed near catch basins, surface waters and other discharge points.

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

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

B-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a NYS licensed/registered PE will oversee all invasive work and the excavation and load-out of all excavated material.

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

The presence of utilities and easements on the site will be investigated by either the qualified environmental professional, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a NYS licensed/registered PE. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

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

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

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

B-5 MATERIALS TRANSPORT OFF-SITE

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

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes are shown in Figure B-1. All trucks loaded with site materials from depths greater than 15 ft. bgs will exit the vicinity of the Site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport;

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

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

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

B-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC project manager approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility). Actual disposal quantities and

associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

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

B-7 MATERIALS REUSE ON-SITE

The qualified environmental professional as defined in 6 NYCRR part 375, or a PE who is licensed and registered in New York State, or a qualified person who directly reports to a NYS licensed/registered PE will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e. contaminated) does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

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

B-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed off-site at a permitted facility in accordance with applicable local, State, and Federal regulations. Dewatering,

purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

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

B-9 FOUNDATION SLAB RESTORATION

After the completion of soil removal and any other invasive activities, the foundation slab will be restored in a manner that complies with the Decision Document. The existing foundation slab is comprised of a six-inch thick concrete slab and a minimum 8-inch thick, clean granular sub-base was installed on this site. Figure 9 presents the location of the foundation slab and typical foundation slab details and applicable demarcation layers. If the type of foundation slab changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

B-10 BACKFILL FROM OFF-SITE SOURCES

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

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

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table B-2. Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Solid waste will not be imported onto the site.

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

B-11 STORMWATER POLLUTION PREVENTION

Silt fences, silt socks, and/or hay bales will be installed, as needed, and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the erosion and sediment controls functional.

All undercutting or erosion of the erosion and sediment controls shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing erosion and sediment controls damaged due to weathering or other reason.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible,

they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing, silt socks and/or hay bales will be installed around the entire perimeter of the construction area.

B-12 EXCAVATION CONTINGENCY PLAN

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

B-13 COMMUNITY AIR MONITORING PLAN

Real-time air monitoring for VOCs and particulate levels at the perimeter of the work area will be performed during excavation to depths greater than 15 ft. bgs. All curing/intrusive work will be performed using wet methods to prevent the release of dust. Continuous air monitoring will be performed during ground intrusive activities and during the handling of contaminated or potentially contaminated media.

A figure showing the location of air sampling stations based on generally prevailing wind conditions is shown in Figure B-2. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

B-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will include limiting the area of open excavations. If nuisance odors are identified at the site boundary, or if odor

complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

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

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

B-15 DUST CONTROL PLAN

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

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

- Dust suppression will be achieved using a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of

spraying water directly onto off-road areas including excavations and stockpiles.

- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

B-16 OTHER NUISANCES

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

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

APPENDIX C
RESPONSIBILITIES of
OWNER and REMEDIAL PARTY

Responsibilities

The responsibilities for implementing the Site Management Plan ("SMP") for the 205 Park Avenue site (the "site"), number C224319, are divided between the site owner and a Remedial Party, as defined below. The owner is currently listed as:

462 Lexington LLC, 89 Bartlett St. Brooklyn, NY 11206 (the "owner").

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

462 Lexington LLC, 89 Bartlett St. Brooklyn, NY 11206.

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

Site Owner's Responsibilities:

1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.

2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in an Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.

3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.

4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.

5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. If damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3 - Notifications.

6) If some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3 - Notifications and coordinate the performance of necessary corrective actions with the RP.

7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part 375 contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A change of use includes, but is not limited to, any activity that may increase direct human or environmental exposure (e.g., day care, school or park). A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html.

8) Until such time as the NYSDEC deems the vapor mitigation system unnecessary, the owner shall operate the system, pay for the utilities for the system's operation, and report any maintenance issues to the RP and the NYSDEC.

9) In accordance with the tenant notification law, within 15 days of receipt, the owner must supply a copy of any vapor intrusion data, that is produced with respect to structures and that exceeds NYSDOH or OSHA guidelines on the site, whether produced by the NYSDEC, RP, or owner, to the tenants on the property. The owner must otherwise comply with the tenant and occupant notification provisions of Environmental Conservation Law Article 27, Title 24.

Remedial Party Responsibilities

1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.

2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.

3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.

4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).

5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html .

6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3 - Notifications of the SMP.

7) The RP is responsible for the proper maintenance of any installed vapor intrusion mitigation systems associated with the site, as required in Section 5.0.

8) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

9) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the NYSDEC project manager to discuss the need to update such documents.

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

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

APPENDIX D – ENVIRONMENTAL EASEMENT

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

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RECORDING AND ENDORSEMENT COVER PAGE **PAGE 1 OF 10**

Document ID: 2022120600514001 Document Date: 11-28-2022 Preparation Date: 12-07-2022
Document Type: EASEMENT
Document Page Count: 9

PRESENTER:
TS AGENCY, LLC/ AIS PICK-UP
25 ROBERT PITT DRIVE, SUITE 105
58 VENDERBILT
MONSEY, NY 10952
845-352-8512
TITLESEARCH@TITLESEARCHAGENCY.COM

RETURN TO:
TS AGENCY, LLC/ AIS PICK-UP
25 ROBERT PITT DRIVE, SUITE 105
58 VENDERBILT
MONSEY, NY 10952
845-352-8512
TITLESEARCH@TITLESEARCHAGENCY.COM

PROPERTY DATA

Borough	Block	Lot	Unit	Address
BROOKLYN	2033	50	Entire Lot	205 PARK AVENUE

Property Type: OTHER Easement

CROSS REFERENCE DATA

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

PARTIES

GRANTOR/SELLER:
462 LEXINGTON LLC
89 BARTLETT ST
BROOKLYN, NY 11206

GRANTEE/BUYER:
N.Y.S. DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 BROADWAY
ALBANY, NY 12233

FEES AND TAXES

Mortgage :

Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	82.00
Affidavit Fee:	$	0.00

Filing Fee: $ 100.00

NYC Real Property Transfer Tax: $ 0.00

NYS Real Estate Transfer Tax: $ 0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK
Recorded/Filed 12-08-2022 17:00
City Register File No.(CRFN): **2022000446085**

City Register Official Signature

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

THIS INDENTURE made this 28th day of November, 2022 between Owner, 462 Lexington LLC, having an office at 89 Bartlett Street, Brooklyn, New York 11206 (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

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

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

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

WHEREAS, Grantor, is the owner of real property located at the address of 205 Park Avenue in the City of New York, County of Kings and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 2033 Lot 50, being the same as that property conveyed to Grantor by deed dated February 26, 2007 and recorded in the City Register of the City of New York as CRFN #2007000288509. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.294 +/- acres, and is hereinafter more fully described in the Land Title Survey dated June 16, 2022 prepared by Vincent Teutonico, L.S. of City Mapping, Inc., which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

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

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C224319-05-21, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

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

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

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

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

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

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

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

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

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

(7) All future activities on the property that will disturb remaining

contaminated material must be conducted in accordance with the SMP;

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

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

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

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

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

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

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

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

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

Law.

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

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

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

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

(i) are in-place;

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

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

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

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

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

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

(7) the information presented is accurate and complete.

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

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

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

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

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against

the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

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

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

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

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

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

Parties shall address correspondence to:	Site Number: C224319 Office of General Counsel NYSDEC 625 Broadway Albany New York 12233-5500
With a copy to:	Site Control Section Division of Environmental Remediation NYSDEC 625 Broadway Albany, NY 12233

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

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the

recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

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

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

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

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

Remainder of Page Intentionally Left Blank

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

462 Lexington LLC:

By: _____

Print Name: Brucky LeHrawk

Title: CWNR Date: 10/19/22

Grantor's Acknowledgment

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

On the 19 day of October, in the year 20 22 before me, the undersigned, personally appeared Brucky LeHrawk, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

_____
Notary Public - State of New York

TZIREL BLUM
NOTARY PUBLIC, State of New York
No. 01BL6139819
Qualified in Kings County
Commission Expires January 17 20 26

Tzirel Blum
No. 01BL6139819
Expires 1/17/2026

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

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

Grantee's Acknowledgment

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

On the 17th day of November, in the year 2022, before me, the undersigned, personally appeared Andrew O. Guglielmi, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

JENNIFER ANDALORO
Notary Public, State of New York
No. 02AN6098246
Qualified in Albany County
Commission Expires January 14, 2024

SCHEDULE "A" PROPERTY DESCRIPTION

All that certain Lot, piece or parcel of land, with the buildings and improvements thereon erected, situate, lying and being in the Borough of Brooklyn, County of Kings, State of New York:

BEGINNING at the corner formed by the intersection of the southerly side of Flushing Avenue and the easterly side of Clermont Avenue;

RUNNING THENCE southerly along the easterly side of Clermont Avenue 531.37 feet to the point and place of beginning of the herein described parcel;

RUNNING THENCE southerly and continuing along the easterly side of Clermont Avenue 43.75 feet to the corner formed by the intersection of the easterly side of Clermont Avenue and the northerly side of Park Avenue;

THENCE easterly along the northerly side of Park Avenue 204.08 feet to the corner formed by the northerly side of Park Avenue and the westerly side of Vanderbilt Avenue;

THENCE northerly along the westerly side of Vanderbilt Avenue 84.33 feet to a point;

THENCE westerly 200.00 feet to the point and place of BEGINNING.

Said parcel containing 12,807.9 square feet or 0.294 acres.

APPENDIX E – FIELD SAMPLING PLAN/ QUALITY ASSURANCE PROJECT PLAN

Known for excellence.
Built on trust.

QUALITY ASSURANCE PROJECT PLAN

205 Park Avenue
Block 2033, Lot 50
Brooklyn, New York

October 17, 2022
File No. 12.0076834.10

PREPARED FOR:
462 Lexington Avenue, LLC
89 Bartlett Street, Brooklyn, NY 11206

PREPARED FOR:
Goldberg Zoino Associates of New York, P.C. d/b/a GZA GeoEnvironmental of New York
104 West 29th Street, 10th Floor
New York, New York 10001

31 Offices Nationwide
www.gza.com

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1.0 INTRODUCTION

GZA GeoEnvironmental of New York (GZA) has developed this Quality Assurance Project Plan (QAPP) to establish the procedures for sample collection, analysis and quality assurance for the Remedial Investigation (RI) to be performed at 205 Park Avenue, Brooklyn, New York (the Site). Sampling and analytical activities will be conducted in accordance with this QAPP, and the applicable requirements of the New York State Department of Environmental Conservation (NYSDEC).

1.1 PROJECT SCOPE

This QAPP describes field, analytical, and reporting standard operating procedures (SOPs) that will be utilized during the RI. The information and data collected will be utilized to assess the environmental conditions at the Site. These procedures generally apply to the following activities:

- Soil boring advancement
- Soil sample collection
- Groundwater monitoring well installation
- Monitor well gauging and sampling
- Soil gas sampling
- Laboratory analysis
- Report preparation

1.2 PROJECT OBJECTIVES

This QAPP was prepared to ensure that field sampling procedures, selected analytical methods, and chemical analytical data are of sufficient quality to meet the intended usage. As specific conditions and additional information warrant, this QAPP may be amended or revised to include Site-specific quality assurance/quality control (QA/QC) procedures. The information/data collected during the RI will be used to assist in the further delineation of known Site contamination and to evaluate the potential impact of areas of concern not previously investigated.

1.3 SAMPLE DESIGN AND RATIONALE

The RI sampling program has been designed to evaluate soil, soil gas, and groundwater conditions of the Site prior to redevelopment.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

A description of specific roles and responsibilities is provided below.

The Project Manager will be responsible for:

- Initiating project activities;
- Identifying project staff, equipment, and other resource requirements;

- Interfacing with client concerning technical matters and project progress;
- Monitoring task activities, and adjusting efforts or resources, as required to help ensure that established quality objectives are maintained;
- Internal project administration; and
- Oversight of report preparation.

The Field Team Leader/Site Supervisor will be responsible for:

- Supervising the technical performance of the project staff and field subcontractors;
- Ensuring compliance with the work plan;
- Coordinating data validation and quality assurance;
- Report preparation; and
- Working with the Project Manager in coordinating overall project quality assurance including preparation of work plans and review of data.

The field team will be comprised of various members of GZA staff based on their availability.

The Health and Safety Coordinator will be responsible for working with the Project Manager and Field Team Leader/Site Supervisor in formulation of a Site-specific Health and Safety Plan.

Quality Assurance will be accomplished through the GZA Consultant Reviewer project review process.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

3.1 DATA QUALITY PROTOCOLS

New York State Department of Health Environmental Laboratory Accreditation Program (ELAP)-certified laboratories will provide analytical services for the Monitoring program. Groundwater and soil samples will be analyzed for one or more compound classes using the following analytical methods:

- TCL Volatile Organic Compounds (VOCs) by EPA Method 8260C/D
- Semi-Volatile Organic Compounds (SVOCs) by EPA Method 8270D
- TAL Metals by EPA Method 6010D
- Pesticides by EPA Method 8081B
- Polychlorinated Biphenyls (PCBs) by EPA Method 8082A
- 1,4-Dioxane by EPA Method 8270D
- Perfluorinated Alkyl Acids by EPA Method 537
- Soil gas samples will be analyzed for VOCs via EPA Method TO-15
-

Sample containers, preservation, holding times and volumes will be in accordance with the particular EPA method.

3.2 ACCURACY

Accuracy is defined as the degree of agreement of a measurement or average of measurements with an accepted reference or true value. Accuracy will be evaluated by use of calibration and calibration verification procedures, laboratory control samples, and surrogate, matrix, and analytical spikes at the frequencies specified in **Section 4.5.** Not all accuracy checks are incorporated into each analytical method. Accuracy is defined as the degree of agreement of a measurement or average of measurements with an accepted reference or true value. Accuracy will be evaluated by use of calibration and calibration verification procedures, laboratory control samples, and surrogate, matrix, and analytical spikes at the frequencies specified in **Section 4.5**. Not all accuracy checks are incorporated into each analytical method.

3.3 PRECISION

Precision is defined as a measure of mutual agreement among individual measurements of the sample property. Precision will be evaluated by the analysis of laboratory and matrix spike duplicate samples at the rate specified in **Section 4.5**. We will also collect 5% duplicate samples in the field for comparison purposes.

3.4 DATA REPRESENTATIVENESS

Samples will be collected in a standardized manner designed to produce representative samples. This QAPP and the RI are designed so that the samples collected will present an accurate representation of actual Site conditions.

3.5 DATA COMPARABILITY

Data comparability will be ensured by control of sample collection methodology, analytical methodology, and data reporting and by the usage of USEPA-approved methodologies. The QAPP and sampling methodologies are designed so that comparability questions are minimized. Standardized sampling techniques and analytical methods will be used to attain stated project objectives. The required level of laboratory deliverables will maximize comparability of analytical results.

3.6 DATA COMPLETENESS

The number of samples to be collected is based on the need for data completeness. Data gaps will be addressed when/if they occur by systematic re-sampling and/or increasing the number of sampling points.

4.0 SAMPLING PROCEDURES

Environmental sampling will include groundwater sampling, soil sampling, and soil gas sampling. Additionally, wastes generated during well installation and development will be sampled and tested for characterization for disposal, as needed. Groundwater samples will be collected using bladder pumps, submersible pumps or bailers. Grab or composite sampling using appropriate hand-held sampling equipment will be the preferred method for waste characterization sampling.

4.1 SOIL SAMPLING (DIRECT PUSH DRILLING)

Sampling will be performed using four or five foot-long acetate sleeves that will be advanced continuously to the desired depth below the surface. Soil samples from each sleeve will be screened using a photoionization detector (PID) calibrated to 100 parts per million (ppm) isobutylene to detect possible organic vapors. Organic vapor screening will be performed by slicing open the acetate sleeve, making a small slice in the soil column with a clean knife or sampling tool, inserting the PID probe and pushing the slice closed, and monitoring the soil for approximately 5 to 10 seconds. This procedure will be repeated at intervals along the soil column at the field geologist's discretion.

The samples will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.) Samples for laboratory analysis will be collected from the six-inch interval most likely to be contaminated, based on PID readings, discoloration, staining, and the field geologist's judgment (field conditions may require a section longer than six inches to make sufficient sample; however this decision will be field-based).

The samples will be collected by cutting the soil in two places with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenized in a decontaminated stainless-steel pan before being placed in the sample bottles. Samples collected for analysis for VOCs and total organic halides will be placed directly into the sample containers without homogenization (as per EPA sampling method 5035A). Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Only clean metal instruments will be allowed to touch the sample. If there is insufficient soil volume in the spoon, then this will be made up by attempting a second direct push sleeve at the same depth, or by using the next immediate sample interval above or below this depth, if appropriate. If there is no recovery, then the sample depth will be skipped, and drilling will progress to the next depth interval.

Soil samples will be collected in laboratory provided containers and transported to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory, under chain-of-custody procedures for analysis. Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at below 4^{o}C.

Details of sampling procedures for the emerging contaminants 1,4-dioxane and per- and poly-fluoroalkyl substances (PFAS) are provided in Attachments A and B.

4.2 SOIL SAMPLING (HOLLOW-STEM AUGER)

Soil samples will be collected utilizing 2-inch-diameter by 2-foot-long split spoon samplers driven ahead of a hollow stem auger. Three-inch-diameter split spoon samplers may also be used. Augers with a minimum inside diameter of 4¼ inches will be used for drilling where wells are proposed. If soil sampling below the groundwater table is required, augers will be equipped with center plugs and/or inert "knock out" plates to control sub-water table sediments from rising inside the auger flights and hampering collection of representative soil samples.

Each split spoon sample will be screened using a PID to detect possible organic vapors. Organic vapor screening will be performed by opening the split spoon, making a small slice in the soil column with a clean knife or sampling tool, inserting the PID probe and pushing the slice closed, and monitoring the soil for approximately 5 to 10 seconds. This procedure will be repeated at intervals along the split spoon soil column at the field geologist's discretion.

The split spoons will be examined for staining, discoloration, odors, and debris indicative of contamination (ash, coal fragments, wood chips, cinders, petroleum staining, etc.). One sample will be collected from the designated six-inch

interval as per the accompanying workplan. Note that due to sample recovery or field conditions, sample intervals other than six inches may be necessary to collect sufficient sample. Additionally, sample intervals other than those designated in the accompanying workplan may be selected based on field conditions.

The samples will be collected by cutting the soil in two places with a decontaminated steel, stainless steel, or aluminum trowel, spoon, or knife and homogenizing in a decontaminated stainless steel pan before being placed in the sample bottles. Samples collected for analysis for VOCs and total organic halides samples will be placed directly into the sample containers without homogenization. Samplers will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Only clean metal instruments will be allowed to touch the sample. If there is no recovery, then the sample depth will be skipped, and drilling will progress to the next sampling interval.

Soil samples will be collected in laboratory provided containers and transported to a NYSDOH ELAP certified laboratory, under proper chain of custody procedures for analysis. Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at below 4°C.

Details of sampling procedures for the emerging contaminants 1,4-dioxane and per- and poly-fluoroalkyl substances (PFAS) are provided in Attachments A and B.

4.3 GROUNDWATER SAMPLING (PERMANENT WELL)

Groundwater sampling of permanent monitoring wells is described according to the following distinct phases of this work: well installation/construction, well development, well purging, and well sampling.

4.3.1 Well Installation/Construction

Groundwater monitoring wells will be constructed of threaded two-inch diameter PVC well casing and 10-slot well screen. Clean silica sand (No. 1 sand) will be placed in the annular space around the well to a minimum of one foot above the top of the well screen, two feet being optimal. Solid PVC riser, attached to the well screen, will extend to grade or above if the well is a stick-up. For a two-inch diameter well, the annular space for the filter pack should be between 2 to 4 inches thick. (The 4 ¼ inside diameter hollow stem augers will be retracted as the filter pack is installed to yield the required annular space.) A two-foot thick bentonite seal will be placed above the sand pack and moistened with potable water for a minimum of 15 minutes before backfilling the remaining space with a cement-bentonite grout. If warranted by depth, filling will be completed using a tremie pipe placed below the surface of the grout. A stick-up or flush-mount protective casing with a locking well cap will be installed and a measuring point marked on each PVC well riser. Soils will be logged utilizing a modified Bermister classification system. Boring logs/well construction diagrams will be prepared for each well.

4.3.2 Well Development

Following installation, the groundwater monitoring wells will be developed using a two-inch diameter submersible pump(s) (or equivalent) until the water is reasonably free of turbidity. Fifty nephelometric turbidity units (NTUs) or less will be the turbidity goal but not an absolute value. The wells will be developed aggressively to remove fines from the formation and sand pack. The wells will be allowed to equilibrate for 14 days prior to sampling. The volume of water removed, the well development time, and field instrument readings will be recorded in the field logbook.

4.3.3 Low-Flow Well Sampling

Upon opening each monitoring well, the headspace will be measured using PID calibrated to 100 ppm isobutylene, and water level measurements will be recorded using an electronic water level meter or oil-water interface probe, as appropriate. The depth to product (if present), depth to water, and the total depth will be measured from the top of the marked PVC casings to an accuracy of 0.01 feet. Before sampling, the wells will be purged utilizing a low-flow submersible stainless-steel pump with dedicated polyethylene tubing connected to a transparent flow cell. Very low purging rates are proposed, on the order of 100 ml/minute to 500 ml/minute, to minimize suspension of particulate matter in the well.

Groundwater from each well will be purged until turbidity, pH, temperature, dissolved oxygen, and specific conductivity have stabilized. As practical, all field measurements will be taken from the flow cell and will be recorded in the field logbook during and after purging, and before sampling.

Purging will be performed with the pump intake placed at the midpoint of the well screen or the midpoint of the water column (to be determined based on the depth and length of the screen interval) to ensure that all stagnant water in the well is removed, while not stirring up sediment that may have accumulated on the bottom of the well. Equipment will be lowered into the well very carefully to prevent suspension of bottom sediment and subsequent entrainment onto sampling equipment. Surging will be avoided. Dedicated tubing will be used for each well. Pumps will be carefully cleaned between wells according to the procedures specified in **Section 4.7.** Ideally, pumping rates will be at a rate so that no drawdown of the groundwater level occurs (i.e., pumping rate is less than recharge rate). During purging, the sampler will actively monitor and track the volume of water purged and the field parameter readings. Data will be recorded in the field logbook or well purge data sheet. Sampling personnel will wear phthalate-free gloves such as nitrile (no latex will be used) and will avoid contact of the gloves with the sample. Only clean instruments will be allowed to touch the sample.

Per- and poly-fluoroalkyl substances (PFAS), if analyzed, are to be sampled first. PFAS are very stable manmade chemicals that have properties that allow them to repel both water and oil. The water repelling properties of these substances allow them to be applied to almost any material to make it water, oil, and stain repellant. These properties were first used commercially in the 1950s, and they are used in a wide variety of consumer products, including carpets, clothing, non-stick pans, paints, polishes, waxes, cleaning products, and food packaging. Firefighters and the military use them in fire-suppressing foam. Based upon its usage it is important to prevent cross-contamination while collecting groundwater samples for PFAS analysis. A detailed sampling procedure is discussed in Attachment B. The PFAS samples should be kept in a separate and dedicated cooler and should not be placed with the other sample containers.

1, 4 Dioxane analysis: Collect groundwater samples and pour it slowly into two of the 250 ml Amber Glass vials with Teflon Lined caps.

The samples will be collected in laboratory prepared sample bottles (pre-preserved, if appropriate), placed in iced coolers, and removed from light immediately after collection. In addition, all sample bottles must be filled to the top so that no aeration of the samples occurs during transport. All bottles will be filled to avoid cascading and aeration of the samples, the goal being to minimize any precipitation of colloidal matter.

4.4 SOIL GAS SAMPLING

4.4.1 Soil Gas Sampling (Direct Push)

A direct-drive rig will be utilized to drive rods with a decontaminated stainless-steel probe through six-mil plastic sheeting to the desired sample depth, which will be approximately 1.5 feet above the capillary fringe. The soil gas probe will then

be purged at a flow rate not greater than 0.2 liters/minute to evacuate one to three volumes using a photoionization detector (PID) with an integrated vacuum pump (PhotoVac 2020 or appropriate alternate). No PID readings will be taken prior to sample collection. Following the stabilization period, each probe will be connected to an evacuated laboratory-supplied SUMMA® canister. SUMMA® canisters are passivated stainless steel vessels that have been cleaned and certified contaminant-free by the contract laboratory. Each SUMMA® canister will be shipped to the sampling site under a high vacuum (30" Hg) to ensure that the canister remains free of contaminants prior to use. After connecting the SUMMA® canister to the soil gas probe, a regulator valve on the canister will be opened and the vacuum will slowly draw the sample into the canister over a period of two hours. The samples will not be drawn at greater than 0.2 liters per minute. Quantitation limits for all analytes range between 1.6 ppbV and 4.0 ppbV, depending on the compound. After collecting the soil gas sample, the valve will be closed and disconnected from the soil gas probe. The soil-gas samples will be shipped overnight to a New York ELAP certified laboratory for TO-15 analysis.

A tracer gas (e.g., helium, butane, or sulfur hexafluoride) will be utilized prior to sample collection to evaluate the potential for infiltration of outdoor air into the sample. Subsequent rounds of soil gas sampling would include the use of tracer gas only if the initial round of sampling indicates that outdoor air has the potential to influence soil gas sample results.

When soil vapor samples are collected, the following conditions that may influence the interpretation of results will be documented:

- Identification of any nearby commercial or industrial buildings that likely uses volatile organic compounds;
- A sketch of the Site, showing streets, neighboring commercial or industrial facilities (with estimated distances to the Site, and soil-gas sampling locations);
- Weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction); and
- Any pertinent observations, such as odors or readings from field instrumentation.

4.5 FIELD DATA COLLECTION

Data to be collected in the field may include:

- Groundwater level and/or free product level measurements via electronic water level indicator, oil/water interface probe, and or pressure-based water level data loggers;
- Pumping rates (calculated based on gallons pumped in a measured time);
- Water quality parameters including temperature, pH, oxidation-reduction potential, dissolved oxygen, specific conductivity, turbidity, etc. via water quality field meter; and,
- Volatile organic compound screening for soils and well headspace via PID.

Field data will be recorded in the field logbook, boring log forms and/or well purge datasheets.

4.6 QC SAMPLE COLLECTION

QC samples may include equipment rinsate/field blanks, trip blanks, sample duplicates and matrix spike/matrix spike duplicates (MS/MSDs).

Equipment Rinsate/Field Blanks will be used to check for potential contamination from ambient air and/or field sampling equipment. Equipment rinsate/field blanks will be collected in the field by pouring laboratory-supplied deionized water over/through decontaminated sampling equipment prior to sample collection. Equipment rinsate/field blanks will be submitted to the laboratory at a frequency of one per 20 soil samples. For groundwater samples, an equipment/rinsate blank will be collected for each sampling day when more than one groundwater sample is collected. Equipment rinsate/field blank analytical parameters will match sample analytical parameters. Equipment rinsate/field blanks will not be collected for samples associated with waste disposal.

Trip Blanks will be used to assess the potential for volatile organic compound contamination of groundwater samples due to contaminant migration during sample shipment and storage. Trip blanks will consist of laboratory-supplied deionized water. Trip blanks are never opened and travel to and from the Site with the empty and full sample bottles. Trip blanks are stored with the investigative samples and kept closed until analyzed by the laboratory. Trip blanks will be submitted to the laboratory at a frequency of one per cooler that contains groundwater samples for VOC analysis only.

Sample Duplicates are an additional aliquot of the same sample submitted for the same parameters as the original sample. Sample duplicates will be used to assess sampling and analytical reproducibility. Duplicate samples consist of an actual sample taken in the field that has been split into two identical aliquots and put into two separate sampling containers. Each duplicate of a soil sample (except for the VOC fraction) will be homogenized in a dedicated stainless-steel pan prior to alternately filling the sample containers. The volatile fraction for soils will be collected directly from the sampling device without homogenization. Sample duplicates will be analyzed as two separate samples and submitted at a frequency of one per 20 samples for all matrices and all parameters with the exception of parameters collected for waste characterization purposes.

MSs and MSDs are two additional aliquots of the same sample submitted for the same parameters as the original sample. However, the additional aliquots are spiked with the compounds of concern. Matrix spikes provide information about the effect of the sample matrix on the measurement methodology. MS/MSDs samples will be selected by the laboratory at a frequency of one per 20 investigative samples per matrix for organic parameters. MSs will be submitted at a frequency of one per 20 investigative samples per matrix for inorganic parameters.

4.7 SAMPLE PRESERVATION AND CONTAINERIZATION

The analytical laboratory will supply the sample containers for the applicable samples. These containers will be cleaned by the manufacturer to meet or exceed all analyte specifications established in the latest U.S. EPA's *Specifications and Guidance for Contaminant-Free Sample Containers*. The containers will be pre-preserved, as required by the analytical method.

4.8 EQUIPMENT DECONTAMINATION

Re-usable Teflon®, Stainless steel, and aluminum sampling equipment will be cleaned between each use in the following manner:

- Wash/scrub with a biodegradable degreaser ("Simple Green") if there is oily residue on equipment surface;
- Tap water rinse;
- Wash and scrub with Alconox and water mixture;
- Tap water rinse;

- 10 percent HNO_3 rinse for non-dedicated, stainless steel groundwater sampling equipment for metals analysis only (excludes submersible pump and flow cell) and 1 percent HNO_3 rinse for non-dedicated, non-stainless steel equipment;
- Hexane rinse (optional, only if required to remove heavy petroleum coating);
- Distilled/deionized water rinse; and,
- Air dry.

Cleaned equipment will be wrapped in aluminum foil if not used immediately after air-drying.

Groundwater sampling pumps (whale pumps) will be cleaned by washing and scrubbing with an Alconox/water mixture, rinsing with tap water and irrigating with distilled/deionized water.

Bladder pumps will utilize dedicated bladders, o-rings, and grab plates. Bladder pumps will be cleaned by taking apart the pump and washing and scrubbing with an Alconox/water mixture, rinsing with tap water and irrigating with distilled/deionized water. Once the pump is clean, new dedicated parts (bladder, o-rings, and grab plate) will be installed.

Disposable, dedicated equipment (e.g. bailers, tubing, etc.) will be used to the extent feasible.

5.0 DOCUMENTATION AND CHAIN-OF-CUSTODY

5.1 SAMPLE COLLECTION DOCUMENTATION

5.1.1 Field Data Documentation/Field Logs

A system of logging pertinent data collected during sampling operations will be maintained using bound field logbooks. Each page will be numbered, dated, and initialed or signed by the person making the entry. Entries will be made in ink. Errors will be crossed out with a single line, initialed, and dated. At the completion of the day, if a page is not complete, a diagonal line will be drawn through the remainder of the page with the signature at the bottom.

Sample locations will be recorded and referenced to the Site map so that each location is permanently established. Samples will be tagged or labeled with pertinent Site information at the time of sampling. **Section 5.1.3** describes sample identification. Pertinent Site information to be supplied in the field log for each task is listed below:

- Initials or Signature of note taker
- Name and location of investigation
- Date and time of arrival and departure
- Names of all personnel on-Site and their affiliation
- Purpose of the visit
- Field instruments used, date and time of calibration and calibration checks, method of calibration, standards used
- Field measurement results
- Date, time, and location of all sampling points

- Method of sample collection
- Factors that could affect sample integrity
- Name of sampler(s)
- Sample identification and sample description
- Documentation of conversations with the client, regulatory personnel, field decisions, and approval
- Sample locations intervals
- Weather conditions
- Inventory of drum contents and storage location for each drum of waste material generated.

Field notebooks should contain only factual information entered as real-time notes, which will enable the user to recreate events on-Site. Drilling/boring logs and monitoring well construction details will be recorded in the field notebook and/or on a separate boring log/well construction form for each boring/monitoring well. Soil descriptions will be based on a modified Burmister soil classification system, where minor components and relative soil density will not be specified. Strata not sampled will be so indicated. Groundwater sampling field data will be recorded in the field notebook and/or on separate purge data sheet for each monitoring well sampled.

5.1.2 Chain-of-Custody Records

Sample custody is discussed in detail in **Sections 5.1.4 through 5.1.6** of this Plan. Chain-of-custody records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signature(s) of sampler(s); (3) the sample number, date and time of collection, and whether the sample is grab or composite; and (4) if applicable, air bill or other shipping number. Sample receipt and log-in procedures at the laboratory are described in **Section 5.1.6** of this Plan.

Samples will be transferred to the custody of the respective laboratories via third-party commercial carriers or via laboratory courier service within timeframes required by NJDEP field sampling procedures.

5.1.3 Sample Labeling

Immediately upon collection, each sample will be labeled with an adhesive label, which includes the date and time of collection, sampler's initials, tests to be performed, preservative (if applicable), and a unique identifier. The following identification scheme will be used:

A. The sample ID number will include the soil, soil gas, sediment, wastewater, or monitoring well location, along with the sample depth, sample interval, and the depth interval at which it was collected.

Example:

Sample P-9(5-5.5') indicates the sample was taken at boring location P-9, from the 6-inch interval in the spoon beginning at 5.0 feet below grade and ending at 5.5 feet below grade.

Duplicate samples will be labeled as blind duplicates by giving them sample numbers indistinguishable from a normal sample.

Blanks should be spelled out and identify the associated matrix, e.g. Field Blank

MS/MSDs will be noted in the Comments column of the COC.

B. The analysis required will be indicated for each sample.

Example: SVOC

C. Date taken will be the date the sample was collected, using the format: MM-DD-YY.

Example: 03-22-12

D. Time will be the time the sample was collected, using military time.

Example: 14:30

E. The sampler's name will be printed in the "Sampled By" section.

F. Other information relevant to the sample.

Example: Equipment Blank

A sample label will contain the following information:

Job No.

Client

Sample Number

Date/Sample Time

Sample Matrix

Grab or Composite (explain)

Preservatives

Analyses

Sampler Signature

An example sample label is presented below:

Job No: XXXXXXXXX

Client: Name

Sample No: OU1-B22(5-5.5')

Matrix: Soil
Date Taken: 3/22/12

Time Taken: 14:30

Sampler: B. Smith

Analysis: SVOC

This sample label contains the authoritative information for the sample. Inconsistencies with other documents will be settled in favor of the vial or container label unless otherwise corrected in writing from the field personnel collecting samples.

5.1.4 Sample Custody

A sample is considered to be under a person's custody if:

- The item is in the actual possession of the person;
- The item is in the view of the person after being in actual possession of the person;
- The item was in the actual physical possession of the person but is locked up to prevent tampering; or,
- The item is in a designated and identified secure area.

5.1.5 Field Custody Procedures

Samples will be collected following the sampling procedures documented in **Section 4.00** of this Plan. Documentation of sample collection is described in **Section 5.1.1** of this Plan. Sample chain-of-custody and packaging procedures are summarized below. These procedures are intended to ensure that the samples will arrive at the laboratory with the chain-of-custody intact.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.
- All bottles will be identified by the use of sample labels with sample numbers, sampling locations, date/time of collection, and type of analysis. The sample labeling system is presented in **Section 5.1.3** of this Plan.
- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample label because the pen would not function in wet weather.
- Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to the analytical laboratory courier, or to/from a secure storage location.
- All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files.
- Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and/or secured to the inside top of each sample box or cooler. If using a

commercial carrier service to ship sample containers to the laboratory, the containers will be secured with strapping tape and custody seals. The custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. The cooler will be strapped shut with strapping tape in at least two locations.

- If the samples are sent by commercial carrier, the air bill will be used. Air bills will be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.

Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory sample custodian or laboratory courier, and signature of the laboratory sample custodian or courier on the chain-of-custody document as receiving the samples and signature of sampler as relinquishing samples.

5.1.6 Laboratory Custody Procedures

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will:

- Examine the shipping containers to verify that the custody tape is intact, if applicable;
- Examine all sample containers for damage;
- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the chain-of-custody records;
- Compare samples received against those listed on the chain-of-custody;
- Verify that sample holding times have not been exceeded;
- Examine all shipping records for accuracy and completeness;
- Determine sample pH (if applicable) and record on chain-of-custody form;
- Sign and date the chain-of-custody immediately (if shipment is accepted) and attach the air bill;
- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the Laboratory Project Manager, who will be responsible for contacting GZA;
- Attach laboratory sample container labels with unique laboratory identification and test; and,
- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field ID provided by field personnel.
- The Laboratory Project Manager will be notified of sample arrival.

The completed chain-of-custody, air bills, and any additional documentation will be placed in the final evidence file.

5.2 SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

No field analyses are anticipated for this program. If site conditions were to warrant field analysis, the responsible contractor will prepare an addendum establishing the field analytical procedures. Analyses of all samples will be performed by NYSDOH ELAP certified laboratories.

5.3 SAMPLE PRESERVATION

5.3.1 Soil Samples

Samples collected for non-VOC analyses will be collected in 4-oz amber glass containers. VOC samples will be collected in 5g EnCore® Samplers. All samples will be placed immediately in the sample cooler to be maintained at 4°C.

5.3.2 Groundwater Samples

Samples collected for non-VOC analyses will be collected in 1000-ml amber glass containers or 250-ml plastic containers. VOC samples will be collected in 40-ml VOA vials. All samples will be placed immediately in the sample cooler to be maintained at 4°C.

5.4 INVESTIGATION-DERIVED WASTE

Drill cuttings and purged well water will be containerized in DOT-approved or equivalent 55-gallon drums and stored on-Site pending analysis and proper off-Site disposal.

6.0 CALIBRATION/ANALYTICAL PROCEDURES

6.1 LABORATORY CALIBRATION

Calibration procedures for a specific laboratory instrument will consist of initial calibrations, initial calibration verifications, and/or continuing calibration verification. Detailed descriptions of the calibration procedures for a specific laboratory instrument are included in the laboratory's standard operating procedures (SOPs), which describe the calibration procedures, their frequency, acceptance criteria, and the conditions that will require recalibration. These procedures are as required in the respective analytical methodologies. The initial calibration associated with all analyses must contain a low-level calibration standard which is less than or equal to the quantitation limit.

6.2 LABORATORY PREVENTATIVE MAINTENANCE

Preventative maintenance and periodic maintenance will be performed as needed and documented in laboratory notebooks, instrument maintenance logbooks, or work orders as appropriate in accordance with method-specific requirements.

PID screening instruments will be calibrated daily prior to field activities according to the instrument manufacturer's specifications using certified calibration gases. Sampling personnel shall perform battery checks daily. The recorded calibration information includes date of calibration, standards used, and calibration results.

6.3 FIELD PREVENTATIVE MAINTENANCE

Field instruments will be checked prior to use in the field according to the procedures and frequencies specified by the manufacturer. GZA utilizes a commercial instrument rental company (e.g. Pine Environmental or US Environmental) to provide field instrumentation. Records of factory calibrations and instrument maintenance will be maintained by the instrument rental company. Field maintenance will be performed as needed and recorded in the field logbook.

7.0 DATA VALIDATION AND REPORTING

Laboratory deliverables will include, at a minimum:

1. A cover page, including facility name and address, laboratory name and address, laboratory certification number, date of analytical report preparation, and signature of laboratory director.
2. A contents page.
3. A non-conformance summary
3. A listing of all field sample identification numbers and corresponding laboratory sample identification numbers
3. A listing of the analytical methods used
4. Detection limits for each analyte
5. Tabulated sample results, including date of analysis
6. Method blank results
7. Chain-of-custody documents
8. Temperature of sample at receipt

GEOTECHNICAL
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TABLES

Table 1 Sampling plan with analytical method

Table 1 - Summary of Sampling Program Rationale and Analysis
205 Park Avenue
Brooklyn, New York

Sample Identifier	Location	Approximate Number of Samples	Rationale for Sampling	Laboratory Analysis
Soil Boring Soils				**All Samples**
SRI-1 through SRI-8	8 locations throughout the Site	At a minimum, two soil samples will be collected from each test boring (for a total of 10 soil samples) for laboratory analysis. This includes a surface soil sample (from the 0-4 feet bgs interval) and a soil immediately above the water table. Approximately 18 samples (including 2 duplicates).	To characterize soil quality across the Site.	VOCs (EPA Method SW 846 8260); SVOCs (EPA Method SW 846 8270), pesticides/PCBs (EPA Methods SW 846 8081/8082), and Target Analyte List metals (EPA Method 6010 and 7471),1,4-Dioxane (EPA Method SW 846 8260, isotope dilution for 1-4 Dioxane), and PFAs (EPA Method SW 846 537)
Groundwater - Temporary Well Points				**All Samples**
GW-1 through GW-6	4 onsite locations and 2 off-site locations; screened across water table	7 (including one duplicate)	To characterize groundwater quality on Site	VOCs (EPA Method SW 846 8260), SVOCs (EPA Method SW 846 8270), pesticides/PCBs (EPA Methods SW 846 8081/8082), total and dissolved TAL metals (EPA Methods SW 846 6010/6020/7470), 1,4-Dioxane (EPA Method SW 846 8260, isotope dilution for 1-4 Dioxane) and PFAs (EPA Method SW 846 537)
Groundwater - Temporary Well Points				**All Samples**
SV-1	On onsite location along the northern perimeter of the Site.	3 samples (including one duplicate and one outdoor ambient air)	To characterize soil vapor on Site	EPA Method TO-15

Notes:

TAL = Target Analyte List
TCL = Target Compound List
VOCs + TICs = volatile organic compounds plus tentatively identified compounds
SVOCs + TICs = semi-volatile organic compounds plus tentatively identified compounds
PCBs = polychlorinated biphenyls
PFAs = perfluorinated compounds

ATTACHMETNS

Attachment A Sampling for 1,4-Dioxane and Per- and Polyfluoroalkyl Substances (PFAS) Under DEC's Part 375 Remedial Programs (June 2019)

June 2019

Sampling for 1,4-Dioxane and Per- and Polyfluoroalkyl Substances (PFAS) Under DEC's Part 375 Remedial Programs

Objective

The Department of Environmental Conservation (DEC) is requiring sampling of all environmental media and subsequent analysis for the emerging contaminants 1,4-Dioxane and PFAS as part of all remedial programs implemented under 6 NYCRR Part 375, as further described in the guidance below.

Sample Planning

The number of samples required for emerging contaminant analyses is to be the same number of samples where "full TAL/TCL sampling" would typically be required in an investigation or remedial action compliance program.

Sampling of all media for ECs is required at all sites coming into or already in an investigative phase of any DER program. In other words, if the sampling outlined in the guidance hasn't already been done or isn't part of an existing work plan to be sampled for in the future, it will be necessary to go back out and perform the sampling prior to approving a SC report or issuing a decision document.

PFAS and 1,4-dioxane shall be incorporated into the investigation of potentially affected media, including soil, groundwater, surface water, and sediment as an addition to the standard "full TAL/TCL sampling." Biota sampling may be necessary based upon the potential for biota to be affected as determined pursuant to a Fish and Wildlife Impact analysis. Soil vapor sampling for PFAS and 1,4-dioxane is not required.

Upon an emerging contaminant being identified as a contaminant of concern (COC) for a site, those compounds must be assessed as part of the remedy selection process in accordance with Part 375 and DER-10 and included as part of the monitoring program upon entering the site management phase.

Special Testing Requirements for Import or Reuse of Soil: Soil imported to a site for use in a soil cap, soil cover, or as backfill must be tested for 1,4-dioxane and PFAS contamination in general conformance with DER-10, Section 5.4(e). Soil samples must be analyzed for 1,4-dioxane using EPA Method 8270, as well as the full list of PFAS compounds (currently 21) using EPA Method 537.1 (modified).

For 1,4-dioxane, soil exceeding 0.1 ppm must be rejected per DER 10: Appendix 5 - Allowable Constituent Levels for Imported Fill or Soil, Subdivision 5.4(e).

If PFOA or PFOS is detected in any sample at or above 1 ppb, then a soil sample must be tested by the Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed. If the SPLP results exceed 70 ppt combined PFOA/S, then the source of backfill must be rejected. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays.

The work plan should explicitly describe analysis and reporting requirements, including laboratory analytical procedures for modified methods discussed below.

Analysis and Reporting

Labs should provide a full category B deliverable, and a DUSR should be prepared by an independent 3rd party data validator. QA/QC samples should be collected as required in DER-10, Section 2.3(c). The electronic data submission should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

PFAS analysis and reporting: DEC has developed a *PFAS Analyte List* (below) for remedial programs. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any compounds, the DEC project manager, in consultation with the DEC remedial program chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site.

Currently, ELAP does not offer certification for PFAS compounds in matrices other than finished drinking water. However, laboratories analyzing environmental samples (e.g., soil, sediments, and groundwater) are required by DER to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537 or ISO 25101. Labs must also adhere to the requirements and criteria set forth in the Laboratory Guidance for Analysis of PFAS in Non-Potable Water and Solids.

Modified EPA Method 537 is the preferred method to use for environmental samples due to its ability to achieve very low detection limits. Reporting limits for PFAS in groundwater and soil are to be 2 ng/L (ppt) and 1 ug/kg (ppb), respectively. If contract labs or work plans submitted by responsible parties indicate that they are not able to achieve these reporting limits for the entire list of 21 PFAS, site-specific decisions will need to be made by the DEC project manager in consultation with the DEC remedial program chemist. Note: Reporting limits for PFOA and PFOS in groundwater should not exceed 2 ng/L.

Additional laboratory methods for analysis of PFAS may be warranted at a site. These methods include Synthetic Precipitation Leaching Procedure (SPLP) by EPA Method 1312 and Total Oxidizable Precursor Assay (TOP Assay).

SPLP is a technique for determining the potential for chemicals in soil to leach to groundwater and may be helpful in determining the need for addressing PFAS-containing soils or other solid material as part of the remedy. SPLP sampling need not be considered if there are no elevated PFAS levels in groundwater. If elevated levels of PFAS are detected in water, and PFAS are also seen in soil, then an SPLP test should be considered to better understand the relationship between the PFAS in the two media.

The TOP Assay can assist in determining the potential PFAS risk at a site. For example, some polyfluoroalkyl substances may transform to form perfluoroalkyl substances, resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from the site. To conceptualize the amount and type of oxidizable perfluoroalkyl substances which could be liberated in the environment, a “TOP Assay” analysis can be performed, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized.

PFAS-containing materials can be made up of per- and polyfluoroalkyl substances that are not analyzable by routine analytical methodology (LC-MS/MS). The TOP assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by current

analytical methodology. Please note that analysis of highly contaminated samples, such as those from an AFFF site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. Please consult with a DEC remedial program chemist for assistance interpreting the results.

1,4-Dioxane analysis and reporting: The reporting limit for 1,4-dioxane in groundwater should be no higher than 0.35 µg/L (ppb) and no higher than 0.1 mg/kg (ppm) in soil. Although ELAP offers certification for both EPA Method 8260 and EPA Method 8270 for 1,4-dioxane, DER is advising the use of Method 8270 SIM for water samples and EPA Method 8270 for soil samples. EPA Method 8270 SIM is not necessary for soils if the lab can achieve the required reporting limits without the use of SIM. Note: 1,4-dioxane is currently listed as a VOC in the Part 375 SCO tables but will be moved to the SVOC table with the next update to Part 375.

Refinement of sample analyses: As with other contaminants that are analyzed for at a site, the emerging contaminant analyte list may be refined for future sampling events based on investigative findings. Initially, however, sampling using this PFAS Analyte List and 1,4-dioxane is needed to understand the nature of contamination.

PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

Attachment B Sampling, Analysis, and Assessment of Per- and Poly-Fluorinated Alkyl Substances (PFAS) (January 2021)

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Under NYSDEC's Part 375 Remedial Programs

January 2021

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ERRATA SHEET for

SAMPLING, ANALYSIS, AND ASSESSMENT OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) Under NYSDEC's Part 375 Remedial Programs Issued January 17, 2020

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…) If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020
Soil Sample Results, page 10	"The extent of soil contamination for purposes of delineation and remedy selection should be determined by having certain soil samples tested by Synthetic Precipitation Leaching Procedure (SPLP) and the leachate analyzed for PFAS. Soil exhibiting SPLP results above 70 ppt for either PFOA or PFOS (individually or combined) are to be evaluated during the cleanup phase."	"Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values. " [Interim SCO Table] "PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP. As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf. "	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Testing for Imported Soil Page 11	Soil imported to a site for use in a soil cap, soil cover, or as backfill is to be tested for PFAS in general conformance with DER-10, Section 5.4(e) for the PFAS Analyte List (Appendix F) using the analytical procedures discussed below and the criteria in DER-10 associated with SVOCs. If PFOA or PFOS is detected in any sample at or above 1 µg/kg, then soil should be tested by SPLP and the leachate analyzed for PFAS. If the SPLP results exceed 10 ppt for either PFOA or PFOS (individually) then the source of backfill should be rejected, unless a site-specific exemption is provided by DER. SPLP leachate criteria is based on the Maximum Contaminant Levels proposed for drinking water by New York State's Department of Health, this value may be updated based on future Federal or State promulgated regulatory standards. Remedial parties have the option of analyzing samples concurrently for both PFAS in soil and in the SPLP leachate to minimize project delays. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable. PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil…	In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil…	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021

Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs

Objective

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) performs or oversees sampling of environmental media and subsequent analysis of PFAS as part of remedial programs implemented under 6 NYCRR Part 375. To ensure consistency in sampling, analysis, reporting, and assessment of PFAS, DER has developed this document which summarizes currently accepted procedures and updates previous DER technical guidance pertaining to PFAS.

Applicability

All work plans submitted to DEC pursuant to one of the remedial programs under Part 375 shall include PFAS sampling and analysis procedures that conform to the guidelines provided herein.

As part of a site investigation or remedial action compliance program, whenever samples of potentially affected media are collected and analyzed for the standard Target Analyte List/Target Compound List (TAL/TCL), PFAS analysis should also be performed. Potentially affected media can include soil, groundwater, surface water, and sediment. Based upon the potential for biota to be affected, biota sampling and analysis for PFAS may also be warranted as determined pursuant to a Fish and Wildlife Impact Analysis. Soil vapor sampling for PFAS is not required.

Field Sampling Procedures

DER-10 specifies technical guidance applicable to DER's remedial programs. Given the prevalence and use of PFAS, DER has developed "best management practices" specific to sampling for PFAS. As specified in DER-10 Chapter 2, quality assurance procedures are to be submitted with investigation work plans. Typically, these procedures are incorporated into a work plan, or submitted as a stand-alone document (e.g., a Quality Assurance Project Plan). Quality assurance guidelines for PFAS are listed in Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS.

Field sampling for PFAS performed under DER remedial programs should follow the appropriate procedures outlined for soils, sediments or other solids (Appendix B), non-potable groundwater (Appendix C), surface water (Appendix D), public or private water supply wells (Appendix E), and fish tissue (Appendix F).

QA/QC samples (e.g. duplicates, MS/MSD) should be collected as specified in DER-10, Section 2.3(c). For sampling equipment coming in contact with aqueous samples only, rinsate or equipment blanks should be collected. Equipment blanks should be collected at a minimum frequency of one per day per site or one per twenty samples, whichever is more frequent.

Analysis and Reporting

As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.

The investigation work plan should describe analysis and reporting procedures, including laboratory analytical procedures for the methods discussed below. As specified in DER-10 Section 2.2, laboratories should provide a full Category B deliverable. In addition, a Data Usability Summary Report (DUSR) should be prepared by an independent, third party data validator. Electronic data submissions should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html.

DER has developed a *PFAS Analyte List* (Appendix F) for remedial programs to understand the nature of contamination at sites. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. If lab and/or matrix specific issues are encountered for any analytes, the DER project manager, in consultation with the DER chemist, will make case-by-case decisions as to whether certain analytes may be temporarily or permanently discontinued from analysis at each site. As with other contaminants that are analyzed for at a site, the *PFAS Analyte List* may be refined for future sampling events based on investigative findings.

Routine Analysis

Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP) does not offer certification for PFAS in matrices other than finished drinking water. However, laboratories analyzing environmental samples for PFAS (e.g., soil, sediments, and groundwater) under DER's Part 375 remedial programs need to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533. Laboratories should adhere to the guidelines and criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids). Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist.

Additional Analysis

Additional laboratory methods for analysis of PFAS may be warranted at a site, such as the Synthetic Precipitation Leaching Procedure (SPLP) and Total Oxidizable Precursor Assay (TOP Assay).

In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils.

SPLP is a technique used to determine the mobility of chemicals in liquids, soils and wastes, and may be useful in determining the need for addressing PFAS-containing material as part of the remedy. SPLP by EPA Method 1312 should be used unless otherwise specified by the DER project manager in consultation with the DER chemist.

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated

if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

Commercial laboratories have adopted methods which allow for the quantification of targeted PFAS in air and biota. The EPA's Office of Research and Development (ORD) is currently developing methods which allow for air emissions characterization of PFAS, including both targeted and non-targeted analysis of PFAS. Consult with the DER project manager and the DER chemist for assistance on analyzing biota/tissue and air samples.

Data Assessment and Application to Site Cleanup

Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.

Water Sample Results

PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below. In addition, further assessment of water may be warranted if either of the following screening levels are met:

a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or
b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L

If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.

Soil Sample Results

Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values.

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	1.1	3.7

[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.
[2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.

PFOA, PFOS and 1,4-dioxane are all considered semi-volatile compounds, so composite samples are appropriate for these compounds when sampling in accordance with DER-10, Table 5.4(e)10. Category B deliverables should be submitted for backfill samples, though a DUSR is not required.

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS

The following guidelines (general and PFAS-specific) can be used to assist with the development of a QAPP for projects within DER involving sampling and analysis of PFAS.

General Guidelines in Accordance with DER-10

- Document/work plan section title – Quality Assurance Project Plan
- Summarize project scope, goals, and objectives
- Provide project organization including names and resumes of the project manager, Quality Assurance Officer (QAO), field staff, and Data Validator
    - The QAO should not have another position on the project, such as project or task manager, that involves project productivity or profitability as a job performance criterion
- List the ELAP certified lab(s) to be used for analysis of samples
- Include a site map showing sample locations
- Provide detailed sampling procedures for each matrix
- Include Data Quality Usability Objectives
- List equipment decontamination procedures
- Include an "Analytical Methods/Quality Assurance Summary Table" specifying:
    - Matrix type
    - Number or frequency of samples to be collected per matrix
    - Number of field and trip blanks per matrix
    - Analytical parameters to be measured per matrix
    - Analytical methods to be used per matrix with minimum reporting limits
    - Number and type of matrix spike and matrix spike duplicate samples to be collected
    - Number and type of duplicate samples to be collected
    - Sample preservation to be used per analytical method and sample matrix
    - Sample container volume and type to be used per analytical method and sample matrix
    - Sample holding time to be used per analytical method and sample matrix
- Specify Category B laboratory data deliverables and preparation of a DUSR

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by LC-MS/MS for PFAS using methodologies based on EPA Method 537.1
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
- Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids

General

The objective of this protocol is to give general guidelines for the collection of soil, sediment and other solid samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in to contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel spoon
- stainless steel bowl
- steel hand auger or shovel without any coatings

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Sampling is often conducted in areas where a vegetative turf has been established. In these cases, a pre-cleaned trowel or shovel should be used to carefully remove the turf so that it may be replaced at the conclusion of sampling. Surface soil samples (e.g. 0 to 6 inches below surface) should then be collected using a pre-cleaned, stainless steel spoon. Shallow subsurface soil samples (e.g. 6 to ~36 inches below surface) may be collected by digging a hole using a pre-cleaned hand auger or shovel. When the desired subsurface depth is reached, a pre-cleaned hand auger or spoon shall be used to obtain the sample.

When the sample is obtained, it should be deposited into a stainless steel bowl for mixing prior to filling the sample containers. The soil should be placed directly into the bowl and mixed thoroughly by rolling the material into the middle until the material is homogenized. At this point the material within the bowl can be placed into the laboratory provided container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A soil log or sample log shall document the location of the sample/borehole, depth of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

The objective of this protocol is to give general guidelines for the collection of groundwater samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers tape and sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel inertia pump with HDPE tubing
- peristaltic pump equipped with HDPE tubing and silicone tubing
- stainless steel bailer with stainless steel ball
- bladder pump (identified as PFAS-free) with HDPE tubing

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Monitoring wells should be purged in accordance with the sampling procedure (standard/volume purge or low flow purge) identified in the site work plan, which will determine the appropriate time to collect the sample. If sampling using standard purge techniques, additional purging may be needed to reduce turbidity levels, so samples contain a limited amount of sediment within the sample containers. Sample containers that contain sediment may cause issues at the laboratory, which may result in elevated reporting limits and other issues during the sample preparation that can compromise data usability. Sampling personnel should don new nitrile gloves prior to sample collection due to the potential to contact PFAS containing items (not related to the sampling equipment) during the purging activities.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Additional equipment blank samples may be collected to assess other equipment that is utilized at the monitoring well
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A purge log shall document the location of the sample, sampling equipment, groundwater parameters, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix D - Sampling Protocols for PFAS in Surface Water

General

The objective of this protocol is to give general guidelines for the collection of surface water samples for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include: stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.

A list of acceptable equipment is provided below, but other equipment may be considered appropriate based on sampling conditions.

- stainless steel cup

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Where conditions permit, (e.g. creek or pond) sampling devices (e.g. stainless steel cup) should be rinsed with site medium to be sampled prior to collection of the sample. At this point the sample can be collected and poured into the sample container.

If site conditions permit, samples can be collected directly into the laboratory container.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- Collect one equipment blank per day per site and minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers
- Request appropriate data deliverable (Category B) and an electronic data deliverable

Documentation

A sample log shall document the location of the sample, sampling equipment, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate. Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appropriate rain gear (PVC, polyurethane, or rubber rain gear are acceptable), bug spray, and sunscreen should be used that does not contain PFAS. Well washed cotton coveralls may be used as an alternative to bug spray and/or sunscreen.

PPE that contains PFAS is acceptable when site conditions warrant additional protection for the samplers and no other materials can be used to be protective. Documentation of such use should be provided in the field notes.

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells

General

The objective of this protocol is to give general guidelines for the collection of water samples from private water supply wells (with a functioning pump) for PFAS analysis. The sampling procedure used should be consistent with Sampling Guidelines and Protocols – Technological Background and Quality Control/Quality Assurance for NYS DEC Spill Response Program – March 1991 (http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf), with the following limitations.

Laboratory Analysis and Container

Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101. The preferred material for containers is high density polyethylene (HDPE). Pre-cleaned sample containers, coolers, sample labels, and a chain of custody form will be provided by the laboratory.

Equipment

Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. Additional materials may be acceptable if pre-approved by New York State Department of Environmental Conservation's Division of Environmental Remediation.

No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials (e.g. plumbers tape), including sample bottle cap liners with a PTFE layer.

Equipment Decontamination

Standard two step decontamination using detergent (Alconox is acceptable) and clean, PFAS-free water will be performed for sampling equipment. All sources of water used for equipment decontamination should be verified in advance to be PFAS-free through laboratory analysis or certification.

Sampling Techniques

Locate and assess the pressure tank and determine if any filter units are present within the building. Establish the sample location as close to the well pump as possible, which is typically the spigot at the pressure tank. Ensure sampling equipment is kept clean during sampling as access to the pressure tank spigot, which is likely located close to the ground, may be obstructed and may hinder sample collection.

Prior to sampling, a faucet downstream of the pressure tank (e.g., washroom sink) should be run until the well pump comes on and a decrease in water temperature is noted which indicates that the water is coming from the well. If the homeowner is amenable, staff should run the water longer to purge the well (15+ minutes) to provide a sample representative of the water in the formation rather than standing water in the well and piping system including the pressure tank. At this point a new pair of nitrile gloves should be donned and the sample can be collected from the sample point at the pressure tank.

Sample Identification and Logging

A label shall be attached to each sample container with a unique identification. Each sample shall be included on the chain of custody (COC).

Quality Assurance/Quality Control

- Immediately place samples in a cooler maintained at 4 ± 2º Celsius using ice
- Collect one field duplicate for every sample batch, minimum 1 duplicate per 20 samples. The duplicate shall consist of an additional sample at a given location
- Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, minimum 1 MS/MSD per 20 samples. The MS/MSD shall consist of an additional two samples at a given location and identified on the COC
- If equipment was used, collect one equipment blank per day per site and a minimum 1 equipment blank per 20 samples. The equipment blank shall test the new and decontaminated sampling equipment utilized to obtain a sample for residual PFAS contamination. This sample is obtained by using laboratory provided PFAS-free water and passing the water over or through the sampling device and into laboratory provided sample containers.
- A field reagent blank (FRB) should be collected at a rate of one per 20 samples. The lab will provide a FRB bottle containing PFAS free water and one empty FRB bottle. In the field, pour the water from the one bottle into the empty FRB bottle and label appropriately.
- Request appropriate data deliverable (Category B) and an electronic data deliverable
- For sampling events where multiple private wells (homes or sites) are to be sampled per day, it is acceptable to collect QC samples at a rate of one per 20 across multiple sites or days.

Documentation

A sample log shall document the location of the private well, sample point location, owner contact information, sampling equipment, purge duration, duplicate sample, visual description of the material, and any other observations or notes determined to be appropriate and available (e.g. well construction, pump type and location, yield, installation date). Additionally, care should be performed to limit contact with PFAS containing materials (e.g. waterproof field books, food packaging) during the sampling process.

Personal Protection Equipment (PPE)

For most sampling Level D PPE is anticipated to be appropriate. The sampler should wear nitrile gloves while conducting field work and handling sample containers.

Field staff shall consider the clothing to be worn during sampling activities. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials should be avoided. All clothing worn by sampling personnel should have been laundered multiple times.

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the latest guidelines developed by the Division of Fish and Wildlife (DFW) entitled “General Fish Handling Procedures for Contaminant Analysis” (Ver. 8).

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

Purpose: This procedure describes data collection, fish processing and delivery of fish collected for contaminant monitoring. It contains the chain of custody and collection record forms that should be used for the collections.

Organization: Environmental Monitoring Section
Bureau of Ecosystem Health
Division of Fish and Wildlife (DFW)
New York State Department of Environmental Conservation (NYSDEC)
625 Broadway
Albany, New York 12233-4756

Version: 8

Previous Version Date: 21 March 2018

Summary of Changes to this Version: Updated bureau name to Bureau of Ecosystem Health. Added direction to list the names of all field crew on the collection record. Minor formatting changes on chain of custody and collection records.

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

Quality Assurance Officer and Approval Date: Jesse Becker, 26 April 2019

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:

   1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).

   2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.

   3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.

B. The following data are required on each **Fish Collection Record** form:

   1. Project and Site Name.

   2. DEC Region.

   3. All personnel (and affiliation) involved in the collection.

   4. Method of collection (gill net, hook and line, etc.)

   5. Preservation Method.

C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:

   1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.

   2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.

   3. Date collected.

   4. Sample location (waterway and nearest prominent identifiable landmark).

   5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

smallest sub-unit of weight on weighing instrument). Take all measures as soon as possible with calibrated, protected instruments (e.g. from wind and upsets) and prior to freezing.

6. Sex - fish may be cut enough to allow sexing or other internal investigation, but do not eviscerate. Make any incision on the right side of the belly flap or exactly down the midline so that a left-side fillet can be removed.

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.

2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.

3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.

4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate “Age” column.

5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.

6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.

7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.

E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish’s tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with

the same information.

F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.

G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.

H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:

No materials containing Teflon.
No Post-it notes.
No ice packs; only water ice or dry ice.
Any gloves worn must be powder free nitrile.
No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
Wash hands after handling any food containers or packages as these may contain PFCs.
Keep pre-wrapped food containers and wrappers isolated from fish handling.
Wear clothing washed at least six times since purchase.
Wear clothing washed without fabric softener.
Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.

I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.

J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.

K. A recommended equipment list is at the end of this document.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF FISH AND WILDLIFE
FISH COLLECTION RECORD

Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

Sampling Method: □Electrofishing □Gill netting □Trap netting □Trawling □Seining □Angling □Other _____

Preservation Method: □Freezing □Other _____ Notes (SWFDB survey number): _____

FOR LAB USE ONLY- LAB ENTRY NO.	COLLECTION OR TAG NO.	SPECIES	DATE TAKEN	LOCATION	AGE	SEX &/OR REPROD. CONDIT	LENGTH ( )	WEIGHT ( )	REMARKS

richter: revised 2011, 5/7/15, 10/4/16, 3/20/17; becker: 3/23/17, 4/26/19

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, _____, of _____ collected the
(Print Name) (Print Business Address)

following on _____, 20____ from _____
(Date) (Water Body)

in the vicinity of _____
(Landmark, Village, Road, etc.)

Town of _____, in _____ County.

Item(s) _____

_____

Said sample(s) were in my possession and handled according to standard procedures provided to me prior to collection. The sample(s) were placed in the custody of a representative of the New York State Department of Environmental Conservation on _____, 20_____.

_____ _____
Signature Date

I, _____, received the above mentioned sample(s) on the date specified and assigned identification number(s) _____ to the sample(s). I have recorded pertinent data for the sample(s) on the attached collection records. The sample(s) remained in my custody until subsequently transferred, prepared or shipped at times and on dates as attested to below.

_____ _____
Signature Date

SECOND RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
THIRD RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
FOURTH RECIPIENT (Print Name)	TIME & DATE	PURPOSE OF TRANSFER
SIGNATURE	UNIT	
RECEIVED IN LABORATORY BY (Print Name)	TIME & DATE	REMARKS
SIGNATURE	UNIT	
LOGGED IN BY (Print Name)	TIME & DATE	ACCESSION NUMBERS
SIGNATURE	UNIT	

richter: revised 21 April 2014; becker: 23 March 2017, 26 April, 2019

NOTICE OF WARRANTY

By signature to the chain of custody (reverse), the signatory warrants that the information provided is truthful and accurate to the best of his/her ability. The signatory affirms that he/she is willing to testify to those facts provided and the circumstances surrounding the same. Nothing in this warranty or chain of custody negates responsibility nor liability of the signatories for the truthfulness and accuracy of the statements provided.

HANDLING INSTRUCTIONS

On day of collection, collector(s) name(s), address(es), date, geographic location of capture (attach a copy of topographic map or navigation chart), species, number kept of each species, and description of capture vicinity (proper noun, if possible) along with name of Town and County must be indicated on reverse.

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) developed the following guidelines for laboratories analyzing environmental samples for PFAS under DER programs. If laboratories cannot adhere to the following guidelines, they should contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov prior to analysis of samples.

Isotope Dilution

Isotope dilution techniques should be utilized for the analysis of PFAS in all media.

Extraction

For water samples, the entire sample bottle should be extracted, and the sample bottle rinsed with appropriate solvent to remove any residual PFAS.

For samples with high particulates, the samples should be handled in one of the following ways:

1. Spike the entire sample bottle with isotope dilution analytes (IDAs) prior to any sample manipulation. The sample can be passed through the SPE and if it clogs, record the volume that passed through.
2. If the sample contains too much sediment to attempt passing it through the SPE cartridge, the sample should be spiked with isotope dilution analytes, centrifuged and decanted.
3. If higher reporting limits are acceptable for the project, the sample can be diluted by taking a representative aliquot of the sample. If isotope dilution analytes will be diluted out of the sample, they can be added after the dilution. The sample should be homogenized prior to taking an aliquot.

If alternate sample extraction procedures are used, please contact the DER remedial program chemist prior to employing. Any deviations in sample preparation procedures should be clearly noted in the case narrative.

Signal to Noise Ratio

For all target analyte ions used for quantification, signal to noise ratio should be 3:1 or greater.

Blanks

There should be no detections in the method blanks above the reporting limits.

Ion Transitions

The ion transitions listed below should be used for the following PFAS:

PFOA	413 > 369
PFOS	499 > 80
PFHxS	399 > 80
PFBS	299 > 80
6:2 FTS	427 > 407
8:2 FTS	527 > 507
N-EtFOSAA	584 > 419
N-MeFOSAA	570 > 419

Branched and Linear Isomers

Standards containing both branched and linear isomers should be used when standards are commercially available. Currently, quantitative standards are available for PFHxS, PFOS, NMeFOSAA, and NEtFOSAA. As more standards become available, they should be incorporated in to the method. All isomer peaks present in the standard should be integrated and the areas summed. Samples should be integrated in the same manner as the standards.

Since a quantitative standard does not exist for branched isomers of PFOA, the instrument should be calibrated using just the linear isomer and a technical (qualitative) PFOA standard should be used to identify the retention time of the branched PFOA isomers in the sample. The total response of PFOA branched and linear isomers should be integrated in the samples and quantitated using the calibration curve of the linear standard.

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated for each target analyte and the ratio compared to standards. Lab derived criteria should be used to determine if the ratios are acceptable.

Reporting

Detections below the reporting limit should be reported and qualified with a J qualifier.

The acid form of PFAS analytes should be reported. If the salt form of the PFAS was used as a stock standard, the measured mass should be corrected to report the acid form of the analyte.

Appendix I - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report. Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 14 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of five standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%. Linear fit calibration curves should have an R^2 value greater than 0.990.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects
R^2 >0.990	J flag detects and UJ non detects
Low-level calibration check <50% or >150%	J flag detects and UJ non detects
Mid-level calibration check <70% or >130%	J flag detects and UJ non detects

Initial Calibration Verification

An initial calibration verification (ICV) standard should be from a second source (if available). The ICV should be at the same concentration as the mid-level standard of the calibration curve.

ICV recovery <70% or >130%	J flag detects and non-detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated from the standards for each target analyte. Lab derived criteria should be used to determine if the ratios are acceptable. If the ratios fall outside of the laboratory criteria, qualify results as an estimated maximum concentration.

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Branched and Linear Isomers

Observed branched isomers in the sample that do not have a qualitative or quantitative standard should be noted and the analyte should be qualified as biased low in the final data review summary report. Note: The branched isomer peak should also be present in the secondary ion transition.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

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APPENDIX F – HEALTH AND SAFETY PLAN

Known for excellence.
Built on trust.

CONSTRUCTION HEALTH AND SAFETY PLAN

205 Park Avenue,
Brooklyn, NY
NYSDEC BCP Number: C224319

October 2022
File No. 12.0076834.10

PREPARED FOR:
462 Lexington, LLC
670 Myrtle Ave, Brooklyn, NY

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1.0 INTRODUCTION

1.1 OVERVIEW

This project-specific Construction Health and Safety Plan (CHASP) has been developed by GZA GeoEnvironmental of New York (GZA) on behalf of 462 Lexington, LLC (Client) to establish the procedures necessary for the protection from potential contaminated materials resulting from the remedial action activities at 205 Park Avenue in Brooklyn, New York located in the Wallabout neighborhood of Brooklyn, New York (Site). This CHASP is intended to supplement the Contractor's Safety Program. The procedures in this plan have been developed based on current knowledge regarding the hazards which are known or anticipated for the operations to be conducted at this Site.

1.2 SITE HAZARDS

This CHASP covers only the hazards associated with potential chemical exposures. Physical hazards such as injuries from typical excavation field work activities, including the operation of heavy equipment, noise exposure, heat and cold stress, electrical hazards, fire hazards, excavation hazards and general safety hazards associated with walking on working surfaces (trip and fall) are covered by the Contractor's Safety Program.

An E-Designation for Hazardous Materials (E-464) was placed on the Site by the New York City Department of City Planning (DCP) on 9/28/2018. This project has been assigned project number 15TMP0625K, 15EHAN039K by the New York City Office of Environmental Remediation (NYC OER).

The remedial action calls for the handling, transport and disposal of soil, fill, fluids and other materials removed from the property. Site activities may pose chemical exposure hazards through skin contact, ingestion and inhalation from volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and metals on-Site. The potential adverse health effects form these detected contaminants are diverse. Many of these compounds are known or suspected to result in chronic illness from long-term exposures. However, due to the limited nature of the proposed construction, only acute effects are a potential concern. See **Section 2.0** for detailed chemical hazard information.

1.3 PROJECT TEAM

The organizational structure established for the implementation of construction health and safety requirements established by this CHASP include identifying personnel who have been assigned specific authority to implement and enforce the provisions of this CHASP. Prior to the construction appropriate personnel will be identified in the table below:

Name	**Project Title/Assigned Role**	**Phone Numbers**
TBD	Project Superintendent	Work: TBD Mobile: TBD
TBD	Site Supervisor (Contractor)	Work: TBD Mobile: TBD
TBD	Site Health and Safety Officer (Contractor)	Work: TBD Mobile: TBD

Controlling Site hazards depends upon the degree to which management enforces compliance and employees cooperate with the specified health and safety requirements. Therefore, personnel at all levels of the organization

must recognize their individual responsibility to comply. Activities covered by this CHASP must be conducted in compliance with this CHASP and with applicable federal, state, and local health and safety regulations, including 29 CFR 1910.120. Personnel covered by this CHASP who cannot or will not comply must be excluded from Site activities by the Project Superintendent.

2.0 HAZARD ASSESSMENT

The following hazard assessment applies only to the activities within the specified scope of this CHASP.

2.1 CHEMICAL HAZARDS AND KNOWN/ SUSPECT CHEMICALS OF CONCERN

The chemical hazard information provided below is based on data provided in GZA GeoEnvironmental's January 2020 *Remedial Investigation Report*. During our investigation, Site soils were sampled for VOCs, SVOCs, polychlorinated biphenyls (PCBs), pesticides, and metals. Constituents exceeding the New York State Department of Environmental Conservation (NYSDEC) Part 375: Unrestricted Use Soil Cleanup Objectives (SCOs) and their respective health effects are listed below for reference. Information presented is based upon established Occupational Safety and Health Administration (OSHA) permissible exposure limits (PEL) and the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits (RELs) with time-weighted average (TWA). See **Attachment A** for safety data sheets (SDS) related to the compounds listed below. All other analytical parameters were reported within acceptable levels for Site urban residential land use. See **Section 4.2** for a description of the personal protective equipment (PPE) that should be used for this Site.

Chemicals	**REL/PEL/TLV[1]**	**Health Hazards**
Xylene	PEL = 435 mg/m3 TWA REL = 435 mg/m3 TWA	Not classifiable as a human carcinogen.
Benzo(a)anthracene	PEL = 0.2 mg/m3 TWA REL = 0.1 mg/m3 TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Benzo(a)pyrene	PEL = 0.2 mg/m3 TWA REL = 0.1 mg/m3 TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Benzo(b)fluoranthene	PEL = 0.2 mg/m3 TWA REL = 0.1 mg/m3 TWA	No signs or symptoms of acute or chronic exposure have been reported in humans; suspect human carcinogen.
Benzo(k)fluoranthene	not available	not available
Chrysene	PEL = 0.2 mg/m3 TWA REL = 0.1 mg/m3 TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Dibenzo(a,h)anthracene	PEL= Not applicable REL= Not applicable	Probably Carcinogen to Humans- The exposure circumstance entails exposures that are probably carcinogenic to humans.
Indeno(1,2,3-cd)pyrene	not available	not available
Lead	PEL = 0.05 mg/m3 TWA REL = 0.05 mg/m3 TWA	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension.

[1] The threshold limit value (TLV) of a chemical substance is believed to be a level to which a worker can be exposed day after day for a working lifetime without adverse effects.

Chemicals	REL/PEL/TLV[1]	Health Hazards
Mercury	PEL = 0.05 mg/m3 TWA REL = 0.1 mg/m3 TWA	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria.
Zinc (oxide dust)	PEL = 15 mg/m3 TWA REL = 5 mg/m3 TWA	Exposure to zinc oxide can occur through inhalation, ingestion, and eye or skin contact; affects the respiratory system; Acute exposure to zinc oxide can result in coughing, substernal pain, upper respiratory tract irritation, rales, chills, fever, nausea, and vomiting; Chronic exposure to zinc oxide by skin contact may result in papular-pustular skin eruptions in the axilla, inner thigh, inner arm, scrotum and pubic areas.
Copper	PEL = 0.1 mg/m3 REL = 0.1 mg/m3 TLV = 0.2 mg/m3	Irritation eyes, upper respiratory system; metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough, lassitude (weakness, exhaustion); metallic or sweet taste; discoloration skin, hair.
Nickel	PEL = 1 mg/m3 TWA REL = 0.015 mg/m3 TWA	Exposure can occur through inhalation, ingestion, and eye or skin contact; Symptoms include sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]
Dieldrin	PEL = 0.25 mg/m3 (skin) TWA REL = 0.25 mg/m3 TWA	Human poisoning from dieldrin is characterized by major motor convulsions. Other effects include malaise, incoordination, headache, dizziness, and gastrointestinal disturbances. The seizures have developed with and without other symptoms of poisoning.
4,4'-DDE	NA	Human health effects from DDD, DDE, and DDT at low environmental doses are unknown. Following exposure to high doses, human symptoms can include vomiting, tremors or shakiness, and seizures. Laboratory animal studies showed effects on the liver and reproduction. DDD, DDE, and DDT are considered a possible human carcinogen.
4,4'-DDD	NA	
4,4'-DDT	PEL = 1 mg/m3 (skin) REL = 0.5 mg/m3 TLV = 1 mg/m3 TWA	

2.2 VOLATILE ORGANIC COMPOUNDS

VOCs including Xylene were detected a concentrations exceeding Unrestricted Use SCOs in the soil/fill samples collected during the Remedial Investigation. Chlorinated VOCs were detected at concentrations above NYSDEC Class GA Ambient Water Quality Standards (AWQS) in groundwater samples. Laboratory analytical results indicate that tetrachloroethene, above AWQS, are present in groundwater in this area. The vapor pressures of these compounds are high enough to potentially generate airborne vapor. On sites where, high concentrations of these compounds are present, a potential inhalation hazard to the field team during subsurface investigations can result. Community air quality monitoring for VOC concentrations will be implemented throughout the Site during all phases of excavation, and dust management will be in place to ensure minimal exposure to soil and groundwater VOCs.

2.3 SEMI-VOLATILE ORGANIC COMPOUNDS

SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene were detected at concentrations exceeding their respective Unrestricted Use SCOs. Due to the relatively low vapor pressure of SVOCs, vapor hazards at ambient temperatures are not expected. However, if Site conditions are dry, the generation of contaminated dusts may pose a potential inhalation hazard. Therefore, dust levels should be controlled with wetting if necessary, as described in **Section 3.2**. In addition, repeated contact with certain SVOCs compounds have been associated with the development of skin cancer. Contact of SVOCs with the skin may cause photosensitization of the skin, producing skin burns after subsequent exposure to ultraviolet radiation. Protective measures, such as the wearing of chemically resistant gloves, are appropriate when handling SVOC contaminated materials.

2.4 METALS

Various metals including copper, mercury, lead, nickle, and zinc were detected in concentrations exceeding UUSCOs in soil samples collected throughout the Site, and the Site's former use as a gasoline refueling station. Overexposure to metal compounds has been associated with a variety of local and systemic health hazards, both acute and chronic in nature, including lung damage, neurological effects, gastrointestinal effects, kidney and liver damage, allergic dermatitis and other skin disorders. Exposure to metals is most commonly through inhalation and ingestion of dust. Metallic mercury is unique among metals, as it releases toxic vapors at normal room temperatures, and can be absorbed through the skin.

To estimate health risk, GZA calculated the airborne mercury exposure through dust. The basis of comparison used was the more conservative nuisance dust standard of the ACGIH Threshold Limit Value, 8-hour time-weighted average of 10 milligram per cubic meter of air (mg/m3). This nuisance dust is a general rule of thumb for the dust allowed before preventive measures, such as soil wetting of exposed soil, are used.

Based on the maximum concentration of mercury detected in soil of 0.82 mg/kg, the maximum mercury concentration is anticipated to be 0.000008 mg/m3. The OSHA Permissible Exposure Level (PEL) for mercury is a ceiling concentration of 0.1 mg/m3. When compared, the expected mercury in air concentration is a full five orders of magnitude less than the OSHA PEL.

GZA believes that airborne mercury and additional listed metals are not a significant risk to Site workers. GZA understands that mercury is a volatile element. GZA does not anticipate measurable mercury vapor concentrations, given the relatively low soil concentrations.

2.5 PESTICIDES

The pesticides dieldrin, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT were detected at concentrations exceeding their Unrestricted Use SCOs at samples collected at the Site. Overexposure to pesticides has been associated with a variety of local and systemic health hazards, both acute and chronic in nature. Exposure to pesticides is most commonly through inhalation and ingestion of dust. Therefore, dust levels should be controlled with wetting if necessary, as described in Section 3.2 and in accordance with the project dust control plan (DCP). Protective measures, such as the wearing of gloves and eye protection, are appropriate when handling groundwater on Site.

3.0 AIR MONITORING

Air monitoring falls into two separate categories: direct reading/environmental monitoring, and personal exposure monitoring. The following Sections summarize the types of environmental monitoring as well as the appropriate response actions applicable to the Site.

3.1 ORGANIC VAPOR MONITORING

The potential for volatile vapor hazards has been identified for the Site (see Section 2.2). Therefore, organic vapor monitoring with a photoionization detector (PID) is required during ground intrusive remedial activities on Site.

3.2 AIR MONITORING INSTRUMENTS AND ACTION LEVELS

Photoionization Detector (PID) - Breathing Zone Readings

0 to 10 ppm	Remain in Level D. Use colorimetric tubes or other chemical specific device to verify PID readings do not contain low PEL toxic materials (benzene, vinyl chloride, etc.) where applicable. If benzene is present above 1 ppm withdraw from excavation and proceed to Level C. Low PEL toxic materials are not expected to be present at the Site.
10 to 25 ppm	Withdraw from work area and contact Project Manager. Proceed to Level C protection for re-entry, or discontinue operation
> 25 ppm	Secure operations, withdraw from work area, and discontinue work at that location until contaminants can be evaluated, and detailed plan implemented.

3.3 TOTAL PARTICULATES

Due to the presence of SVOCs, pesticides and metals in soils on-Site, total respirable particulates may be a concern. Dust levels should be visually monitored and if levels become noticeable, such as visible dust present within the breathing zone, then soils should be wetted down to control dusty conditions. Wetting may be accomplished using various methods, including a hose connected to a fire hydrant or other on-Site source of water. The Client's Project Superintendent shall be responsible for determining when the wetting of soils is needed and the most appropriate method to use. In addition, recommended measurements for particulate monitoring are detailed below.

Upwind concentrations should be measured at the start of each workday during active handling of excavated materials (including stockpiling and truck loading) and periodically thereafter to establish background conditions. The particulate air monitoring work will be conducted using a pDR-1200 personal airborne particulate monitor (or approved equivalent) calibrated daily.

The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers (um) in size (PM-10) and capable of integrating over a period of five minutes or less for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate excess of the action level.

Dust migration will be visually assessed during all work activities, and at no time will the downwind perimeter particulate levels be allowed to exceed a total standard of 10 mg/m^3 (or "nuisance" dust levels).

If the downwind PM-10 particulate level is 100 micrograms per cubic meter (ug/m^3) greater than the background (upwind perimeter) for a five-minute period, or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques (e.g., soil wetting) provided the downwind PM-10 particulate levels do not exceed 150 ug/m^3 above the upwind level and no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 ug/m^3 above the upwind level, work must be stopped, and a re-evaluation of activities initiated. Work can resume if dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentrations to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

3.4 PARTICULATE MONITORING, RESPONSE LEVELS, AND ACTIONS

Parameter	Monitoring Instrument	Response Levels(above background levels)	Action	Conditions for Continuing Work Activities
Particulates < 10 um (PM-10)	Dust Meter	Fugitive dust migration	1. Implement dust suppression techniques	Dust suppression techniques are in place
		> 100 ug/m^3 but < 150 ug/m^3	1.Implement dust suppression techniques	Levels must not exceed 150 ug/m^3 with dust suppression techniques in
		> 150 ug/m^3	1. Halt activity 2. Re-evaluate activities	Levels decrease below 150 ug/m^3 and fugitive dust migration is

3.5 PERSONAL EXPOSURE MONITORING

No asbestos, no lead-based paint, and no radiological hazards have been identified within the vicinity of the proposed excavation area at the Site as the Site is currently undeveloped. Therefore, personal exposure monitoring is not required during soil excavations.

4.0 PERSONAL PROTECTIVE EQUIPMENT

PPE will be donned as described below for the activities covered by this CHASP. Based on available analytical data and the proposed intrusive activities, the Contractor, anticipates that all activities will require Level D or Modified Level D PPE. Level C PPE and Level B are not expected to be required.

4.1 GENERAL SITE WORK

General Site work conducted outside the excavation areas, operators of heavy equipment, and non-intrusive activities which do not generate dust will require Level D protective equipment. Level D is defined as:

- Hardhat;
- Eye protection;
- Hearing protection (with Site workers at all times and donned when appropriate);
- Steel-toed work boots; and
- Work clothes.

Workers shall wear appropriate hearing protection during designated hearing protection-required tasks (such as jack hammering, pile driving etc.). To reduce the exposure to noise, personnel working in areas of excessive noise must use hearing protectors (earplugs or earmuffs).

Rule-of-Thumb: Wherever actual data from sound level meters or noise dosimeters is unavailable, if it is necessary to raise one's voice above a normal conversational level to communicate with others within three to five feet away, hearing protection should be worn.

4.2 EXCAVATION AREAS AND OTHER SOIL HANDLING

Personnel working in the areas of active excavation, but not operating heavy equipment, and any other personnel potentially contacting contaminated materials will be required to wear Modified Level D PPE. Modified Level D is defined as:

- Hardhat;
- Eye protection;
- Hearing protection (as warranted see above);
- Steel-toed work boots;
- Tyvek Coveralls; and
- Disposable nitrile chemically resistant gloves.

5.0 SITE CONTROL

To prevent both exposure of unprotected personnel and migration of contamination due to tracking by personnel or equipment, work areas along with personal protective equipment requirements will be clearly identified with signage. Pedestrian traffic will be managed to the extent possible by the Contractor's Traffic and Pedestrian Control Plan.

The Contractor will designate a work zone and support zone as defined below.

5.1 WORK ZONE

Work zones on Site will be temporary or dynamic, encompassing the work area(s) actively being worked on that particular day. Site personnel will be advised of the current work area(s) as part of daily site safety meetings. The Contractor will have a hydrant permit or other water source available to wet down exposed soils to control dust.

5.2 SUPPORT ZONE

The support zone will consist of an area outside the areas of active excavation and soil handling, where equipment and support vehicles will be located. Eating, drinking and smoking will be permitted only in this area. Sanitary facilities will be located on Site. In addition, potable water and water and soap for hand washing will be available at the Site.

5.3 OTHER SITE CONTROL AND SAFETY MEASURES

The following measures are designed to augment the specific health and safety guidelines provided in this plan. These issues will form the basis of the daily safety meetings discussed in **Section 7.4**, below.

- The Site hazards will be evaluated by the Client's Project Superintendent using the Site Safety Checklist.
- No one is to perform field work alone. Team members must be intimately familiar with the procedures for initiating an emergency response.
- Avoidance of contamination is of the utmost importance. Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces or materials. Walk around (not through) puddles and discolored surfaces. Do not kneel on the ground or set equipment on the ground.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited except in the support zone after proper decontamination as defined in **Section 6.0**.
- The use of alcohol or drugs is prohibited on-Site and during the conduct of field operations.
- Safety equipment (PPE) will be required for all field personnel unless otherwise approved by the subcontractor's health and safety representatives and/or the Project Superintendent.

5.4 SITE SECURITY

The Site shall be unoccupied during Site work EXCEPT for Contractor personnel and subcontractors. If possible, access to the work areas during field work will be limited by closing site gates to reduce unauthorized pedestrian traffic. The Client's Project Superintendent is responsible for identifying the presence of all employees on Site.

Equipment left on Site during off hours must be locked, immobilized and/or otherwise secured to prevent theft or unauthorized use or access. The Contractor and subcontractors' employees will not be permitted on Site during off-hours without specific client approval.

6.0 DECONTAMINATION

Proper decontamination will be performed for personnel and equipment before leaving the Site. All solid waste generated during decontamination will be bagged by the Contractor personnel and stored on Site for disposal. Water will be disposed of by on-Site infiltration into soil within an exclusion zone.

6.1 PERSONAL DECONTAMINATION

Personal decontamination will be accomplished by following a systematic procedure of cleaning and removal of personal protective equipment (PPE). The Contractor will supply decontamination equipment to allow PPE to be brushed to remove gross contamination and then scrubbed clean in a detergent solution and then rinsed clean. To facilitate this, a three-basin wash system will be set up on site by the Contractor.

Disposable PPE, such as Tyvek coveralls, gloves, and hearing protection, etc. will be placed in trash bags in an on-Site container pending its disposal. Alternative chemical decontamination procedures, such as steam-cleaning reusable rubber outer boots, may be used if necessary.

Steps required in a decontamination sequence will depend on the level of protection worn in accordance with **Section 4.0**:

1. Remove and wipe clean hard hat.
2. Brush boots and gloves of gross contamination.
3. Scrub boots and gloves clean.
4. Remove boot covers (if in use).
5. Rinse boots and gloves.
6. Dry non-disposable equipment with paper towels
7. Remove Tyvek coveralls.
8. Remove eye protection.
9. Remove chemically resistant gloves.

6.2 EQUIPMENT DECONTAMINATION

Hand tools and portable equipment will be decontaminated upon leaving the active excavation areas using the same procedures for personal decontamination. Wooden tools are difficult to decontaminate because they absorb chemicals. Wooden hand tools will be kept on Site for the project duration and handled only by protected workers. At the end of the Site activities, wooden tools will be discarded if they cannot be decontaminated properly.

Large equipment will be decontaminated in an area near the entrance to the Site. Decontamination of large equipment will mitigate the risk of spreading potentially contaminated soil off-Site. The Contractor will use a combination of long-handled brushed, rods and shovels for general exterior cleaning and dislodging contaminated soil caught in tires and the undersides of vehicles and equipment.

Prior to leaving the Site, large equipment will be inspected to assure that excess material has not adhered to the equipment. If needed, the Contractor will clean the large equipment, including washing tires and undercarriages with a hose to remove excess adhered soil prior to leaving the Site.

Exposed excavated material will be covered on each truck after loading. The cover will be secured and remain in place until the container has reached the disposal facility.

7.0 MEDICAL MONITORING AND TRAINING REQUIREMENTS

Training records for Site personnel and subcontractors shall be provided by the Contractor prior to on-Site work and will be maintained on Site.

7.1 MEDICAL MONITORING

It is not anticipated that respiratory protection will be required.

7.2 TRAINING

All personnel covered by this CHASP must have completed the appropriate training requirements specified in 29 CFR 1910.1200 Hazard Communication and 29 CFR 1910.120(e).

Workers requiring access to the excavation (laborers and operators) prior to completion of soil remedial activities associated with petroleum-contaminated soils will require 40-hour HAZWOPER training. Workers at the site that may come into contact with other contaminated soils will require 30-hour HAZWOPER training.

Also, at least one Contractor employee must be on Site during all activities to act as the Site Foreman and will be responsible for identifying existing and predictable hazards in surroundings or working conditions that are unsanitary, hazardous, or dangerous

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance." The Contractor personnel covered by this CHASP may not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). The Contractor response actions will be limited to evacuation and medical/first aid as described within this Section, below.

The basic elements of an emergency evacuation plan include employee training, alarm systems, escape routes, escape procedures, critical operations or equipment, rescue and medical duty assignments to Site workers and or the community, and will have the authorization to take prompt corrective measures to eliminate them. This individual must have documentation of at least three days of supervised field experience as well as completion of the specified 8-hour training course for managers and supervisors. Records of certifications and training should be kept by the Contractor.

7.3 SUBCONTRACTORS

Subcontractors will be required to provide to the Contractor Project (Site) Manager specific written documentation that each individual assigned to this project has completed the medical monitoring and training requirements specified above. This information must be provided prior to their performing any work on site.

7.4 SITE SAFETY MEETINGS

Prior to the commencement of on-Site investigative activities, a Site safety meeting will be held to review the specific requirements of this CHASP. Sign-off sheets will be collected at this meeting (see **Attachment B**). Short safety refresher meetings will be conducted daily or, if more frequent, as conditions or work activates change. In addition, the Project Superintendent will document that Site visitors have had the required training in accordance with 29 CFR 1910.120 and will provide documented pre-entry safety briefings.

8.0 EMERGENCY ACTION PLAN

, designation of responsible parties, emergency reporting procedures, and methods to account for all employees after evacuation.

8.1 EMPLOYEE INFORMATION

General training regarding emergency evacuation procedures are included in the Contractor initial and refresher training courses. Also, as described, employees must be instructed in the specific aspects of emergency evacuation applicable to the Site as part of the site safety meeting prior to the commencement of all on-site activities. On-Site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed. This information will be provided during the Site safety meetings (see **Section 7.4**) and will be documented by the Contractor.

8.2 EMERGENCY SIGNAL AND ALARM SYSTEMS

An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial Site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices cannot be clearly perceived above ambient noise levels (i.e., noise from heavy equipment, trucks, etc.) and anytime a clear line-of-sight cannot be easily maintained amongst all personnel because of distance, terrain or other obstructions. The Contractor will maintain an air horn (or whistle) on-Site that will be used to signal an emergency so that it can be heard over other construction noises on-Site.

8.3 EMERGENCY CONTACTS

Police:	911
Fire:	911
Ambulance:	911
Hospital:	(718) 250-8000 (The Brooklyn Hospital Center)

8.4 HOSPITAL LOCATION

The Brooklyn Hospital Center is located at 121 Dekalb Avenue, Brooklyn, NY 11201. **Attachment C** presents a hospital route map.

8.5 INCIDENT REPORTING PROCEDURES

Any incident (other than minor first aid treatment) resulting in injury, illness or property damage requires an accident investigation and report. The investigation should be initiated as soon as emergency conditions are under control. The purpose of this investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided.

The investigation should begin while details are still fresh in the mind of anyone involved. The person administering first aid may be able to start the fact gathering process if the injured can speak. Pertinent facts must be determined. Questions beginning with who, what, when, where, and how are usually most effective to discover ways to improve job performance in terms of efficiency and quality of work, as well as safety and health concerns. An Accident and Injury Report Form is included as **Attachment D**.

ATTACHMENT A — SAFETY DATA SHEETS

Safety Data Sheet

Prepared in accordance with Commission Regulation (EU) 2015/830

Stock Number: 31270
Revision Date: 01-08-2019
This document replaces SDS dated: 13-08-2018
2 Letter ISO country code/language code: UK/EN

Benzo(a)anthracene Standard

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

1.1 Product identifier: **Benzo(a)anthracene Standard**
Stock Number: 31270

Other means of identification:
Synonyms: None Known
REACH Registration No.: None Known
Molecular formula: CH3OH

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

Relevant identified uses: For Laboratory use only
Uses advised against: Uses other than recommended use.

1.3 Details of the Supplier of the Safety Data Sheet:	**Manufacturer**	**Supplier**
	Restek Corporation 110 Benner Circle Bellefonte, Pa. 16823 USA 00 1 814-353-1300 00 1 814-353-1309 sds@restek.com	Thames Restek UK LTD Units 8-16, Ministry Wharf Wycombe Road, Saunderton Buckinghamshire United Kingdom HP14 4HW 01494 563377 sales@thamesrestek.co.uk
1.4 Emergency telephone number:	00 1 800-424-9300 (CHEMTREC within the US) 00 1 703-741-5970 (Outside USA)	0870-8200418 (CHEMTREC within the UK) +1 703-741-5970 (CHEMTREC International)

Poison Centre contact information: National Poisons Information Service (NPIS)
Email: director.birmingham.unit@npis.org
Website: http://www.npis.org/

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture:

Classification according to Regulation (EC) No 1272/2008 [CLP]: Carcinogenicity Category 1B
Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 1

Flammable Liquid Category 2
Hazardous to the aquatic environment - Chronic Category 2
Acute Toxicity - Dermal Category 3
Acute Toxicity - Oral Category 3

2.2 Label elements:

Labelling according to Regulation (EC) No 1272/2008 [CLP]:

Hazard pictograms:

Signal Word: Danger

Hazard Statements:
H225 - Highly flammable liquid and vapour
H301+H311 - Toxic if swallowed or in contact with skin
H350 - May cause cancer.
H370 - Causes damage to organs
H411 - Toxic to aquatic life with long lasting effects

Precautionary Statements:
P201 - Obtain special instructions before use.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 - Keep container tightly closed.
P260 - Do not breathe dust/fume/gas/mist/vapours/spray.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER/doctor.

Supplemental Hazard information (EU): None Known

2.3 Other hazards: This substance does not meet the PBT or vPvB criteria of REACH, Annex XIII

SECTION 3: Composition/information on ingredients

3.1 Substances:
Not applicable

3.2 Mixtures:

Chemical Name	%	CAS #	EC No. REACH Registration No.	Classification (EC) No 1272/2008	M Factor	SCL	Acute Toxicity Estimates
benz (a) anthracene	0.1	56-55-3	200-280-6 None Known	Aquatic Acute 1; H400 Aquatic Chronic 1; H410 Carc. 1B; H350	AQUATIC CHRONIC 1: M = 100 AQUATIC ACUTE 1: M = 100	No data available	Not determined
methanol	99.9	67-56-1	200-659-6 None Known	Acute Tox. 3 (Dermal); H311 Acute Tox. 3 (Inh Dust/Mist); H331 Acute Tox. 3 (Oral); H301 Flam. Liq. 2; H225 STOT SE 1; H370	No data available	STOT SE 2: 3%<10% STOT SE 1: 10%	Not determined

For full text of H-statements see Section 16.

SECTION 4: First aid measures

4.1 Description of 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

Eye contact: 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.

Self protection of the first aider: No data available

4.2 Most important symptoms and Coma and death

effects, both acute and delayed:

4.3 Indication of any immediate medical attention and special treatment needed: IF exposed or concerned: Get medical advice/ attention. IF exposed or concerned: Call a POISON CENTER/doctor. Call a POISON CENTER/doctor if you feel unwell.

SECTION 5: Firefighting measures

5.1 Extinguishing media:

Suitable 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.

Unsuitable extinguishing media: None Known

5.2 Special hazards arising from the substance or mixture: 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.

Hazardous Combustion Products: Carbon dioxide, Carbon monoxide

5.3 Advice for firefighters: 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.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

Non-emergency personnel: Non-emergency personnel should be kept clear of the area

Emergency responders: 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.

6.2 Environmental precautions: No data available

6.3 Methods and material for containment and cleaning up:

Small spills: Refer to information provided for large spills

Large spills: 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.

6.4 Reference to other sections: Refer to section 13 for disposal information

SECTION 7: Handling and storage

7.1 Precautions for safe handling: 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

7.2 Conditions for safe storage, including any incompatibilities:

Conditions for safe storage: Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed. Keep away from sources of ignition

Materials to Avoid/Chemical Incompatibility: Strong oxidizing agents

7.3 Specific end use(s): For Laboratory use only

SECTION 8: Exposure controls/personal protection

8.1 Control parameters:

Occupational Exposure limit values:

Chemical Name	United Kingdom - Workplace Exposure Limits (WELs) - TWAs	United Kingdom - Workplace Exposure Limits (WELs) - STELs	United Kingdom - Biological Monitoring Guidance Values
methanol	200 ppm TWA; 266 mg/m3 TWA	250 ppm STEL; 333 mg/m3 STEL	No data available

DNEL: None Known

PNEC: None Known

8.2 Exposure controls:

Appropriate engineering controls: Local exhaust ventilation is recommended when generating excessive levels of vapours from handling or thermal processing.

Individual protection measures, such as personal protective equipment:

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

Skin Protection:

Hand protection: No information available

Other 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
Respiratory Protection:	If an exposure limit is exceeded or if an operator is experiencing symptoms of inhalation overexposure as explained in Section 3, provide 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.
Respirator Type(s):	None required where adequate ventilation is provided. If airborne concentrations are above the applicable exposure limits, use NIOSH/MSHA approved respiratory protection.
Thermal Hazards:	Not applicable
Environmental exposure controls:	No data available

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties:

Appearance:	No data available
Colour:	No data available
Odour:	Mild
Odour threshold:	No data available
pH:	Not applicable
Melting Point/Freezing Point (°C):	
Melting point (°C):	No data available
Freezing point (°C):	No data available
Initial boiling point and boiling range (°C):	65
Flash point (°C):	11
Evaporation Rate (water = 1):	No data available
Flammability (solid, gas):	No data available
Upper/lower flammability or explosive limits:	
Upper flammable or explosive limit, % in air:	36
Lower flammable or explosive limit, %	6

in air:

Vapour pressure:	No data available
Vapor Density (Air=1):	1.1
Relative density (water = 1):	0.791 - 0.792 g/cm3 at 20 °C
Solubility(ies):	Moderate; 50-99%
Partition coefficient: n-octanol/water:	No data available
Auto-ignition temperature (°C):	464
Decomposition temperature (°C):	No data available
Viscosity:	No data available
Explosive properties:	No data available
Oxidizing properties:	No data available

9.2 Other information:

Volatile Organic Chemicals:	99.9
Bulk density:	6.676

SECTION 10: Stability and reactivity

10.1 Reactivity:	Not expected to be reactive
10.2 Chemical stability:	Stable under normal conditions.
10.3 Possibility of hazardous reactions:	None expected under standard conditions of storage
10.4 Conditions to avoid:	No data available
10.5 Incompatible materials:	Strong oxidizing agents
10.6 Hazardous decomposition products:	Carbon dioxide, Carbon monoxide

SECTION 11: Toxicological information

11.1 Information on toxicological effects:

Acute toxicity:

Chemical Name	ORAL LD50 (rat)	DERMAL LD50 (rabbit)	INHALATION LC50 (rat)
methanol	No data available	No data available	INHALATION LC50-8H Rat 22500 ppm

Classification has been based on toxicological information of the components in Section 3.

Skin corrosion/irritation:
Based on available data, the classification criteria are not met.

Serious eye damage/irritation:
Based on available data, the classification criteria are not met.

Respiratory or skin sensitisation:
Based on available data, the classification criteria are not met.

Germ cell mutagenicity:
Based on available data, the classification criteria are not met.

Carcinogenicity:
Classification has been based on toxicological information of the components in Section 3.

Reproductive toxicity:
Based on available data, the classification criteria are not met.

STOT-single exposure:
Classification has been based on toxicological information of the components in Section 3.

STOT-repeated exposure:
Based on available data, the classification criteria are not met.

Aspiration hazard:
Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

12.1 Toxicity: Moderate ecological hazard. This product may be dangerous to plants and/or wildlife.

Ecological Toxicity Data:

Chemical Name	CAS #	Aquatic EC50 Crustacea	Aquatic ERC50 Algae	Aquatic LC50 Fish
No data available				

12.2 Persistence and degradability: Biodegrades slowly.
12.3 Bioaccumulative potential: No data available
12.4 Mobility in soil: No data available
12.5 Results of PBT and vPvB assessment: No data available

12.6 Other adverse effects: None Known

12.7 Additional information: No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods:

Disposal methods: Spent or discarded material is a hazardous waste.
Dispose of by incineration following Federal, State, Local, or Provincial regulations.

Waste codes / waste designations according to LoW: No data available

SECTION 14: Transport information

International carriage of dangerous goods by road (ADR), rail or inland waterways:

14.1 UN number: UN1230

14.2 UN proper shipping name: Methanol

14.3 Transport hazard class(es): 3(6.1)

14.4 Packing group: II

International carriage of dangerous goods by air (IATA):

14.1 UN number: UN1230

14.2 UN proper shipping name: Methanol

14.3 Transport hazard class(es): 3(6.1)

14.4 Packing group: II

14.5 Environmental hazards: Yes

14.6 Special precautions for user: No data available

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: No data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

Chemical Name	EINECS	SVHC
methanol	Yes	No

benz (a) anthracene	Yes	No

15.2 Chemical Safety Assessment No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

SECTION 16: Other information

Revision Date: 01-08-2019

Indication of changes: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.

Abbreviations and acronyms:

CAS = Chemical Abstract Service
DNEL= Derivative No Effect Level
EC= European Community
EINECS = European Inventory of Existing Chemical Substances
MSHA = Mine Safety Health Administration
NIOSH = National Institute of Occupational Safety & Health
OEL = Occupational Exposure Limit
PBT= Persistent, Bioaccumulative, Toxic
PNEC= Predicted No Effect Concentration
SCOEL= Scientific Committee on Occupational Exposure Limits
TLV = Threshold Limit Value
TWA= Time Weighted Average
vPvB= Very Persistent, Very Bioaccumulative
Wt.% = Weight Percent

Key literature references and sources for data: No data available

Hazard phrase(s) referenced in section 3

H350 - May cause cancer.
H225 - Highly flammable liquid and vapour
H301+H311+H331 - Toxic if swallowed, in contact with skin or if inhaled
H370 - Causes damage to organs
H410 - Very toxic to aquatic life with long lasting effects

Precautionary Statements:

Prevention:

P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.

	P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
	P233 - Keep container tightly closed.
	P240 - Ground/bond container and receiving equipment.
	P241 - Use explosion-proof electrical/ventilating/lighting equipment.
	P242 - Use only non-sparking tools.
	P243 - Take precautionary measures against static discharge.
	P260 - Do not breathe dust/fume/gas/mist/vapours/spray.
	P264 - Wash thoroughly after handling.
	P270 - Do not eat, drink or smoke when using this product.
	P273 - Avoid release to the environment.
	P280 - Wear protective gloves/protective clothing/eye protection/face protection.
Response:	P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER/doctor.
	P302+P352 - If on skin: Wash with plenty of water.
	P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
	P308+P311 - IF exposed or concerned: Call a POISON CENTER/doctor.
	P308+P313 - IF exposed or concerned: Get medical advice/ attention.
	P312 - Call a POISON CENTER/doctor if you feel unwell.
	P321 - Specific treatment (see Sections 4 to 8 on this SDS and any additional information on this label).
	P330 - Rinse mouth.
	P361+P364 - Take off immediately all contaminated clothing and wash it before reuse.
	P370+P378 - In case of fire: Use an appropriate extinguisher (see section 5) to extinguish.
	P391 - Collect spillage.
Storage:	P233 - Keep container tightly closed.
	P403+P235 - Store in a well-ventilated place. Keep cool.
	P405 - Store locked up.
Disposal:	P501 - Dispose of contents/container to a suitable disposal site in accordance with local/national/international regulations.

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Safety Data Sheet
acc. to OSHA HCS

Printing date 03/24/2019 Version Number 2 Reviewed on 03/21/2019

*
1 Identification

· **Product identifier**

· **Trade name: Benzo(a)pyrene**

· **Part number:** RAH-010, RAH-010-10MG
· **CAS Number:**
50-32-8
· **EC number:**
200-028-5
· **Index number:**
601-032-00-3
· **Application of the substance / the mixture** Reagents and Standards for Analytical Chemical Laboratory Use

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Agilent Technologies, Inc.
5301 Stevens Creek Blvd.
Santa Clara, CA 95051 USA

· **Information department:**
Telephone: 800-227-9770
e-mail: pdl-msds_author@agilent.com
· **Emergency telephone number:** CHEMTREC®: 1-800-424-9300

*
2 Hazard(s) identification

· **Classification of the substance or mixture**

GHS08 Health hazard

Muta. 1B H340 May cause genetic defects.
Carc. 1B H350 May cause cancer.
Repr. 1B H360 May damage fertility or the unborn child.

GHS07

Skin Sens. 1 H317 May cause an allergic skin reaction.

· **Label elements**
· **GHS label elements** The substance is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**

GHS07

GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
benzo[a]pyrene
· **Hazard statements**
May cause an allergic skin reaction.

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

Printing date 03/24/2019 Version Number 2 Reviewed on 03/21/2019

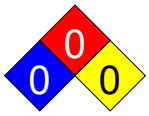
Trade name: Benzo(a)pyrene

(Contd. of page 1)

May cause genetic defects.
May cause cancer.
May damage fertility or the unborn child.

· **Precautionary statements**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid breathing dust/fume/gas/mist/vapors/spray
Contaminated work clothing must not be allowed out of the workplace.
Wear protective gloves/protective clothing/eye protection/face protection.
If on skin: Wash with plenty of water.
IF exposed or concerned: Get medical advice/attention.
Specific treatment (see on this label).
If skin irritation or rash occurs: Get medical advice/attention.
Wash contaminated clothing before reuse.
Store locked up.
Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Classification system:**
· **NFPA ratings (scale 0 - 4)**



Health = 0
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = *0
Fire = 0
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Substances**
· **CAS No. Description**
50-32-8 benzo[a]pyrene
· **Identification number(s)**
· **EC number:** 200-028-5
· **Index number:** 601-032-00-3

4 First-aid measures

· **Description of first aid measures**
· **After inhalation:**
Supply fresh air and to be sure call for a doctor.
In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water.

(Contd. on page 3)

Safety Data Sheet
acc. to OSHA HCS

Trade name: Benzo(a)pyrene

(Contd. of page 2)

· **After swallowing:** If symptoms persist consult doctor.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:** Use fire fighting measures that suit the environment.
· **Special hazards arising from the substance or mixture** No further relevant information available.
· **Advice for firefighters**
· **Protective equipment:** No special measures required.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures** Not required.
· **Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**
0.6 mg/m³
· **PAC-2:**
120 mg/m³
· **PAC-3:**
700 mg/m³

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
· **Information about protection against explosions and fires:** Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Keep receptacle tightly sealed.

(Contd. on page 4)

(Contd. of page 3)

· **Specific end use(s)** No further relevant information available.

*

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**	
50-32-8 benzo[a]pyrene	
PEL	Long-term value: 0.2 mg/m³ see Coal tar pitch volatiles
REL	Long-term value: 0.1 mg/m³ Coal tar pitch volatile; Pocket Guide Apps. A+C
TLV	L; BEIp

· **Ingredients with biological limit values:**	
50-32-8 benzo[a]pyrene	
BEI	- Medium: urine Time: end of shift at end of workweek Parameter: 1-Hydroxypyrene with hydrolysis (nonquantitative)

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
· **Breathing equipment:**
When used as intended with Agilent instruments, the use of the product under normal laboratory conditions and with standard practices does not result in significant airborne exposures and therefore respiratory protection is not needed.
Under an emergency condition where a respirator is deemed necessary, use a NIOSH or equivalent approved device/equipment with appropriate organic or acid gas cartridge.
· **Protection of hands:**
Although not recommended for constant contact with the chemicals or for clean-up, nitrile gloves 11-13 mil thickness are recommended for normal use. The breakthrough time is 1 hr. For cleaning a spill where there is direct contact of the chemical, butyl rubber gloves are recommended 12-15 mil thickness with breakthrough times exceeding 4 hrs. Supplier recommendations should be followed.
· **Material of gloves**
For normal use: nitrile rubber, 11-13 mil thickness
For direct contact with the chemical: butyl rubber, 12-15 mil thickness
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· **Penetration time of glove material**
For normal use: nitrile rubber: 1 hour
For direct contact with the chemical: butyl rubber: >4 hours

(Contd. on page 5)

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Printing date 03/24/2019 Version Number 2 Reviewed on 03/21/2019

Trade name: Benzo(a)pyrene

(Contd. of page 4)

· **Eye protection:**

Tightly sealed goggles

*

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Solid
Color:	Not determined.
· **Odor:**	Characteristic
· **Odor threshold:**	Not determined.
· **pH-value:**	Not applicable.
· **Change in condition**	
Melting point/Melting range:	179 °C (354.2 °F)
Boiling point/Boiling range:	495 °C (923 °F)
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Product is not flammable.
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Not determined.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapor pressure:**	Not applicable.
· **Density at 20 °C (68 °F):**	1.35 g/cm³ (11.26575 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not applicable.
· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with**	
Water:	Insoluble.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
VOC content:	0.00 % 0.0 g/l / 0.00 lb/gal
Solids content:	100.0 %

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(Contd. of page 5)

· **Other information** No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**
· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** No irritating effect.
· **Sensitization:** Sensitization possible through skin contact.
· **Additional toxicological information:**

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**
1

· **NTP (National Toxicology Program)**
R

· **OSHA-Ca (Occupational Safety & Health Administration)**
Substance is not listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 3 (Assessment by list): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

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Trade name: Benzo(a)pyrene

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· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

*

14 Transport information

· **UN-Number**	
· **DOT, IMDG, IATA**	UN3077
· **UN proper shipping name**	
· **DOT**	Environmentally hazardous substance, solid, n.o.s. (benzo[a] pyrene)
· **IMDG**	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (benzo[a]pyrene), MARINE POLLUTANT
· **IATA**	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (benzo[a]pyrene)
· **Transport hazard class(es)**	
· **DOT, IMDG, IATA**	
· **Class**	9 Miscellaneous dangerous substances and articles
· **Label**	9
· **Packing group**	
· **DOT, IMDG, IATA**	III
· **Environmental hazards:**	
· **Marine pollutant:**	Yes (DOT) Symbol (fish and tree)
· **Special marking (IATA):**	Symbol (fish and tree)
· **Special precautions for user**	Warning: Miscellaneous dangerous substances and articles
· **Danger code (Kemler):**	90
· **EMS Number:**	F-A,S-F
· **Stowage Category**	A
· **Stowage Code**	SW23 When transported in BK3 bulk container, see 7.6.2.12 and 7.7.3.9.
· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.

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Safety Data Sheet
acc. to OSHA HCS

Trade name: Benzo(a)pyrene

(Contd. of page 7)

· **Transport/Additional information:**

· **DOT**

· **Quantity limitations**	On passenger aircraft/rail: No limit On cargo aircraft only: No limit
· **Hazardous substance:**	1 lbs, 0.454 kg
· **Remarks:**	Special marking with the symbol (fish and tree).

· **IMDG**

· **Limited quantities (LQ)**	5 kg
· **Excepted quantities (EQ)**	Code: E1 Maximum net quantity per inner packaging: 30 g Maximum net quantity per outer packaging: 1000 g
· **UN "Model Regulation":**	UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (BENZO[A]PYRENE), 9, III

*
15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **Sara**

· **Section 355 (extremely hazardous substances):**
Substance is not listed.

· **Section 313 (Specific toxic chemical listings):**
Substance is listed.

· **TSCA (Toxic Substances Control Act):**
Substance is listed.

· **Proposition 65**

· **Chemicals known to cause cancer:**
Substance is listed.

· **Chemicals known to cause reproductive toxicity for females:**
Substance is not listed.

· **Chemicals known to cause reproductive toxicity for males:**
Substance is not listed.

· **Chemicals known to cause developmental toxicity:**
Substance is not listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**
CaH

· **TLV (Threshold Limit Value established by ACGIH)**
A2

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
Substance is listed.

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Safety Data Sheet
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· **National regulations:**
· **Additional classification according to Decree on Hazardous Materials:**
Carcinogenic hazardous material group I (extremely dangerous).
Carcinogenic hazardous material group II (very dangerous).
Carcinogenic hazardous material group III (dangerous).

· **Information about limitation of use:**
Workers are not allowed to be exposed to this hazardous material. Exceptions can be made by the authorities in certain cases.
· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

*
16 Other information

The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.

· **Department issuing SDS:** Document Control / Regulatory
· **Contact:** regulatory@ultrasci.com
· **Date of preparation / last revision** 03/24/2019 / 1
· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
BEI: Biological Exposure Limit
Skin Sens. 1: Skin sensitisation – Category 1
Muta. 1B: Germ cell mutagenicity – Category 1B
Carc. 1B: Carcinogenicity – Category 1B
Repr. 1B: Reproductive toxicity – Category 1B
· *** Data compared to the previous version altered.**

Safety Data Sheet

Revision Date: 08/13/18
www.restek.com

2 Letter ISO country code/language code: US/EN

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:	10
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:

GHS Classification:	Carcinogenicity Category 1B 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. May cause cancer.
GHS Precautions:	
Safety Precautions:	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/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. IF exposed or concerned: Get medical advice/attention. 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: Specific target organ toxicity - Single exposure - STOT SE 3: H336 May cause drowsiness or dizziness.

Repeated Exposure Target Organs: No data available

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.9
benzo (b) fluoranthene	205-99-2	205-911-9	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 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. 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
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	750 ppm STEL; 1782 mg/m3 STEL	500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (b) fluoranthene	205-99-2	Not established	None Known	Not established	No data available

Personal Protection:

Engineering Measures:	Local exhaust ventilation is recommended when generating excessive levels of vapours 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:	Not applicable
Vapor Pressure:	No data available
Vapor Density:	2.0 (air = 1)
Boiling Point (°C):	56.05 °C at 1013.25 hPa
Melting Point (°C):	-95.4 °C Melting Point
Flash Point (°F):	39
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	No data available
Lower Flammable/Explosive Limit, % in air:	No data available
Autoignition Temperature (°C):	465 deg C
Decomposition Temperature (°C):	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:	None known.
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; Inhalation LC50 Rat 50100 mg/m3 8 h; Oral LD50 Rat 5800 mg/kg

Component Carcinogenic Data:

OSHA:

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

ACGIH:

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

NIOSH:

Chemical Name	CAS No.
No data available	

NTP:

Chemical Name	CAS No.
No data available	

IARC:

Chemical Name	CAS No.	Group No.
Monograph 92 [2010]; Supplement 7 [1987]; Monograph 32 [1983]	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.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: 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: 12/08/16

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: 07/15/19
www.restek.com

2 Letter ISO country code/language code: US/EN

1. IDENTIFICATION

Catalog Number / Product Name:	**31274 / Benzo(k)fluoranthene Standard**
Company:	Restek Corporation
Address:	110 Benner Circle Bellefonte, Pa. 16823
Phone#:	814-353-1300
Fax#:	814-353-1309
Emergency#:	800-424-9300 (CHEMTREC) 703-527-3887 (Outside the US)
Email:	www.restek.com
Revision Number:	12
Intended use:	For Laboratory use only

2. HAZARD(S)IDENTIFICATION

Emergency Overview:

GHS Hazard Symbols:

GHS Classification:	Carcinogenicity Category 1B 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. May cause cancer.
GHS Precautions:	
Safety Precautions:	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/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. IF exposed or concerned: Get medical advice/attention. 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: Specific target organ toxicity - Single exposure - STOT SE 3: H336 May cause drowsiness or dizziness.

Repeated Exposure Target Organs: No data available

3. COMPOSITION / INFORMATION ON INGREDIENT

Chemical Name	CAS #	EINEC #	% Composition
Acetone	67-64-1	200-662-2	99.9
benzo (k) fluoranthene	207-08-9	205-916-6	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 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. 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
Acetone	67-64-1	2500 ppm IDLH (10% LEL)	750 ppm STEL; 1782 mg/m3 STEL	500 ppm TWA; 1188 mg/m3 TWA	1000 ppm TWA; 2400 mg/m3 TWA
benzo (k) fluoranthene	207-08-9	Not established	None Known	Not established	No data available

Personal Protection:

Engineering Measures:	Local exhaust ventilation is recommended when generating excessive levels of vapours 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:	Not applicable
Vapor Pressure:	No data available
Vapor Density:	2.0 (air = 1)
Boiling Point (°C):	480 °C 56.05 °C at 1013.25 hPa
Melting Point (°C):	-95.4 °C Melting Point
Flash Point (°F):	39
Flammability:	Highly Flammable
Upper Flammable/Explosive Limit, % in air:	No data available
Lower Flammable/Explosive Limit, % in air:	No data available
Autoignition Temperature (°C):	465 deg C
Decomposition Temperature (°C):	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:	99.9
Molecular Weight:	58.08

10. STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Conditions to Avoid:	None known.
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; Inhalation LC50 Rat 50100 mg/m3 8 h; Oral LD50 Rat 5800 mg/kg

Component Carcinogenic Data:

OSHA:

Chemical Name	CAS No.	
Benzo(k)fluoranthene	207-08-9	Present

ACGIH:

Chemical Name	CAS No.	
Acetone	67-64-1	A4 - Not Classifiable as a Human Carcinogen

NIOSH:

Chemical Name	CAS No.
No data available	

NTP:

Chemical Name	CAS No.
No data available	

IARC:

Chemical Name	CAS No.	Group No.
Monograph 92 [2010]; Supplement 7 [1987]; Monograph 32 [1983]	207-08-9	Group 2B

12. ECOLOGICAL INFORMATION

Overview: This material is not expected to be harmful to the ecology.

Mobility: No data

Persistence: No data

Bioaccumulation: No data

Degradability: No data

Ecological Toxicity Data: No data available

13. DISPOSAL CONSIDERATIONS

Waste Description of Spent Product: Spent or discarded material is a hazardous waste.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: Acetone
UN Number: UN1090
Hazard Class: 3
Packing Group: II

International:

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

Marine Pollutant: No

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

15. REGULATORY INFORMATION

United States:

Chemical Name	CAS#	CERCLA	SARA 313	SARA EHS 313	TSCA
Acetone	67-64-1	X	-	-	X
benzo (k) fluoranthene	207-08-9	X	X	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
Benzo[k]fluoranthene	207-08-9	Prop 65 Cancer

State Right To Know Listing:

Chemical Name	CAS#	New Jersey	Massachusetts	Pennsylvania	California
Acetone	67-64-1	X	X	X	X
benzo (k) fluoranthene	207-08-9	X	X	X	X

16. OTHER INFORMATION

Prior Version Date: 06/15/18

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
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.

COPPER METAL
SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identity: Copper Metal.

Trade Names and Synonyms: Cu-CATH-1; Copper Cathode (Higher Purity Grade).

Manufacturer:
Teck Advanced Materials Inc.
13670 Danielson Street
Suite H & I
Poway, CA 92064
Emergency Telephone: 858-391-2935

Supplier:
Teck Advanced Materials Inc.
13670 Danielson Street
Suite H & I
Poway, CA 92064

Preparer:
Teck Metals Ltd.
Suite 3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of Last Review: June 19, 2015.

Date of Last Edit: June 19, 2015.

Product Use: Copper is used in the manufacture of bronzes, brass, other copper alloys, and electrical conductors.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

NOTE: In the form in which it is sold, this product is not regulated as a Hazardous Product in the U.S. or Canada. This Safety Data Sheet is provided for information purposes only.

Health		Physical	Environmental
Acute Toxicity (Oral, Inhalation)	– Does not meet criteria	Does not meet criteria for any Physical Hazard	Aquatic Toxicity – (Short Term/Long Term) Does not meet any criteria
Skin Corrosion/Irritation	– Does not meet criteria		
Eye Damage/Eye Irritation	– Does not meet criteria		
Respiratory or Skin Sensitization	– Does not meet criteria		
Mutagenicity	– Does not meet criteria		
Carcinogenicity	– Does not meet criteria		
Reproductive Toxicity	– Does not meet criteria		
Specific Target Organ Toxicity:			
Acute Exposure	– Does not meet criteria		
Chronic Exposure	– Does not meet criteria		

LABEL:

Symbols: None required	**Signal Word:** None required
Hazard Statements	**Precautionary Statements:**
None required	None required

Emergency Overview: Reddish metal that does not burn in bulk. Copper dust clouds will not explode readily, if at all, in air. Due to its high melting point, molten copper metal is unlikely to occur in most fire situations. This metal is relatively non-toxic and poses little immediate hazard to personnel or the environment in an emergency situation.

Potential Health Effects: Inhalation of dust may result in irritation of the nasal mucous membranes. Inhalation of copper oxide fumes may cause irritation of the upper respiratory tract and may result in a form of metal fume fever, characterized by flu-like symptoms such as chills, fever, nausea, and vomiting. Ingestion of copper metal may cause metallic taste and gastrointestinal irritation. Copper particles embedded in the eye may cause redness, pain and discoloration of ocular tissue. Direct skin contact may result in irritation in some workers. Discoloration of the skin has been observed from handling copper, but does not indicate an actual injury. Copper is not listed as a carcinogen by OSHA, the NTP, the ACGIH, IARC, or the EU (see Toxicological Information, Section 11).

Potential Environmental Effects: Copper is relatively insoluble in water and, therefore, likely has low bioavailability. However, long-term exposure in aquatic and terrestrial environments or processing of the product can lead to the release of the constituent copper in more bioavailable forms. These bioavailable forms have the potential to yield toxic effects on aquatic organisms (see Ecological Information, Section 12).

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENT	CAS Registry No.	CONCENTRATION (% wgt/wgt)
Copper	7440-50-8	>99.9%

Note: See Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms: Mild eye irritation, redness.* Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for five minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, immediately obtain medical attention. DO NOT attempt to manually remove anything stuck to the eye, but rather seek immediate medical attention in this case.

Skin Contact: *Symptoms: Soiling of skin.* Dust: No health effects expected. If irritation does occur, flush with lukewarm, gently flowing water and mild soap for five minutes or until the product is removed. If skin irritation persists or if you feel unwell, obtain medical advice. Molten Metal: Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: *Symptoms: Coughing and irritation in heavy dust/fume clouds.* If symptoms are experienced, remove source of contamination or move victim from exposure area to fresh air. Get medical advice/attention if you feel unwell or are concerned. NOTE: Metal fume fever may develop 3-10 hours after exposure to copper fume. If symptoms of metal fume fever (flu-like symptoms) develop, obtain medical attention.

Ingestion: *Symptoms: Metallic taste, stomach upset.* Rinse mouth. If irritation or discomfort occurs, obtain medical advice.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not considered a fire or explosion hazard. Finely-divided copper metal dust or powder has also been demonstrated to be non-flammable in laboratory testing. Explosions may occur however upon contact with certain incompatible materials (see Stability and Reactivity, Section 10).

Extinguishing Media: Use any means of extinction appropriate for the surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam.

Fire Fighting: If possible, move solid materials from fire area. Cool any materials that are exposed to heat or flames by the application of water streams until well after the fire has been extinguished. Copper metal has a high melting point, and is unlikely to melt except in the most extreme fire conditions. If molten metal is present, do not use direct water streams on fires, due to the risk of a steam explosion that could potentially eject molten metal uncontrollably. Use a fine water mist on the front-running edge of the spill and on the top of the molten metal to cool and solidify it. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face piece mask.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection. Molten metal should be allowed to cool and harden before cleanup. Once solidified wear gloves, pick up and return to process. Powder or dust should be cleaned up using methods which will minimize dust generation (e.g., vacuum solids, dampen material and shovel or wet sweep). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labelled containers for later recovery in view of the commercial value of copper. Treat or dispose of waste material in accordance with all local, state/provincial, and national requirements.

Personal Precautions: Persons responding to an accidental release should wear protective clothing, gloves and a respirator in the event of a molten metal spill (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust and fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash and radiant heat.

Environmental Precautions: Copper compounds, while not readily bioavailable in the environment, have the potential to pose ecological effects to aquatic life forms under certain chemical conditions. Releases of the product to water and soil should, therefore, be prevented.

SECTION 7. HANDLING AND STORAGE

Store copper in a dry, covered area. Copper cathodes suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Cathodes may contain cavities that collect moisture. Entrained moisture will expand explosively when immersed in a molten bath and potentially spatter molten metal out of the bath.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines:

Component	ACGIH TLV	OSHA PEL	NIOSH REL
Copper (Dust)	1 mg Cu/m^3	1 mg Cu/m^3	1 mg Cu/m^3
Copper (Fume)	0.2 mg Cu/m^3	0.1 mg Cu/m^3	0.1 mg Cu/m^3

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction.
ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentration of copper (as either dust or fumes) in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system.

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when copper is processed. Appropriate eye protection should be worn where fume or dust is generated. Where hot or molten metal is handled, heat resistant gloves, goggles or face shield, and clothing to protect from hot metal splash and radiant heat should be worn. Safety type boots are recommended.

Respirators: Where copper dust or fumes are generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-95 particulate filter cartridge as a minimum).

General Hygiene Considerations: Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate, designated areas.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Reddish metal	**Odour:** None	**Odour Threshold:** Not Applicable	**pH:** Not Applicable
Vapour Pressure: 1 mm Hg at 1083°C Negligible @ 20°C	**Vapour Density:** Not Applicable	**Melting Point/Range:** 1083°C	**Boiling Point/Range:** 2595°C
Relative Density (Water = 1)**:** 8.94	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Not Applicable	**Solubility:** Insoluble in water
Flash Point: None	**Flammable Limits (LEL/UEL):** Not Flammable	**Auto-ignition Temperature:** None	**Decomposition Temperature:** None

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Copper is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur.

Incompatibilities: Copper is incompatible with nitric acid, acetylene, chlorine, fluorine, chlorine trifluoride, and peroxides. Shock-sensitive compounds are formed with acetylenic compounds, ethylene oxide or azide compounds. Copper in finely-divided powder or granular form reacts with strong oxidants like chlorates, bromates, iodates and ammonium nitrate causing a potential explosion hazard.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting, electric arc welding, arc-air gouging or overheating a molten metal bath may generate copper fumes. These fumes will contain copper oxides, which, on inhalation in sufficient quantity, can produce metal fume fever.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Copper is an essential element, but can become toxic when inhaled or ingested in large doses. Most reports of acute toxicity are from suicidal attempts involving ingestion of copper sulphate. Individuals with a rare disorder called "Wilson's Disease" (estimated prevalence 0.003% of the population) are predisposed to accumulate copper and should not be occupationally exposed. However, in the form in which this product is sold it is relatively non-toxic. The major route of exposure would be through the generation and inhalation of copper oxide fume.

Acute:
Skin: Copper metal is not irritating to skin other than by direct abrasive action of metal particles on skin tissue.

Eye: Contact with dust or fume may cause local irritation. Embedded copper particles in the eye result in a brownish or green-brown discoloration of the cornea, lens and iris (chalcosis) which may progress to serious ocular complications.

Inhalation: Copper dust may be irritating to the nasal passages and the throat with a sweetish, metallic taste and excessive salivation. An intense, short-term exposure to copper fumes from cutting or welding, etc. could result in the condition called metal fume fever. The symptoms of metal fume fever generally occur within 3 to 10 hours. They may include immediate dryness and irritation of the throat, metallic taste, tightness of the chest, and coughing that may later be followed by flu-like symptoms of fever, malaise, perspiration, frontal headache, muscle cramps, low back pain, occasionally blurred vision, nausea, and vomiting. Those experiencing a single acute episode of metal fume fever generally recover slowly but without apparent residual effects.

Ingestion: Ingestion of copper metal may cause metallic taste and gastrointestinal irritation. Individuals reported to have ingested large quantities of copper salts have reported gastrointestinal effects including vomiting, diarrhea, nausea, malaise, anorexia, abdominal pain and a metallic taste in the mouth. Effects on the kidneys and liver, and even death have also been reported in severe cases of copper poisoning from ingesting soluble copper salts. However, copper is a strong emetic and spontaneous vomiting following ingestion usually limits uptake of copper.

Chronic: Prolonged exposure to copper dust or fume can cause irritation to the eye and skin. A green discoloration of the skin has been reported similar to that sometimes experienced from copper jewelry. This green discoloration may occasionally also be seen in hair (particularly notable in blonde hair), nails and teeth. A few instances of allergic contact dermatitis have been reported. Copper is not listed as a human carcinogen by the Occupational Safety and Health Administration (OSHA), the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), the American Conference of Governmental Industrial Hygienists (ACGIH) or the European Union (EU).

Animal Toxicity:

Hazardous Ingredient:	Acute Oral Toxicity:	Acute Dermal Toxicity:	Acute Inhalation Toxicity:
Copper	>5,000 mg/kg†	>2,000 mg/kg*	>5.11 mg/L‡

† LD_{50}, Mouse, Oral, ‡ LC_{50}, Rat, Inhalation, 4 hour * LD_{50}, Mouse, Dermal

SECTION 12. ECOLOGICAL INFORMATION

Copper metal is relatively insoluble in water and, therefore, generally has low bioavailability. However, long-term exposure in aquatic and terrestrial environments or processing of the product can lead to the release of the constituent copper in more bioavailable forms. These more bioavailable forms have the potential to yield toxic effects under specific chemical conditions (e.g., low pH). The mobility of the copper compounds in soluble forms is also media-dependent. They can bind with inorganic and organic ligands, reducing their mobility and bioavailability in both soil and water. Bioavailability is also regulated by other factors in the aquatic environment, such as hardness and dissolved organic carbon content.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

No special shipping or transportation requirements in ingot form.

SECTION 15. REGULATORY INFORMATION

U.S.

INGREDIENTS LISTED ON TSCA INVENTORY..... Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD..... No (CFR 1910.1200, revised March 26, 2012)

CERCLA SECTION 103 HAZARDOUS SUBSTANCES ..... Yes .....RQ: 5,000 lbs. (2270 kg.)*
*reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE ..... No

EPCRA SECTION 311/312 HAZARD CATEGORIES ..... No Hazard Categories Apply

EPCRA SECTION 313 TOXIC RELEASE INVENTORY:..... Copper.....CAS No. 7440-50-8
Percent by Weight - At least 99%

SECTION 16. OTHER INFORMATION

Date of Original Issue: January 12, 2007 **Version:** 01 *(First edition)*

Date of Latest Revision: June 19, 2015 **Version:** 05

The information in this Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, 7th Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2015, Guide to Occupational Exposure Values.
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Notice to Reader

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Safety Data Sheet

Revision Date: 06/04/19
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:	11
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:	99.9
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: 03/22/18
Other Information: Any changes to the SDS compared to previous versions are marked by a vertical line in front of the concerned paragraph.
References: No data available
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LEAD METAL
SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identity: Lead Metal

Trade Names and Synonyms: Lead; Pb; Plumbum; Metallic Lead; Inorganic Lead; ASTM B29; TADANAC Lead, Low-Alpha Lead.

Manufacturer:
Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:
In U.S.:
Teck American Metal Sales Incorporated
501 North Riverpoint Blvd, Suite 300
Spokane, WA
USA, 99202

Other than U.S.:
Teck Metals Ltd.
#1700 – 11 King Street West
Toronto, Ontario
M5H 4C7

Preparer:
Teck Metals Ltd.
Suite 3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of Last Review: June 29, 2015.

Date of Last Edit: June 29, 2015.

Product Use: Used as a construction material for tank linings, piping, and equipment used in the manufacture of sulphuric acid and the refining and processing of petroleum; used in x-ray and atomic radiation shielding; used in the manufacture of paint pigments, organic and inorganic lead compounds, lead shot, lead wire for bullets, ballast, and lead solders; used as a bearing metal or alloy; used in the manufacture of storage batteries, ceramics, plastics, and electronic devices; used in the metallurgy of steel and other metals; and used in the form of lead oxide for batteries.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

Health		Physical	Environmental
Acute Toxicity (Oral, Inhalation)	– Does not meet criteria	Does not meet criteria for any Physical Hazard	**Aquatic Toxicity – Short Term (Acute) Category 3**
Skin Corrosion/Irritation	– Does not meet criteria		
Eye Damage/Eye Irritation	– Does not meet criteria		
Respiratory or Skin Sensitization	– Does not meet criteria		
Mutagenicity	– Does not meet criteria		
Carcinogenicity	**– Category 2**		
Reproductive Toxicity	**– Category 1A**		
Specific Target Organ Toxicity Chronic Exposure	**– Category 1**		

LABEL:

Symbols:

Signal Word:

DANGER

Hazard Statements	**Precautionary Statements:**
DANGER! Causes damage to kidneys, blood-forming systems, central nervous system and digestive tract through prolonged or repeated exposure. May damage the unborn child. May cause harm to breast-fed children. Suspected of damaging fertility. Suspected of causing cancer. Harmful to aquatic life.	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection. Do not breathe dust or fumes. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. If exposed or concerned or you feel unwell: Get medical advice/attention. Avoid release to the environment.

Emergency Overview: A bluish-white to silvery-grey, heavy, soft metal that does not burn in bulk. Finely-divided lead dust clouds are a moderate fire and explosion hazard, however. When heated strongly in air, highly toxic lead oxide fumes can be generated. Inhalation or ingestion of lead may produce both acute and chronic health effects. Possible cancer and reproductive hazard. SCBA and full protective clothing are required for fire emergency response personnel.

Potential Health Effects: Inhalation or ingestion of lead may result in headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm, and joint pain. Prolonged exposure may also cause central nervous system damage, hypertension, gastrointestinal disturbances, anemia, kidney dysfunction and possible reproductive effects. Pregnant women should be protected from excessive exposure in order to prevent lead crossing the placental barrier and causing infant neurological disorders. Lead and inorganic lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP lists lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU does not currently list lead as a human carcinogen (see Toxicological Information, Section 11).

Potential Environmental Effects: Lead metal has relatively low bioavailability; however, compounds which it forms with other elements can be toxic to both aquatic and terrestrial organisms at low concentrations. These compounds can be particularly toxic in the aquatic environment. Lead bioaccumulates in plants and animals in both aquatic and terrestrial environments (see Ecological Information, Section 12).

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENT	CAS Registry No.	CONCENTRATION (% wgt/wgt)
Lead	7439-92-1	99+%

Note: See Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Eye irritation, redness. Gently brush product off face if necessary. Do not rub eye(s). Let the eye(s) water naturally for a few minutes. Look right and left, then up and down. If particle/dust does not dislodge, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, get medical advice/attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: *Symptoms:* Skin soiling, mild irritation. Gently brush away excess dust. Wash gently and thoroughly with lukewarm, gently flowing water and non-abrasive soap for 5 minutes, or until product is removed. If skin irritation occurs or you feel unwell, get medical advice/attention. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: *Symptoms:* Respiratory irritation. Remove source of exposure or move person to fresh air and keep comfortable for breathing. Seek medical attention if you feel unwell.

Ingestion: *Symptoms:* Stomach upset. If you feel unwell or are concerned, get medical advice/attention.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not flammable or combustible. Finely-divided lead dust or powder is a moderate fire hazard and moderate explosion hazard when dispersed in the air at high concentrations and exposed to heat, flame, or other ignition sources. Explosions may also occur upon contact with certain incompatible materials (see Stability and Reactivity, Section 10).

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam.

Fire Fighting: Do not use direct water streams on fires where molten metal is present, due to the risk of a steam explosion that could potentially eject molten metal uncontrollably. Use a fine water mist on the front-running edge of the spill and on the top of the molten metal to cool and solidify it. If possible, move solid material from fire area or cool material exposed to flame to prevent melting of the metal ingots. Highly toxic lead oxide fumes may evolve in fires. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Restrict access to the area until completion of clean-up. Clean up spilled material immediately, observing precautions outlined below. Molten metal should be allowed to solidify before cleanup. If solid metal, wear gloves, pick up and return to process. If dust, wear recommended personal protective equipment (see below) and use methods which will minimize dust generation (e.g., vacuum solids). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labelled containers for later recovery or disposal. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

Personal Precautions: Persons responding to an accidental release should wear protective clothing, gloves and a respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust and fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash as well as a respirator to protect against inhalation of lead fume. Workers should wash and change clothing following cleanup of a lead spill to prevent personal contamination with lead dust.

Environmental Precautions: Lead metal has low bioavailability; however, compounds which it forms with other elements can be toxic to aquatic and terrestrial organisms. Releases of the product to water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store in a DRY, covered area, separate from strong acids, other incompatible materials, active metals and food or feedstuffs. Solid metal suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Otherwise, entrained moisture could expand explosively and spatter molten metal out of the bath. No special packaging materials are required. Lead metal, in contact with wood or other surfaces, may leave traces of lead particulate that can accumulate over time. Cleaning or disposal of these surfaces requires review to ensure that any effluent or solid waste disposal meets the requirements of regulations in the applicable jurisdiction.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines:

Component	ACGIH TLV	OSHA PEL	NIOSH REL
Lead	0.05 mg/m^3	0.05 mg/m^3	0.05 mg/m^3

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction.
ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentration of lead fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Local exhaust is recommended for melting, casting, welding, grinding, flame cutting or burning, and use of lead powders.

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when lead is processed. Appropriate eye protection should be worn where fume or dust is generated. Where hot or molten metal is handled, heat resistant gloves, goggles or face shield, and clothing to protect from radiant heat and hot metal splash should be worn. Safety type boots are recommended.

Respirators: Where lead dust or fumes are generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge). When exposure levels are obviously high but the actual concentration is unknown, a self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask should be worn.

General Hygiene Considerations: Do not eat, drink or smoke in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate, designated areas as well as at the end of the workday. A double locker-shower system with separate clean and dirty sides is usually required for lead handling operations to avoid cross-contamination of street clothes. Contaminated clothing should be changed frequently and laundered before each reuse. Inform laundry personnel of contaminants' hazards. Workers should not take dirty work clothes home and launder them with other personal clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Malleable, bluish-white to silvery-grey solid metal	**Odour:** None	**Odour Threshold:** Not Applicable	**pH:** Not Applicable
Vapour Pressure: (negligible @ 20°C)	**Vapour Density:** Not Applicable	**Melting Point/Range:** 328°C	**Boiling Point/Range:** 1,740°C
Relative Density (Water = 1)**:** 11.34	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Not Applicable	**Solubility:** Insoluble in water
Flash Point: None	**Flammable Limits (LEL/UEL):** Not Flammable	**Auto-ignition Temperature:** None	**Decomposition Temperature:** None

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur. Freshly cut or cast lead surfaces tarnish rapidly due to the formation of an insoluble protective layer of basic lead carbonate.

Incompatibilities: Lead reacts vigorously with strong acids (e.g., hot concentrated nitric acid, boiling concentrated hydrochloric acid, etc.), strong oxidizers such as peroxides, chlorates, nitrates and halogen or interhalogen compounds such as chlorine trifluoride. Powdered lead metal in contact with disodium acetylide, chlorine trifluoride, sodium carbide or fused ammonium nitrate poses a risk of explosion. Solutions of sodium azide in contact with lead metal can form lead azide, which is a detonating compound. Vigorous reactions can also occur between molten lead and active metals, such as sodium, potassium, lithium and calcium. A lead-zirconium alloy (10-70% Zr) will ignite when struck with a hammer.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting or burning, electric arc welding or overheating a molten bath will generate highly toxic lead oxide fume. Lead oxide is highly soluble in body fluids and the particle size of the metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Lead accumulates in bone and body organs once it enters the body. Elimination from the body is slow. Initial and periodic medical examinations are advised for persons repeatedly exposed to levels at or above the exposure limits of lead dust or fumes. Once lead enters the body, it can affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal system. The primary routes of exposure to lead are inhalation or ingestion of dust and fumes.

Acute:
Skin/Eye: Contact with dust or fume may cause local irritation but would not cause tissue damage.

Inhalation: Exposure to lead dust or fume may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An intense, short-term exposure to lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are unlikely in industry today. Kidney damage, as well as anemia, can occur from acute exposure.

Ingestion: Symptoms due to ingestion of lead dust or fume would be similar to those from inhalation. Other health effects such as metallic taste in the mouth and constipation or bloody diarrhea might also occur.

Chronic:
Prolonged exposure to lead dust and fume may produce many of the symptoms of short-term exposure and may also cause central nervous system damage, gastrointestinal disturbances, anemia, and, rarely, wrist drop. Reduced hemoglobin production has been associated with low lead exposures. Symptoms of central nervous system damage due to moderate lead exposure include fatigue, headaches, tremors and hypertension. Very high lead exposure can result in lead encephalopathy with symptoms of hallucinations, convulsions, and delirium. Kidney dysfunction and possible injury has also been associated with chronic lead poisoning. Chronic over-exposure to lead has been implicated as a causative agent for the impairment of male and female reproductive capacity. Pregnant women should be protected from excessive exposure as lead can cross the placental barrier and unborn children may suffer neurological damage or developmental problems due to excessive lead exposure. Teratogenic and mutagenic effects from exposure to lead have been reported in some studies but not in others. The literature is inconsistent and no firm conclusions can be drawn at this time. Lead and lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP lists lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen.

Animal Toxicity:

Hazardous Ingredient:	Acute Oral Toxicity:	Acute Dermal Toxicity:	Acute Inhalation Toxicity:
Lead	No Data	No Data	No Data

SECTION 12. ECOLOGICAL INFORMATION

While lead metal is relatively insoluble, its processing or extended exposure in aquatic and terrestrial environments may lead to the release of lead compounds in more bioavailable forms. While lead compounds are not particularly mobile in the aquatic environment, they can be toxic to aquatic organisms, especially fish, at low concentrations. Water hardness, pH and dissolved organic carbon content are three major factors which regulate the degree of lead toxicity. Lead in soil is generally neither very mobile nor bioavailable, as it can become strongly sorbed onto soil particles, increasingly so over time, to a degree related to physical properties of the soil. Lead bioaccumulates in plants and animals in both aquatic and terrestrial environments.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME ..... Not a regulated product in ingot form.
TRANSPORT CANADA AND U.S. DOT CLASSIFICATION ..... Not Applicable

TRANSPORT CANADA AND U.S. DOT PIN ..... Not Applicable
MARINE POLLUTANT..... No
IMO CLASSIFICATION ..... Not Regulated

SECTION 15. REGULATORY INFORMATION

U.S.
Ingredient Listed on TSCA Inventory..... Yes

Hazardous Under Hazard Communication Standard ..... Yes

CERCLA Section 103 Hazardous Substances..... ..... Lead ..... RQ: 10 lbs. (4.54 kg.)*
*reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA Section 302 Extremely Hazardous Substance..... No

EPCRA Section 311/312 Hazard Categories ..... Delayed (chronic) health hazard - Carcinogen
Delayed (chronic) health hazard – Reproductive toxin

EPCRA Section 313 Toxic Release Inventory..... Lead CAS No. 7439-92-1
Percent by Weight - At least 99%

SECTION 16. OTHER INFORMATION

Date of Original Issue: July 23, 1997 **Version:** 01 *(First edition)*

Date of Latest Revision: June 29, 2015 **Version:** 13

The information in this Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2015, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, Guide to Occupational Exposure Values – 2015.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urben, Ed), 1995.
- Canadian Centre for Occupational Health and Safety, Hamilton, ON, CHEMINFO Record No. 608 - Lead (Rev. 2009-05).
- European Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH).
- Health Canada, SOR/2015-17, Hazardous Products Regulations, 30 January 2015.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – present, (multi-volume work), World Health Organization, Geneva.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0052 - Lead.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank (online version).
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham, B. Cohrssen & C.H. Powell, Ed.
- U.S. Dept. of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 13th Report on Carcinogens, October 2014.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards, on-line edition.
- U.S. Dept. of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Lead, September 2005.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader
Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck American Metal Sales Incorporated and Teck Metals Ltd. extend no warranty and assume no responsibility for the accuracy of the content and expressly disclaim all liability for reliance thereon. This safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

SAFETY DATA SHEET

Creation Date 20-Aug-2014 **Revision Date** 24-Dec-2021 **Revision Number** 4

1. Identification

Product Name **Mercury (Certified ACS)**

Cat No. : **M141-1LB; M141-6LB**

Synonyms Colloidal mercury; Hydrargyrum; Metallic mercury

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

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

Emergency Telephone Number CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

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

Acute Inhalation Toxicity - Vapors	Category 2
Reproductive Toxicity	Category 1B
Specific target organ toxicity - (repeated exposure)	Category 1
Target Organs - Central nervous system (CNS), Kidney.	

Label Elements

Signal Word
Danger

Hazard Statements
Fatal if inhaled
May damage the unborn child
Causes damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear respiratory protection
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER or doctor/physician
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Very toxic to aquatic life with long lasting effects
WARNING. Reproductive Harm - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Mercury	7439-97-6	100

4. First-aid measures

General Advice
Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Skin Contact
Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation
Remove to fresh air. If not breathing, give artificial respiration. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion
Do NOT induce vomiting. Call a physician or poison control center immediately.

Most important symptoms and effects
None reasonably foreseeable.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. approved class D extinguishers.

Unsuitable Extinguishing Media Water may be ineffective

Flash Point Not applicable
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Very toxic. Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Keep product and empty container away from heat and sources of ignition. Do not allow run-off from fire-fighting to enter drains or water courses.

Hazardous Combustion Products
Mercury oxide. Toxic fumes.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
4	0	0	N/A

6. Accidental release measures

Personal Precautions Ensure adequate ventilation. Use personal protective equipment as required. No special precautions required. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Should not be released into the environment. Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Pick up and transfer to properly labelled containers.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Do not breathe mist/vapors/spray. Do not ingest. If swallowed then seek immediate medical assistance.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Corrosives area. Keep in a dry place. Keep away from acids. Incompatible Materials. Strong oxidizing agents. Ammonia. Metals. Halogens.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Mercury	TWA: 0.025 mg/m³ Skin	(Vacated) TWA: 0.05 mg/m³ Ceiling: 0.1 mg/m³ (Vacated) STEL: 0.03 mg/m³ Skin (Vacated) Ceiling: 0.1 mg/m³	IDLH: 10 mg/m³ TWA: 0.05 mg/m³ Ceiling: 0.1 mg/m³	TWA: 0.025 mg/m³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location. None under normal use conditions.

Personal Protective Equipment

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

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

Respiratory Protection No special protective equipment required.

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

9. Physical and chemical properties

Physical State	Liquid
Appearance	Silver
Odor	Odorless
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-38.87 °C / -38 °F
Boiling Point/Range	356.72 °C / 674.1 °F
Flash Point	Not applicable
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	0.002 mmHg @ 25 °C
Vapor Density	7.0
Specific Gravity	13.59 (H2O=1)
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	Hg
Molecular Weight	200.59

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat.

Incompatible Materials Strong oxidizing agents, Ammonia, Metals, Halogens

Hazardous Decomposition Products Mercury oxide, Toxic fumes

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Mercury	Not listed	Not listed	LC50 < 27 mg/m³ (Rat) 2 h

Toxicologically Synergistic Products No information available

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

Irritation 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
Mercury	7439-97-6	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects May cause harm to the unborn child.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure Central nervous system (CNS) Kidney

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

The product contains following substances which are hazardous for the environment. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. May cause long-term adverse effects in the environment. Do not allow material to contaminate ground water system.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Mercury	Not listed	0.9 mg/L LC50 96h	Not listed	Not listed

		0.18 mg/L LC50 96h 0.16 mg/L LC50 96h 0.5 mg/L LC50 96h		

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.

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
Mercury - 7439-97-6	U151	-

14. Transport information

DOT

UN-No	UN2809
Proper Shipping Name	Mercury
Hazard Class	8
Subsidiary Hazard Class	6.1
Packing Group	III

TDG

UN-No	UN2809
Proper Shipping Name	Mercury
Hazard Class	8
Subsidiary Hazard Class	6.1
Packing Group	III

IATA

UN-No	UN2809
Proper Shipping Name	Mercury
Hazard Class	8
Subsidiary Hazard Class	6.1
Packing Group	III

IMDG/IMO

UN-No	UN2809
Proper Shipping Name	Mercury
Hazard Class	8
Packing Group	III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Mercury	7439-97-6	X	ACTIVE	S;12C

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule.

TSCA 12(b) - Notices of Export

Component	CAS No	**TSCA 12(b)** - Notices of Export
Mercury	7439-97-6	Section 5

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Mercury	7439-97-6	X	-	231-106-7	X	X		X	X	KE-23117

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Mercury	7439-97-6	100	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
Mercury	-	-	X	X

Clean Air Act

OSHA - Occupational Safety and Health Administration: Not applicable

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

Component	Hazardous Substances RQs	CERCLA EHS RQs
Mercury	1 lb	-

California Proposition 65: This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Mercury	7439-97-6	Developmental	-	Developmental

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Mercury	X	X	X	X	X

U.S. Department of Transportation

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

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

Other International Regulations

Mexico - Grade: No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV -	REACH (1907/2006) - Annex XVII -	REACH Regulation (EC

	Substances Subject to Authorization	Restrictions on Certain Dangerous Substances	1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Mercury	-	Use restricted. See item 18[a]. (see link for restriction details) Use restricted. See item 30. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Mercury	7439-97-6	Listed	Not applicable	Not applicable	0.1% (Max. Conc.)

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Mercury	7439-97-6	Not applicable	Not applicable	X	Annex I - Y29

16. Other information

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

Creation Date 20-Aug-2014
Revision Date 24-Dec-2021
Print Date 24-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Safety Data Sheet

Revision Date: 12/21/16
www.restek.com

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:	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
4,4'-DDD	72-54-8	200-783-0	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'-DDD	72-54-8	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:	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
para,para"-TDE	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.
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'-DDD	72-54-8	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: 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: 12/23/16
www.restek.com

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:	9
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'-DDE	72-55-9	200-784-6	0.100000

4. FIRST-AID MEASURES

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

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

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

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

5. FIRE- FIGHTING MEASURES

Extinguishing Media: Use alcohol resistant foam, carbon dioxide, or dry chemical extinguishing agents. Water 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'-DDE	72-55-9	ND		No TLV	No data available.

Personal Protection:

Engineering Measures:	Local exhaust ventilation is recommended when generating excessive levels of vapors from handling or thermal processing.
Respiratory Protection:	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:	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
para,para"-DDE	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.
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'-DDE	72-55-9	X	-	-	-

The following chemicals are listed on CA Prop 65:

Chemical Name	CAS #	Regulation
DDE	72-55-9	Prop 65 Cancer
Methanol	67-56-1	Prop 65 Devolop Tox
1,1-Dichloro-2,2-bis(p-chlorophenyl)ethylene	72-55-9	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: 11/05/15
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.

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

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SAFETY DATA SHEET

Version 8.5
Revision Date 07/23/2022
Print Date 10/08/2022

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

1.1 Product identifiers

Product name : Xylenes

Product Number : 534056
Brand : SIGALD
Index-No. : 601-022-00-9
CAS-No. : 1330-20-7

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 ST
ST. LOUIS MO 63103
UNITED STATES

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

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 3), H226
Acute toxicity, Inhalation (Category 4), H332
Acute toxicity, Dermal (Category 4), H312
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Carcinogenicity (Category 2), H351
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335
Specific target organ toxicity - repeated exposure (Category 2), hearing organs, H373
Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Central nervous system, Liver, Kidney, H373
Aspiration hazard (Category 1), H304
Short-term (acute) aquatic hazard (Category 2), H401

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Long-term (chronic) aquatic hazard (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word: Danger

Hazard statement(s)

H226	Flammable liquid and vapor.
H304	May be fatal if swallowed and enters airways.
H312 + H332	Harmful in contact with skin or if inhaled.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
H373	May cause damage to organs (hearing organs) through prolonged or repeated exposure.
H373	May cause damage to organs (Central nervous system, Liver, Kidney) through prolonged or repeated exposure if inhaled.
H401	Toxic to aquatic life.
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.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P331	Do NOT induce vomiting.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant

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	foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms : Xylene mixture of isomers

Formula : C_8H_{10}
Molecular weight : 106.17 g/mol
CAS-No. : 1330-20-7
EC-No. : 215-535-7
Index-No. : 601-022-00-9

Component	Classification	Concentration
Xylene		
	Flam. Liq. 3; Acute Tox. 4; Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 3; H226, H332, H312, H315, H319, H335, H373, H304, H401, H412	>= 70 - < 90 %

ethylbenzene		
	Flam. Liq. 2; Acute Tox. 4; Carc. 2; STOT RE 2; Asp. Tox. 1; Aquatic Acute 2; Aquatic Chronic 3; H225, H332, H351, H373, H304, H401, H412	>= 20 - < 30 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

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In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

If swallowed
After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Foam Carbon dioxide (CO2) Dry powder

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture
Carbon oxides
Combustible.
Vapors are heavier than air and may spread along floors.
Forms explosive mixtures with air at elevated temperatures.
Development of hazardous combustion gases or vapours possible in the event of fire.

5.3 Advice for firefighters
Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information
Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition.
Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions
Do not let product enter drains. Risk of explosion.

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6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling

Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

Advice on protection against fire and explosion

Keep away from open flames, hot surfaces and sources of ignition.Take precautionary measures against static discharge.

Hygiene measures

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class

Storage class (TRGS 510): 3: Flammable liquids

7.3 Specific end use(s)

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

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

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Component	CAS-No.	Value	Control parameters	Basis
Xylene	1330-20-7	PEL	100 ppm 435 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		C	300 ppm	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		STEL	150 ppm 655 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		TWA	100 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Not classifiable as a human carcinogen		
		STEL	150 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Not classifiable as a human carcinogen		
ethylbenzene	100-41-4	TWA	100 ppm 435 mg/m3	USA. NIOSH Recommended Exposure Limits
		ST	125 ppm 545 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	100 ppm 435 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		STEL	30 ppm 130 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		PEL	5 ppm 22 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
Xylene	1330-20-7	Methylhippuric acids	1.5g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
ethylbenzene	100-41-4	Sum of mandelic acid and phenyl glyoxylic acid	0.15g/g creatinine	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

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8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min
Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Flame retardant antistatic protective clothing.

Respiratory protection
required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: clear, liquid Color: colorless

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b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	< 0 °C (< 32 °F)
f)	Initial boiling point and boiling range	136 - 140 °C 277 - 284 °F at 1,013 hPa
g)	Flash point	25 °C (77 °F) - closed cup
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 7 %(V) Lower explosion limit: 1.1 %(V)
k)	Vapor pressure	24 hPa at 37.70 °C (99.86 °F)
l)	Vapor density	3.67 - (Air = 1.0)
m)	Density	0.865 g/cm3 at 20 °C (68 °F)
	Relative density	No data available
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Autoignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Relative vapor density	3.67 - (Air = 1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity

Vapor/air-mixtures are explosive at intense warming.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions

No data available

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10.4 Conditions to avoid
Heating.

10.5 Incompatible materials
Strong oxidizing agents

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
Acute toxicity estimate Oral - 3,518 mg/kg
(Calculation method)
LD50 Oral - Rat - male - 3,523 mg/kg (Xylene)
(EC Directive 92/69/EEC B.1 Acute Toxicity (Oral))
Remarks: (ECHA)
Acute toxicity estimate Inhalation - 4 h - 12 mg/l - vapor(Calculation method)

LC50 Inhalation - Rat - male - 4 h - 29.09 mg/l - vapor
(Xylene)
(Regulation (EC) No. 440/2008, Annex, B.2)
Remarks: (Regulation (EC) No 1272/2008, Annex VI)
Acute toxicity estimate Dermal - 1,376 mg/kg
(Calculation method)
LD50 Dermal - Rabbit - > 1,700 mg/kg (Xylene)
Remarks: (RTECS)
No data available
No data available

Skin corrosion/irritation
Skin - Rabbit (Xylene)
Result: Moderate skin irritation - 24 h
Remarks: (IUCLID)
Drying-out effect resulting in rough and chapped skin. After long-term exposure to the chemical: Dermatitis (Xylene)

Serious eye damage/eye irritation
Eyes - Rabbit (Xylene)
Result: Causes serious eye irritation. - 24 h
Remarks: (RTECS)

Respiratory or skin sensitization
Local lymph node assay (LLNA) - Mouse (Xylene)
Result: negative
(OECD Test Guideline 429)

Germ cell mutagenicity
Test Type: Mutagenicity (mammal cell test): chromosome aberration.
(Xylene)
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: Regulation (EC) No. 440/2008, Annex, B.10
Result: negative
Remarks: (National Toxicology Program)

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Test Type: Ames test
(Xylene)
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: sister chromatid exchange assay
(Xylene)
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: Regulation (EC) No. 440/2008, Annex, B.19
Result: negative
(Xylene)
Test Type: dominant lethal test
Species: Mouse

Method: OECD Test Guideline 478
Result: negative

Carcinogenicity

IARC: 2B - Group 2B: Possibly carcinogenic to humans (ethylbenzene)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
May be fatal if swallowed and enters airways.

11.2 Additional Information

Repeated dose toxicity - Rat - male and female - Oral - 90 d - NOAEL (No observed adverse effect level) - 150 mg/kg - LOAEL (Lowest observed adverse effect level) - 150 mg/kg
(Xylene)
Blurred vision, Incoordination., Headache, Nausea, Vomiting, Dizziness, Weakness, anemia, Prolonged or repeated exposure to skin causes defatting and dermatitis. (Xylene)
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. (Xylene)

After absorption:
(Xylene)
Systemic effects:
(Xylene)
Headache
somnolence
Dizziness
agitation, spasms

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narcosis
inebriation
(Xylene)
Effect potentiated by: ethanol
(Xylene)
Other dangerous properties can not be excluded.
(Xylene)
Handle in accordance with good industrial hygiene and safety practice.
(Xylene)

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence
(Xylene)

SECTION 12: Ecological information

12.1 Toxicity

No data available

Toxicity to fish	static test LC50 - Oncorhynchus mykiss (rainbow trout) - 2.60 mg/l - 96 h (Xylene) (OECD Test Guideline 203)
Toxicity to algae	static test EC50 - Pseudokirchneriella subcapitata - 4.36 mg/l - 73 h (Xylene) (OECD Test Guideline 201)
Toxicity to bacteria	Remarks: (ECHA) (Xylene)

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties

No data available

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned

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containers like the product itself. See www.retrologistik.com for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

SECTION 14: Transport information

DOT (US)
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes
Reportable Quantity (RQ): 125 lbs
Reportable Quantity (RQ): 100 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1307 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: XYLENES

IATA
UN number: 1307 Class: 3 Packing group: III
Proper shipping name: Xylenes

SECTION 15: Regulatory information

US TSCA Section 3
This chemical/product is not and cannot be distributed in commerce (as defined in TSCA section 3(5)) or processed (as defined in TSCA section 3(13)) for consumer paint or coating removal.

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
Xylene	1330-20-7	1993-04-24
ethylbenzene	100-41-4	2007-07-01

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

Reportable Quantity : F003 lbs

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Other regulations
No data available

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SECTION 16: Other information

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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Version: 8.5 Revision Date: 07/23/2022 Print Date: 10/08/2022

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ZINC METAL
SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identity: Zinc Metal

Trade Names and Synonyms: High Grade Zinc; Special High Grade Zinc; Zinc, Zn, CGG Alloy <1% Aluminum.

Manufacturer:
Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:
In U.S.:
Teck American Metal Sales Incorporated
501 North Riverpoint Blvd, Suite 300
Spokane, WA
USA, 99202

Other than U.S.:
Teck Metals Ltd.
#1700 – 11 King Street West
Toronto, Ontario
M5H 4C7

Preparer:
Teck Metals Ltd.
Suite 3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of Last Review: July 15, 2015.

Date of Last Edit: July 15, 2015.

Product Use: Zinc metal is used to coat steel for corrosion protection (galvanizing, electroplating, electrogalvanizing), as an alloying element in bronze, brass, aluminum and other metal alloys, for zinc die casting alloys, for zinc dry cell and zinc/air batteries, for the production of zinc sheet for architectural and coinage applications, as a reducing agent in organic chemistry and for other chemical applications.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

NOTE: In the form in which it is sold this product is not regulated as a Hazardous Product in the U.S. or Canada. This Safety Data Sheet is provided for information purposes only.

Health		Physical	Environmental
Acute Toxicity (Oral, Inhalation)	– Does not meet criteria	Does not meet criteria for any Physical Hazard	Aquatic Toxicity – (Short Term/Long Term) Does not meet any criteria
Skin Corrosion/Irritation	– Does not meet criteria		
Eye Damage/Eye Irritation	– Does not meet criteria		
Respiratory or Skin Sensitization	– Does not meet criteria		
Mutagenicity	– Does not meet criteria		
Carcinogenicity	– Does not meet criteria		
Reproductive Toxicity	– Does not meet criteria		
Specific Target Organ Toxicity:			
Acute Exposure	– Does not meet criteria		
Chronic Exposure	– Does not meet criteria		

LABEL:

Symbols: None required	**Signal Word:** None required
Hazard Statements	**Precautionary Statements:**
None required	None required

Emergency Overview: A lustrous bluish-silver metal that does not burn in bulk but may form explosive mixtures if dispersed in air as a fine powder. Zinc oxide fume is formed when zinc metal is heated to or near the boiling point, or is burned. Contact with acids or alkalis generates flammable hydrogen gas which can accumulate in poorly ventilated areas. Do NOT use water or foam on burning zinc metal. Apply dry chemical, sand or special powder extinguishing media. Zinc is relatively non-toxic and poses little immediate hazard to the health of emergency response personnel or to the environment in an emergency situation.

Potential Health Effects: Zinc is essentially non-toxic to humans. However, zinc oxide fumes may cause mild local irritation to eyes, nose, throat and upper airways. Acute over-exposure to zinc oxide fume may cause metal fume fever, characterized by flu-like symptoms such as chills, fever, nausea, and vomiting which may be delayed 3 – 10 hours in onset. In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. Zinc is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU (see Toxicological Information, Section 11).

Potential Environmental Effects: Zinc metal has relatively low bioavailability and poses no immediate ecological risks. Depending on physico-chemical characteristics (e.g., pH, water hardness), compounds of zinc metal can be toxic, particularly in the aquatic environment. Zinc also has the potential to bioaccumulate in plants and animals in both aquatic and terrestrial environments (see Ecological Information, Section 12).

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENTS	CAS Registry No.	CONCENTRATION (% wgt/wgt)
Zinc	7440-66-6	99+%

Note: See Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Mild eye irritation, redness. Do not rub eye(s). Let the eye(s) water naturally for a few minutes. Look right and left, then up and down. If particle/dust does not come out, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If eye irritation persists, get medical advice/attention. DO NOT attempt to manually remove anything from the eye.

Skin Contact: *Symptoms:* Soiling of skin. No health effects expected. If irritation does occur, rinse with lukewarm, gently flowing water for 5 minutes or until the product is removed. If skin irritation occurs or you feel unwell, get medical advice/attention. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: *Symptoms:* Coughing and irritation in heavy dust clouds. If symptoms are experienced remove source of contamination or move victim from exposure area to fresh air immediately and obtain medical advice. NOTE: Metal fume fever may develop 3-10 hours after exposure to zinc oxide fumes. If symptoms of metal fume fever (flu-like symptoms) develop, obtain medical attention.

Ingestion: *Symptoms:* Stomach upset, nausea, diarrhea. If swallowed, no specific intervention is indicated as this material is not likely to be hazardous by ingestion. However, if you are concerned or you feel unwell, obtain medical advice.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is difficult to ignite and is not considered a serious fire hazard. However, finely-divided metallic dust may form flammable or explosive dust clouds when dispersed in the air at high concentrations and exposed to heat, flame, or other ignition sources. Bulk dust in a damp state may heat spontaneously and ignite on exposure to air. Contact with acids and alkali hydroxides results in evolution of hydrogen gas which is potentially explosive. Mixtures with potassium chlorate or fused ammonium nitrate may explode on impact.

Extinguishing Media: Apply dry chemical, dry sand, or special powder extinguishing (Class D) media. Do NOT use water, carbon dioxide or foam on molten metals. Water may be ineffective for extinguishing a fire but should be used to keep fire-exposed billets, ingots and castings cool.

Fire Fighting: If possible, move material not yet involved in the fire from the fire area. If this is not possible, cool fire-exposed zinc by applying hose streams or fogs. Apply only dry chemical, sand, or special powder extinguishing media to any molten or burning zinc metal. Take extreme caution to prevent contact of water with molten or burning zinc. Zinc foil in particular may ignite in the presence of water. Zinc oxide fumes may evolve in fires. Fire fighters should be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of release if possible to do so safely. Clean up spilled material immediately observing precautions in Section 8, Personal Protection. Molten metal should be allowed to cool and harden before cleanup. Once solidified wear gloves, pick up and return to process. Powder or dust should be cleaned up by sweeping/shoveling, etc. Solid metal is recyclable. Return uncontaminated spilled material to the process if possible. Place contaminated material in clean, dry,

suitably labelled containers for later recovery or disposal. Treat or dispose of waste material in accordance with all local, state/provincial, and national requirements.

Personal Precautions: Protective clothing, gloves, and a respirator are recommended for persons responding to an accidental release (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with zinc dust and fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash.

Environmental Precautions: Zinc metal has relatively low bioavailability and poses no immediate ecological risks. Depending on physico-chemical characteristics (e.g., pH, water hardness), compounds of zinc metal can be toxic, particularly in the aquatic environment. Zinc also has the potential to bioaccumulate in plants and animals in both aquatic and terrestrial environments. Releases of the product to water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store zinc in a DRY covered area, separate from incompatible materials. Zinc ingots suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Ingots may contain cavities that collect moisture. Entrained moisture will expand explosively when immersed in a molten bath.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines: *(Time-Weighted Average (TWA) concentration over 8 hr unless otherwise indicated)*

Component	ACGIH TLV	OSHA PEL	NIOSH REL
Zinc	None established†	None established†	None established†

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction.

ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

† NOTE: While there is no established OEL for zinc as such, there are OELs for zinc oxide which may be formed during burning, welding or other fuming processes.

The OSHA PEL final rule limits for zinc oxide dust are 10 mg/m^3 (total) and 5 mg/m^3 (respirable); the OSHA PEL final rule limit for zinc oxide fume is 5 mg/m^3. Note that the OSHA PEL final rule limits are currently non-enforceable due to a court decision. The OSHA PEL transitional limits therefore remain in force at present. They are 15 mg/m^3 (total) and 5 mg/m^3 (respirable) while the transitional PEL for zinc oxide fume is 5 mg/m^3. The ACGIH TLV for zinc oxide is 2 mg/m^3 (respirable fraction) with a Short Term Exposure Limit (STEL) of 10 mg/m^3 (respirable fraction). The NIOSH REL for zinc oxide (dust or fume) is 5 mg/m^3 10 hr TWA with a 15 mg/m^3 ceiling limit (15 minute sample) for zinc oxide dust and a 10 mg/m^3 STEL for zinc oxide fume (15 minute sample).

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentration of zinc oxide fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Where metallic particles of zinc are being collected and transported by a ventilation system, use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Locate dust collectors and fans outdoors if possible and provide dust collectors with explosion vents or blow out panels. Refer to appropriate NFPA Standards 484, 654, and/or 68 for specific guidance.

Protective Clothing: Gloves and coveralls, shop coat or other work clothing are recommended to prevent prolonged or repeated direct skin contact when zinc is processed. Eye protection should be worn where fume or dust is generated. Respiratory protection may be required where zinc oxide fume is generated. Where hot or molten metal is handled, heat-resistant gloves, face shield, and clothing to protect from hot metal splash should be worn. Safety type boots are recommended.

Respirators: Where zinc oxide dust or fumes are generated and cannot be controlled to within acceptable levels, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-95 particulate filter cartridge).

General Hygiene Considerations: Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate designated areas. No special packaging materials are required.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Bluish-silver lustrous metal	**Odour:** None	**Odour Threshold:** None	**pH:** Not Applicable
Vapour Pressure: 1 mm at 487ºC Negligible at 20ºC	**Vapour Density:** Not Applicable	**Melting Point/Range:** 420º C	**Boiling Point/Range:** 908º C
Relative Density (Water = 1)**:** 7.1	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Log P (oct) = -0.47 (estimated)	**Solubility:** Insoluble in Water (0.2 mg/l @ pH 7)
Flash Point: Not Applicable.	**Flammable Limits (LEL/UEL):** LEL (Zinc Dust): 500 g/m^3; UEL Not Determined.	**Auto-ignition Temperature:** Approx 680ºC (dust cloud in air), Approx 460ºC (dust layer).	**Decomposition Temperature:** Oxidation starts approx 450°C

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur. Zinc metal slowly becomes covered with a white coating of a hydrated basic zinc carbonate on exposure to moist air. Fine, condensed zinc dust or powder may heat spontaneously and ignite on exposure to air when damp. Zinc metal will react with acids and strong alkalis to generate hydrogen gas. A violent, explosive reaction may occur when powdered zinc is heated with sulphur. Powdered zinc will become incandescent or ignite in the presence of fluorine, chlorine, bromine or interhalogens (e.g., chlorine trifluoride). Powdered zinc can also react explosively with halogenated hydrocarbons if heated. Mixtures with potassium chlorate or fused ammonium nitrate may explode on impact.

Incompatibilities: Contact with acids and alkalis will generate highly flammable hydrogen gas. Contact with acidic solutions of arsenic and antimony compounds may evolve highly toxic ARSINE or STIBINE gas. Incompatible with strong oxidizing agents such as chlorine, fluorine, bromine, sodium, potassium or barium peroxide, sodium or potassium chlorate, chromium trioxide and fused ammonium nitrate. Also incompatible with elemental sulphur dust, halogenated hydrocarbons or chlorinated solvents, chlorinated rubber, and ammonium sulphide or calcium disulphide.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting, electric arc welding or overheating a molten bath will generate zinc oxide fume which, on inhalation in sufficient quantity, can produce metal fume fever, a transient influenza-like illness.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Zinc, especially in the metal form, is relatively non-toxic. However, it can react with other materials, such as oxygen or acids, to form compounds that can be potentially toxic. The primary route of exposure would be through the generation and inhalation of zinc oxide fume.

Acute:
Skin/Eye: In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. Zinc metal is not chemically irritating to the eyes.

Inhalation: If excessive quantities of zinc oxide fume are inhaled, it can result in the condition called metal fume fever. The symptoms of metal fume fever will occur within 3 to 10 hours, and include immediate dryness and irritation of the throat, tightness of the chest and coughing, which may later be followed by flu-like symptoms of fever, malaise, perspiration, frontal headache, muscle cramps, low back pain, occasionally blurred vision, nausea, and vomiting. The symptoms are temporary and generally disappear, without medical intervention, within 24 to 48 hours of onset. There are no recognized complications, after affects, or chronic affects that result from this condition.

Ingestion: Zinc is not expected to be harmful if ingested. When ingested in excessive quantities, zinc can irritate the stomach resulting in nausea, vomiting, abdominal pain and diarrhea. Ingestion is not a typical route of occupational exposure.

Chronic:
There is no chronic form of metal fume fever but in rare instances an acute incident may be followed by complaints such as bronchitis or pneumonia. Some workers may develop a short-term immunity (resistance) so that repeated exposure to zinc oxide fumes does not cause metal fume fever. This immunity (resistance) however is quickly lost after short absences from work (weekends or vacations). Workers exposed to finely-divided metallic zinc for up to 35 years revealed no acute or chronic illnesses

attributable to zinc. Prolonged or repeated skin contact with zinc dust or powder may cause dryness, irritation and cracking (dermatitis) since zinc is astringent and may tend to draw moisture from the skin. Zinc is not listed as a human carcinogen by the Occupational Safety and Health Administration (OSHA), the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), the American Conference of Governmental Industrial Hygienists (ACGIH) or the European Union (EU).

Animal Toxicity:

Ingredient:	Acute Oral Toxicity:	Acute Dermal Toxicity:	Acute Inhalation Toxicity:
Zinc	>5,000 mg/kg†	No data	No data

† LD_{50}, Mouse, Oral,

SECTION 12. ECOLOGICAL INFORMATION

Zinc metal is relatively insoluble; however, processing of the product or extended exposure in aquatic and terrestrial environments may lead to the release of zinc compounds in bioavailable forms. Zinc is highly mobile, and can be toxic in the aquatic environment with water hardness, pH and dissolved organic carbon content being major regulating factors. Zinc also has the potential to bioaccumulate in plants and animals in both aquatic and terrestrial environments. In soils, zinc is moderately mobile in accordance with soil properties (e.g., cation exchange capacity, pH, redox potential, chemical species); these properties also influence its bioavailability to terrestrial plants.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME ..... Not applicable – not regulated.
U.S. DOT AND TRANSPORT CANADA HAZARD CLASSIFICATION .... Not applicable
U.S. DOT AND TRANSPORT CANADA PID ..... Not applicable
MARINE POLLUTANT..... No
IMO CLASSIFICATION ..... Not regulated

SECTION 15. REGULATORY INFORMATION

U.S.
INGREDIENTS LISTED ON TSCA INVENTORY..... Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD..... No

CERCLA SECTION 103 HAZARDOUS SUBSTANCES ..... Zinc.....Yes ..... RQ: 1,000 lb. (454 kg.)*
* reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE ..... No

EPCRA SECTION 311/312 HAZARD CATEGORIES ..... No Hazard Categories Apply

EPCRA SECTION 313 TOXIC RELEASE INVENTORY:..... This product does not contain any toxic chemicals subject to the Toxic Release reporting requirements. However, potential by-products from working with this product - "Zinc (Fume or Dust)" CAS 7440-66-6 are reportable.

SECTION 16. OTHER INFORMATION

Date of Original Issue: July 23, 1997 **Version:** 01 *(First edition)*

Date of Latest Revision: July 15, 2015 **Version:** 14

The information in this Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, 7th Edition plus updates.

- American Conference of Governmental Industrial Hygienists, 2015, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2015, Guide to Occupational Exposure Values.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition (P. G. Urben, Ed), 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) Hamilton, ON, CHEMINFO Record No. 239 – Zinc Metal.
- European Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH).
- Health Canada, SOR/2015-17, Hazardous Products Regulations, 30 January 2015.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – present, (multi-volume work), World Health Organization, Geneva.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, 13th Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank (on-line version).
- Oak Ridge National Laboratory, Oak Ridge, Tennessee – Toxicity Summary for Zinc and Zinc Compounds, April 1992.
- Patty's Toxicology, 5th Edition, 2001 E. Bingham, B. Cohrssen & CH Powell (Eds.).
- U.S. Dept. of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 13th Report on Carcinogens, October 2014.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards (on-line edition).
- U.S. Dept. of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Zinc - August 2005.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances (RTECS), CCOHS on-line version.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck American Metal Sales Incorporated and Teck Metals Ltd. extend no warranty and assume no responsibility for the accuracy of the content and expressly disclaim all liability for reliance thereon. This safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

ATTACHMENT B — TAILGATE SAFETY MEETING FORM

TAILGATE SAFETY MEETING

CHECK ONE: _____ Initial H&S Orientation _____Periodic "Toolbox" Safety Meeting

Project Site/Location_____

Date_____ Time_____ Job No._____

PM_____ PIC_____

The undersigned have attended a Health and Safety briefing, consisting of a review of the provisions of the Site Specific H&S Plan, and/or appropriate prior H&S events or concerns, and/or review of anticipated H&S concerns and safety measures for the project.

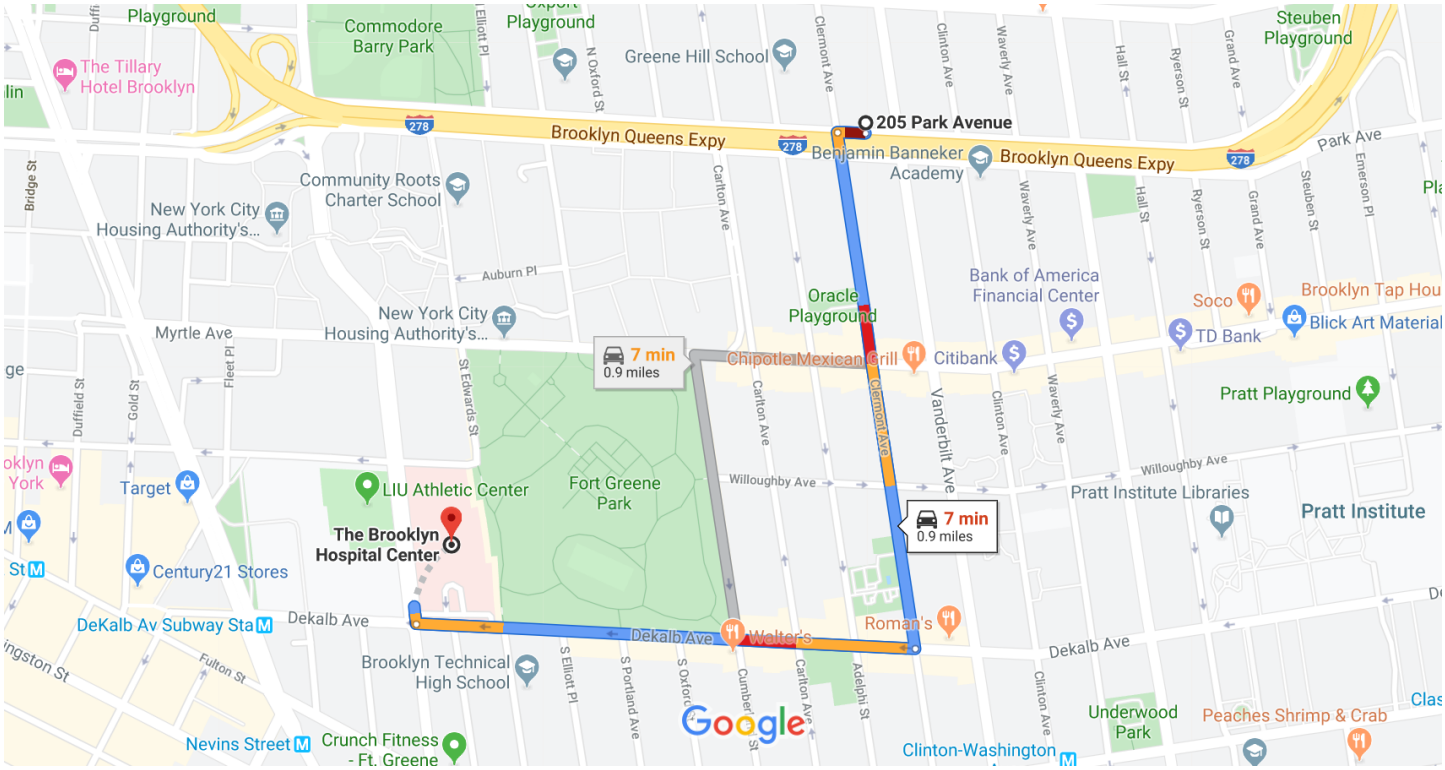
SUMMARY OF HEALTH AND SAFETY TOPICS COVERED (required topics are listed below to be covered in addition to regular site-specific topics)		
1. Pausing and Stopping Work		
2. Preparation for Natural Hazards (insects and ticks, poisonous plants)		
3. Uneven and/or Unstable Terrain in Work Area(s)		
4. How GZA People-Based Safety will be implemented on the site		
NAME (printed)	**SIGNATURE**	**COMPANY**

Conducted by: _____ Date:_____

ATTACHMENT C — ROUTE TO HOSPITAL

205 Park Avenue, Brooklyn, NY to The Brooklyn Hospital Center

Drive 0.9 mile, 7 min



Map data ©2019 Google 200 m

205 Park Ave

Brooklyn, NY 11205

1. Head west on Park Ave toward Clermont Ave

131 ft

2. Turn left at the 1st cross street onto Clermont Ave

0.5 mi

3. Turn right onto Dekalb Ave

0.4 mi

4. Use the right lane to turn right onto Ashland Pl

Destination will be on the right

82 ft

The Brooklyn Hospital Center

121 Dekalb Ave, Brooklyn, NY 11201

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

ATTACHMENT D — ACCIDENT AND INJURY REPORT FORM

SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

Injured Employee _____ Job Title _____

Home Office _____ Division/Department _____

Date/Time of Accident _____

Location of Accident _____

Witnesses to the Accident _____

Injury Incurred? _____ Nature of Injury _____

_____

Engaged in What Task When Injured? _____

_____

Will Lost Time Occur? ____ How Long? _____ Date Lost Time Began _____

Were Other Persons Involved/Injured? _____

_____

How Did the Accident Occur? _____

_____

_____

_____

_____

What Could Be Done to Prevent Recurrence of the Accident? _____

_____

_____

What Actions Have You Taken Thus Far to Prevent Recurrence? _____

_____

_____

Supervisor's Signature _____ Title _____ Date _____

Reviewer's Signature _____ Title _____ Date _____

Note: If the space provided on this form is insufficient, provide additional information on a separate page and attach. The completed accident investigation report must be submitted to the Health and Safety Manager within two days of the occurrence of the accident.

GZA GeoEnvironmental of New York

APPENDIX G
SITE MANAGEMENT FORMS

Table G1

Routine Operation and Maintenance Form

205 Park Avenue,

Brooklyn, New York

System component	Date	Condition/readings
Sealing		
Pipe		

	Date	Average airflow (cfm)	Average Static Vacuum ("W.C.)
Blower			

Sub Slab Vacuum Port	Date	Gate Valve Position (% open)	Average Vacuum ("W.C.)
Riser#1			
Riser#2			

	Date	Average Vacuum ("W.C.)
MP-1		
MP-2		
MP-3		
MP-4		
MP-5		
MP-6		
MP-7		
MP-8		

Semiannual Condition Inspection Form

205 Park Avenue,
Brooklyn, New York

Inspector's Name:	Weather Conditions:
Inspection Date:	Air Temperature:
Inspection Time:	
Comments:	

SSDS System Inspection:

1. **Walk the entire roof surface and the ground floor of the building.**

- Inspect fan stack guide wires
- Inspect fan mounting and vibration isolators
- Inspect bolts and set screws for tightness and rusty condition
- Record the Blower airflow and vacuum
- Inspect condition of piping
- Inspect condition of suction pit sealing
- Record Magnehelic gauge reading
- Record vacuum reading for each riser and monitoring point
- Inspect the condition of the labeling
- Comments (see or hear anything unusual?):

Cover System – Bottom Floor Inspection:

1. **Walk all of the bottom floors.**

- Any visible cracks or depressions in the ground floors?
- Any other visible openings (unintended) in the ground floors?
- Draw approximate location of floor cracks/openings on site map.
- Note the length of the crack/opening.
- Note the width of the crack/opening.
- Comments:

Cover System – Exterior Inspection:
1. Walk and inspect the entire perimeter of the Site.
2. Walk and inspect all of the paved areas (concrete and asphalt) of the Site.
• Are there any signs of significant cracks, settlement, or deterioration of the paved areas?
• Has any of the pavement material been removed?
• Are there any signs of intrusive activities (drilling, digging, trenching, grading, excavating, etc.)?
• Comments:

Repair
Summarize needed/completed repairs to Engineering Controls:
Inspector's Signature:

*Details of the SSDS routine O&M are provide in **Table G1**

APPENDIX H
SOIL BORING LOGS

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-1/TW-1
SHEET: 1 of 2
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 35
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)			
Date	**Time**	**Water Depth**	**Stab. Time**
1/8/2020		25.72	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-2			0	S-1 : Asphalt			ASPHALT	2
					0					
		2.0-2.5			0	Concrete/Brick			FILL	6
		2.5-3			0	Brown fine to medium SAND, trace Silt, trace Gravel.				
		3.0-3.5				Brick/Asphalt				
5	S-2	3.5-4.5			0	Light brown fine to medium SAND, trace Gravel.				
		4.5-6			0	S-2 : Brick				
		6.0-9			0	Brown fine to medium SAND, some Gravel, trace Silt.	1		SAND AND GRAVEL	10
					0					
					0					
		9.0-10			0	Brown fine to medium SAND and GRAVEL.				
10	S-3	10.0-10.5			0	S-3 : Brown fine to medium SAND, some Gravel.			FILL	11
		10.5-11			0	Brick and Gravel, some Asphalt.			SAND AND GRAVEL	15
		11.0-12.5			0	Brown fine to medium SAND, some Gravel and Silt.				
		12.5-13.5			0	Brown fine to medium SAND and GRAVEL, some cobble.				
		13.5-15			0	Light brown fine to medium SAND, trace Gravel.				
15	S-4	15.0-16			0.4	S-4 : Brown fine to medium SAND, some Gravel.	2		FILL	16
		16.0-16.5			0	Brick/Asphalt			SAND	20
		16.5-20			0	Light brown fine to medium SAND, some Gravel.				
					0					
					0					
20	S-5	20.0-21.5			0	S-5 : Brown fine to medium SAND, little Gravel, trace Silt.			FILL	27
					0					
		21.5-27			0	Brown medium to coarse SAND, some Gravel, trace fragments. (moist)				
					0					
					0		3			
25					0					
					0					
	S-6	27.0-30			0.3	S-6 : Brown medium to coarse SAND. (wet @27 ft)			SAND	
					0.2					
					0.1					
30					0.1					

REMARKS

1 - Sample SB-1 (6.5 - 7ft) collected at 08:10
2 - Sample SB-1 (15.5-16 ft) collected at 08:25
3 - GW observed at approximately 27 ft bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-1/TW-1

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:19 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-1/TW-1
SHEET: 2 of 2
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 35
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
1/8/2020		25.72	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
35	S-7	30.0-35			0.2 0.2 0.2 0.1 0 0 0	S-7 : Brown medium to coarse SAND. (wet)			SAND	35
						End of exploration at 35 feet.	4			
40										
45										
50										
55										
60										

REMARKS

4 - Boring complete to 35 ft bgs.
No odor/staining observed.
TW-1 installed with 0-25 ft pvc riser and 25-35 ft screen.
Sample TW-1 collected at 11:50 for PFAS, 1,4 Dioxane and total Hg metals.
Groundwater

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-1/TW-1

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:19 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc. *Engineers and Scientists*	**205 Park Avenue Brooklyn, NY**	**EXPLORATION NO.: SB-10** **SHEET: 1 of 1** **PROJECT NO: 12.0076834.10** **REVIEWED BY: Zhan Shu**

Logged By: N. Albanese/P. Benya **Drilling Co.:** EPhase II **Foreman:** C. Hernandez	**Geoprobe Location:** See Plan **Ground Surface Elev. (ft.):** **Final Geoprobe Depth (ft.):** 20 **Date Start:** 1/6/2020 **Finish:** 1/6/2020	**H. Datum:** **V. Datum:**
Type of Rig: Geoprobe **Rig Model:** 6712 DT **Drilling Method:** Direct Push	**Sampler Type:** DP **Sampler O.D. (in.):** 2.25 **Sampler Length (in.):** 60 **Rock Core Size:**	**Groundwater Depth (ft.)**

Date	Time	Water Depth	Stab. Time

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-2			0	S-1 : Asphalt/Sub-base			ASPHALT	
					0					2
					0					
		2.0-3			0	Brown fine to medium SAND, little Silt.	1			
		3.0-4			0	Brown SILT, trace fine to medium Sand.			SAND AND SILT	
					0					
		4.0-4.5			0	Brown fine to medium SAND, trace Gravel.				
5	S-2	4.5-5			0	Brown fine to medium SAND, trace Silt, trace Gravel.				
		5.0-5.5			0	S-2 : Brown fine to medium SAND, little Gravel, trace Silt.				5.5
		5.5-5.75			0	Asphalt			FILL	5.75
		5.8-6.25			0	Brown fine to medium SAND, trace Silt, trace Gravel.				
		6.3-6.75			0	Brown fine to medium SAND, trace Gravel.			SAND	
		6.8-8			0	Brown fine to medium SAND, little Gravel.				
10		8.0-9			0	Brown fine to medium SAND, trace Silt, trace Gravel.				
	S-2	9.0-10			0	Brown fine to medium SAND, little Gravel.				10
		10.0-10.25			0	S-2 : Asphalt			FILL	10.25
		10.3-15			0	Brown fine to coarse SAND.				
					0					
					0				SAND	
					0					
15					0					
	S-3	15.0-16			0	S-3 : Brown fine to medium SAND.	2			
		16.0-16.25			0	Asphalt				16
		16.3-19			0	Brown fine to medium SAND.			FILL	16.25
					0					
					0				SAND	
					0					
20	S-4	19.0-20			0	S-4 : Brown medium to coarse SAND, trace Gravel.				
					0					20
						End of exploration at 20 feet.	3			
25										
30										

REMARKS

1 - Sample SB-10 (2 - 2.5 ft) collected at 9:50.
2 - Sample SB-10 (15 - 15.5 ft) collected at 10:00
3 - Boring complete to 20 ft bgs.
No odors/staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-10

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:20 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-2
SHEET: 1 of 1
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 20
Date Start: 1/7/2020 **Finish:** 1/7/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
		0.0-1			0	Asphalt/Sub-base			ASPHALT	1
		1.0-1.25			0	Tan fine to medium SAND and GRAVEL.				
		1.3-1.5			0	Asphalt				
		1.5-2			0	Asphalt/Cobble				
		2.0-3			0	Brown fine to medium SAND and SILT, trace cobble.	1		FILL	
		3.0-3.5			0	Brick				
5		3.5-5.5			0	Brown SILT, little fine to medium Sand.				
		5.5-5.75			0	Asphalt				6
		5.8-6			0	Brown SILT, little fine to medium Sand.				
		6.0-7			0	Brown fine to medium SAND, trace Gravel.				
		7.0-9			0	Brown fine to medium SAND and GRAVEL.			SAND, GRAVEL AND COBBLE	
					0					
		9.0-9.5			0	Cobble				
10		9.5-10.5			0	Brown fine to medium SAND and GRAVEL.				10.5
		10.5-11			0	Asphalt				
		11.0-12			0	Brown fine to medium SAND, trace Gravel.			FILL	
		12.0-12.5			0	Brown fine to medium SAND and GRAVEL.				12.75
		12.5-12.75			0	Concrete				
		12.8-13			0	Cobbles and Gravel.			SAND, GRAVEL AND COBBLE	
15		13.0-14.5			0	Brown medium to fine SAND, trace Gravel.				
		14.5-15			0	Brown medium to coarse SAND and GRAVEL.				15.5
		15.0-15.5			0	Brown fine to medium SAND, trace Gravel.				16
		15.5-16			0	Asphalt/Gravel	2		FILL	
		16.0-17			0	Brown fine to medium SAND, some Gravel.				
		17.0-18			0	Brown fine to medium SAND, trace Gravel.			SAND	
		18.0-20			0	Brown fine to medium SAND and GRAVEL.				
20					0					20
						End of exploration at 20 feet.	3			
25										
30										

REMARKS

1 - Sample SB-2 (3.5 - 4 ft) collected at 13:45.
2 - Sample SB-2 (16-16.5 ft) collected at 13:50.
3 - Boring complete to 20 ft bgs
No odors to staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-2

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:20 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-3
SHEET: 1 of 1
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 20
Date Start: 1/7/2020 **Finish:** 1/7/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-1			0	S-1 : Dark brown, fine to medium Sand, little Gravel, trace Silt.			FILL	1
		1.0-2			0	Brick				
		2.0-4.5			0	Concrete and Gravel, some tan, fine to medium Sand.				
					0					
					0					
					0					
5		4.5-5			0	Concrete				
	S-2	5.0-5.5			0	S-2 : Brown medium to coarse SAND, some Gravel, brick				
		5.5-6			0	fragments.				
		6.0-6.25			0	Brown fine to medium SAND, little Gravel.	1			
		6.3-6.75			0	Little brown/gray, fine to medium SAND, some Gravel.				
		6.8-7			0	Brown fine to medium SAND and brick fragments, some				
10		7.0-8			0	Gravel.				
	S-3	8.0-8.5			0	Concrete				
		8.5-9			0	Brown fine to medium SAND, little Silt, trace Gravel.				
		9.0-9.5			0	Brown fine to medium SAND, little Gravel.				
		9.5-10			0	Concrete			SAND, GRAVEL AND COBBLE	
		10.0-11			0	Brown fine to medium SAND and GRAVEL.				
		11.0-11.25			0	Cobble				
15		11.3-12			0	S-3 : Brown medium to fine SAND, some Gravel.				
	S-4	12.0-13			0	Brown fine SAND and SILT.				
		13.0-13.5			0	Brown fine to medium SAND and GRAVEL.		16		
		13.5-14			0	Cobble		16.25	FILL	
		14.0-15			0	Brown fine to coarse SAND and GRAVEL.				
		15.0-16			0	Gravel			SAND, GRAVEL AND COBBLE	
		16.0-16.25			0	Brown fine to coarse SAND and GRAVEL, little cobble.				
20	S-5	16.3-16.5			0	S-4 : Brown fine to medium SAND, some Gravel, little Silt.				20
		16.5-16.75			0	Brown fine to medium SAND and BRICK fragments.	2			
		16.8-18			0	Cobble				
		18.0-19.5			0	Gravel				
		19.5-19.75			0	Brown fine to coarse SAND and GRAVEL, trace Silt.				
		19.8-20				Brown fine to coarse SAND, some Gravel.				
						Brown medium to fine SAND, trace Gravel.				
25						S-5 : Brown fine to coarse SAND, trace Gravel.				
						End of exploration at 20 feet.				
30										

REMARKS

1 - Sample SB-3 (7.7.5 ft) collected at 13:10
2 - Boring complete to 20 ft bgs.
No odors/staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-3

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:21 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-4/TW-2
SHEET: 1 of 2
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 35
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
1/8/2020		25.62	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-2			0	S-1 : Asphalt/Concrete mix			Asphalt/Concrete	2
					0					
		2.0-3			0	Brown, fine to medium SAND, some Gravel, trace Silt, brick fragments.			FILL	3
		3.0-5			0	Brown SILT, little Gravel, trace fine to medium Sand.	1			
					0					
5	S-2	5.0-8			0	S-2 : Brown, fine to medium SAND, trace Gravel.				
					0					
					0				SILT AND SAND	
		8.0-10.5			0	Brown, fine to medium SAND, some Gravel, shale rock fragments.				
					0					
10					0					10.5
	S-3	10.5-11			0	S-3 : Concrete and brick				
		11.0-11.5			0	Brown, fine to medium SAND and GRAVEL, trace Gravel.				
		11.5-12			0	Brick				
		12.0-15			0	Brown, fine to medium SAND and GRAVEL, with concrete fragments (fill) and coal slag.			FILL	
					0					
15										15
	S-4	15.0-16			0	S-4 : Brown, medium to coarse SAND and GRAVEL.	2			
		16.0-16.5			0	Gravel.				
		16.5-19			0	Brown, medium to coarse SAND and GRAVEL.				
					0					
		19.0-20			0	Brown, medium to coarse SAND, little Gravel, moist at 20 feet.				
20	S-5	20.0-21.5			0	S-5 : Brown, fine to medium SAND, little Gravel.				
					0					
		21.5-24			0	Brown, medium to coarse SAND and GRAVEL.				
					0				SAND AND GRAVEL	
					0					
25	S-6	24.0-25			0	S-6 : Brown, medium to coarse SAND, some Gravel. (wet at 25 ft)	3			
					0					
					0					
					0					
					0					
					0					
30					0					

REMARKS

1 - Sample SB-4 (3-3.5 ft) collected at 08:55
2 - Sample SB-4 (15-15.5 ft) collected at 10:05
3 - Moist at 24 to 25 feet. Wet at 25 feet.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-4/TW-2

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:22 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-4/TW-2
SHEET: 2 of 2
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 35
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
1/8/2020		25.62	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-7	30.0-33			0 0 0 0	S-7 : Brown, fine to coarse SAND, trace Gravel.			SAND AND GRAVEL	
		33.0-34			0	Brown, coarse SAND.				
35		34.0-35			0 0	Brown, fine to coarse SAND, trace Gravel.				35
						End of exploration at 35 feet.	4			
40										
45										
50										
55										
60										

REMARKS

4 - End of boring at 35 feet bgs.
No odor/staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-4/TW-2

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:22 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-5A
SHEET: 1 of 1
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 5
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-1			0	S-1 : Brown, fine to medium SAND and GRAVEL, little Silt.				
		1.0-2			0	Concrete				
		2.0-2.5			0	Brick			FILL	
		2.5-3			0	Brown, fine to medium SAND and GRAVEL, little Silt.				
		3.0-3.5			0	Concrete				
	S-2	3.5-4				Little brown, fine to medium SAND and GRAVEL, little Silt.				
5		4.0-5				S-2 : Concrete	1			5
						End of exploration at 5 feet.				
10										
15										
20										
25										
30										

REMARKS

1 - Refusal at 5 ft bgs
No odor/staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-5A

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:23 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-5B
SHEET: 1 of 1
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 9.5
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-1			0	S-1 : Brown, fine to medium SAND and GRAVEL, little Silt.				
		1.0-2			0	Concrete				
		2.0-2.5			0	Brick				
		2.5-3			0	Brown, fine to medium SAND and GRAVEL, little Silt.			FILL	
		3.0-3.5			0	Concrete				
5		3.5-4			0	Little brown, fine to medium SAND and GRAVEL, little Silt.				5.25
	S-2	4.0-5			0	Concrete				
		5.0-5.25			0	S-2 : Concrete				
		5.3-5.75			0	Brown, fine to medium SAND, little Gravel, trace Silt.			SAND, GRAVEL, GRAVEL, ORGANIC MATERIALS AND SHALE FRAGMENTS	
		5.8-6			0	Organic material, wood fragments.				
		6.0-9			0	Brown, fine to medium SAND, little Gravel, trace Silt.				
		9.0-9.25			0	Shale rock fragments.				9.5
10	S-3	9.3-9.5				S-3 : Brown, fine to medium SAND, little Gravel, trace Silt.	1			
						End of exploration at 9.5 feet.				
15										
20										
25										
30										

REMARKS

1 - Refusal at 9.5 ft bgs
No odor/staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-5B

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:23 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-5C/TW-3
SHEET: 1 of 2
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 35
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
1/8/2020		25.37	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-1			0	S-1 : Brown fine to medium SAND and GRAVEL, little Silt.				
		1.0-2			0	Concrete				
		2.0-2.5			0	Brick				
		2.5-3			0	Brown fine to medium SAND and GRAVEL, little Silt.			FILL	
		3.0-3.5			0	Concrete				
5		3.5-4			0	Light brown fine to medium SAND and GRAVEL, little Silt.				
	S-2	4.0-5			0	Concrete				5.5
		5.0-5.5			0	S-2 : Concrete	1			
		5.5-6.5			0	Brown fine to medium SAND, trace Gravel.				
		6.5-10			0	Brown fine to medium SAND, little Silt, little Gravel.				
					0					
10					0					
	S-3	10.0-11.5			0	S-3 : Brown fine to medium SAND and SILT, some Gravel.				
					0				SAND, SILT, GRAVEL AND SHALE FRAGMENTS	
		11.5-11.75			0	Shale rock fragments				
		11.8-15			0	Brown fine to medium SAND, trace Silt, trace Gravel (moist at 11.75)				
					0					
15					0					
	S-4	15.0-16			0	S-4 : Brown fine to medium SAND and GRAVEL.				
		16.0-16.5			0	Gravel	2			
		16.5-17			0	Brown medium to coarse SAND and GRAVEL, trace Silt.				17
		17.0-17.25			0	Brick			FILL	17.25
		17.3-19			0	Brown medium to coarse SAND and GRAVEL, trace Silt.				
		19.0-19.5			0	Brown medium to fine SAND.				
20	S-5	19.5-19.75			5.7	Shale rock fragments.				
		19.8-20			1.2	Brown medium to coarse SAND, trace Silt, trace Gravel.				
		20.0-22			1.4	S-5 : Brown fine to medium SAND, little Gravel, trace				
		22.0-24			0.9	Light brown medium to coarse SAND, some Gravel.				
					3.2				SAND, GRAVEL AND SHALE FRAGMENTS	
		24.0-25			1.6					
25					4.0	Light brown medium to coarse Sand, trace Gravel. (moist at 24 ft)	3			
		25.0-27.5			2.8	Brown medium to coarse SAND.				
					1.7					
					2.5					
		27.5-28			4.3	Brown coarse SAND and GRAVEL.				
		28.0-30			1.0	Brown coarse SAND, trace Gravel.				
30					0.7					

REMARKS

1 - Sample SB-5 (5.5-6 ft) collected at 11:35
2 - Sample SB-5 (15.5-16 ft) collected at 11:40.
3 - Moist at 24 to 25 feet. Wet at 25 feet.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-5C/TW-3

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:24 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-5C/TW-3
SHEET: 2 of 2
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 35
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
1/8/2020		25.37	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-6	30.0-30.5			1.1	S-6 : Dark brown fine to medium SAND, some Gravel.				
		30.5-31			1.0	Light brown fine to medium SAND, trace Gravel.				
		31.0-33			0.4	Brown medium to coarse SAND, some Gravel.			SAND, GRAVEL AND SHALE FRAGMENTS	
					0.3					
		33.0-35			0.7	Brown medium to coarse SAND, little Gravel.				
					1.0					
35					0.2		4			35
					0.3	End of exploration at 35 feet.	5			
					0.5					
					0.9					
					0.5					
					0.6					
40					0.7					
					0.2					
					0.2					
					0.1					
					0.1					
45										
50										
55										
60										

REMARKS

4 - TW-5 installed to 35 ft with PVC riser (0-25 ft) and screen (25-35 ft).
5 - End of boring at 35 feet bgs.
No odor/staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-5C/TW-3

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:24 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-6
SHEET: 1 of 1
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 20
Date Start: 1/7/2020 **Finish:** 1/7/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-1.5			0	S-1 : Asphalt			ASPHALT	1.5
					0					
		1.5-2			0	Brown fine to medium SAND and SILT, Gravel, little Asphalt.				
		2.0-4.5			0	Brown fine to medium SAND and SILT, trace Gravel, little			SAND, SILT, GRAVEL, AND SHALE FRAGMENTS	
					0	Asphalt.				
					0					
5		4.5-5			0	SHALE and GRAVEL, little brown, little Silt, fine to medium				5.25
	S-2	5.0-5.25			0	Sand.				5.5
		5.3-5.5			0	S-2 : Brown fine to medium SAND and SILT, little Gravel.	1		FILL	
		5.5-8			0	Asphalt				
					0	Brown fine to medium SAND, little Silt, little Gravel.			SAND AND GRAVEL	
		8.0-9			0	Brown fine to medium SAND, trace Silt, some Gravel.				
		9.0-10			0	Gravel with little brown, fine to medium Sand.				10
10	S-3	10.0-10.5			0	S-3 : GRAVEL and ASPHALT mix with some fine to medium			FILL	10.5
		10.5-11.5			0	brown Sand.				
		11.5-13			0	Brown medium to coarse SAND, trace Silt.				
					0	Brown medium to coarse SAND some Gravel, trace Silt.				
		13.0-15			0	Light brown medium to coarse SAND.			SAND	
					0					
15					0					
	S-4	15.0-16			0	S-4 : Light brown medium to coarse SAND, trace Gravel, trace			FILL	16
		16.0-20			0	asphalt.	2			
					0	Light brown medium to coarse SAND.				
					0					
					0				SAND	
					0					
20					0					20
						End of exploration at 20 feet.	3			
25										
30										

REMARKS

1 - Sample SB-6 (5.5 - 6 ft) collected at 11:55
2 - Sample SB-6 (15.5-16 ft) collected at 12:00
3 - Boring complete to 20 ft bgs.
No odors/staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-6

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:25 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-7
SHEET: 1 of 1
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 20
Date Start: 1/7/2020 **Finish:** 1/7/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: DP
Sampler O.D. (in.): 2.25
Sampler Length (in.): 60
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-1			0	S-1 : Dark brown SILT and brick fragments.				
		1.0-1.5			0	Light tan fine to medium SAND and GRAVEL.				
		1.5-2.5			0	GRAVEL and BRICK.			FILL	
		2.5-3.5			0	CONCRETE and GRAVEL.				
		3.5-4			0	Dark brown SILT, some fine to medium Sand, little asphalt.				4
5		4.0-5.5			0	Brown fine to medium SAND, some Silt.				
	S-2	5.5-6			0	S-2 : Gray fine to medium SAND and GRAVEL.	1		SAND, GRAVEL, AND SHALE FRAGMENTS	
		6.0-7.5			0	Brown fine to medium SAND, little Gravel.				
		7.5-8			0	Gravel and shale fragments, little brown, fine to medium Sand.				8
		8.0-10			0	Brick, shale, asphalt, concrete mix, some brown, fine to medium Sand, trace Silt.			FILL	
10					0					10
	S-3	10.0-10.5			0	S-3 : Dark brown medium to coarse SAND and SILT, little Gravel.				
		10.5-12			0	Brown fine to medium SAND and GRAVEL, some asphalt.			SAND, SILT, GRAVEL AND SHALE FRAGMENTS	
		12.0-13.5			0	Reddish shale fragments, little Gravel, trace fine to medium Sand.				13.5
		13.5-15			0	Gravel, little brick fragments, trace brown, fine to medium Sand.			FILL	
15					0					15
	S-4	15.0-16			0	S-4 : Brown medium to coarse SAND, some Silt, little Gravel.	2			
		16.0-16.5			0	Gravel with trace light brown Sand, fine to medium.				
		16.5-17.5			0	Cobble, little gravel.			SAND, GRAVEL, AND COBBLE	
		17.5-18			0	Gravel				
	S-5	18.0-20			0	S-5 : Light gray medium to coarse SAND, some Gravel.				
20					0					20
						End of exploration at 20 feet.	3			
25										
30										

REMARKS

1 - Sample SB-6 (6 - 6.5 ft) collected at 10:40.
2 - Sample SB-6 (15 - 15.5 ft) collected at 10:50
3 - Boring complete to 20 ft bgs.
No odors/staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-7

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:26 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-8/TW-4
SHEET: 1 of 2
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time
1/8/2020		24.79	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-1			0.1	S-1 : Brown fine to medium SAND and GRAVEL.				
		1.0-2			0.4	Brown fine to medium SAND and GRAVEL with some asphalt mix.				
		2.0-3			0.4	Gravel with shale fragments.			FILL	
		3.0-4			0.6	Brown fine to medium SAND and GRAVEL.				
		4.0-4.5			0.4	Brick and asphalt mix.				4.5
5					0.1					
	S-2	4.5-5			0.1	Brown fine to medium SAND, little Silt, trace Gravel.				
		5.0-10			0.2	S-2 : Brown fine to coarse SAND, little Silt, trace Gravel.	1			
					0.1					
					0					
					0					
					0					
					0					
10					0					
		10.0-10.5			0	Brown SILT and fine to medium SAND, trace Gravel.				
		10.5-10.75			0	Shale				
		10.8-13			0	Brown fine to medium SAND, some SIlt, little Gravel.				
					0					
		13.0-15			0	Brown fine to coarse SAND.				
					0					
15					0					
	S-3	15.0-16.5			0	S-3 : Brown medium to coarse SAND, some Gravel.	2			
					0					
		16.5-17			0	Brown medium to coarse SAND and GRAVEL.				
		17.0-18				Brown fine to medium SAND.			SAND AND SILT	
		18.0-18.5			0	Brown medium to coarse SAND, some Gravel.				
	S-4	18.5-19			0	Brown medium to coarse SAND and GRAVEL.				
20		19.0-20				S-4 : Brown medium to coarse SAND, trace Gravel.				
		20.0-21			0	Brown fine to medium SAND, trace Gravel.				
		21.0-23			0	Light brown medium to coarse SAND, trace Gravel.				
					0					
		23.0-24			0	Brown medium to coarse SAND, some Gravel.				
		24.0-25			0	Brown medium to coarse SAND, little Gravel.	3			
25		25.0-26			0	Brown fine to medium SAND, trace Gravel. (wet at 25 ft)				
		26.0-30			0	Brown, medium to coarse Sand, trace Gravel.				
					0					
					0					
					0					
30										

REMARKS

1 - Sample SB-5 (5.5-6 ft) collected at 14:20
2 - Sample SB-5 (15.5-16 ft) collected at 14:35.
3 - Moist at 24 to 25 feet. Wet at 25 feet.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-8/TW-4

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:26 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-8/TW-4
SHEET: 2 of 2
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)			
Date	**Time**	**Water Depth**	**Stab. Time**
1/8/2020		24.79	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-5	30.0-32			0	S-5 : Brown medium to coarse SAND, trace Gravel.				
		32.0-33			0	Brown coarse SAND.			SAND AND SILT	
		33.0-34			0	Brown medium to coarse SAND, trace Gravel.				
35		34.0-35			0	Brown coarse Sand.				35
					0	End of exploration at 30 feet.	4 5			
40										
45										
50										
55										
60										

REMARKS

4 - TW-8 installed to 35 ft with PVC riser (0-25 ft) and screen (25-35 ft).
5 - End of boring at 35 feet bgs.
No odor/staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-8/TW-4

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:27 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-9/TW-5
SHEET: 1 of 2
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 35
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
1/8/2020		25.74	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
	S-1	0.0-2			0	S-1 : Asphalt/Sub-base			ASPHALT	
					0					2
		2.0-2.5			0	Light brown fine SAND and GRAVEL, little Asphalt. (Fill)				
		2.5-3			0	Brick				
		3.0-3.5				Light brown fine SAND, little brick, trace Asphalt, trace Gravel.			FILL	
5		3.5-4.5			0	(Fill)				
		4.5-5.5			0	Brown fine to medium SAND, trace Silt, trace Gravel.				
	S-2	5.5-6			0	Brown fine to medium SAND, little Silt, trace Gravel.	1			6
		6.0-8				S-2 : Asphalt				
					0	Brown fine to medium SAND, little Silt, trace Gravel.				
		8.0-9.5			0	Brown medium to coarse SAND, little Gravel.				
					0					
10		9.5-10.5				Brown fine to medium SAND, trace Silt, trace Gravel.				
					0					
	S-3	10.5-11				S-3 : Gravel			SAND AND GRAVEL	
		11.0-12			0	Brown fine to medium SAND.				
		12.0-14.5			0	Brown fine to medium SAND and GRAVEL.				
					0					
					0					
15		14.5-15				Brown fine to medium SAND.				
	S-4	15.0-15.5			0	S-4 : Brown fine to medium SAND, some Silt, trace Gravel.				15.5
		15.5-16			0	Asphalt	2		FILL	16
		16.0-16.5			0	Brown medium to coarse SAND and GRAVEl.				
		16.5-17				Cobble				
		17.0-18			0	Brown fine to coarse SAND, trace Gravel.				
		18.0-19			0	Brown fine to coarse SAND and GRAVEL.				
20		19.0-20				Brown fine to carse SAND, trace Gravel.				
	S-5	20.0-21			0	S-5 : Brown medium to coarse SAND, trace Gravel.				
		21.0-22				Gravel				
		22.0-23			0	Brown medium to coarse SAND, trace Gravel.				
		23.0-24			0	Brown medium to coarse SAND and GRAVEL.			SAND, GRAVEL, AND COBBLE	
		24.0-25			0	Cobble, light brown, fine to medium Sand, trace Gravel.	3			
25	S-6	25.0-30			0	S-6 : Brown fine to coarse SAND, trace Gravel. (wet at 25 ft)				
					0					
					0					
					0					
					0					
30					0					

REMARKS

1 - Sample SB-5 (5.5-6 ft) collected at 14:20
2 - Sample SB-5 (15.5-16 ft) collected at 14:35.
3 - Moist at 24 to 25 feet. Wet at 25 feet.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-9/TW-5

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:28 PM

GEOPROBE LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

205 Park Avenue
Brooklyn, NY

EXPLORATION NO.: SB-9/TW-5
SHEET: 2 of 2
PROJECT NO: 12.0076834.10
REVIEWED BY: Zhan Shu

Logged By: N. Albanese/P. Benya
Drilling Co.: EPhase II
Foreman: C. Hernandez

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 35
Date Start: 1/6/2020 **Finish:** 1/6/2020

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712 DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)			
Date	**Time**	**Water Depth**	**Stab. Time**
1/8/2020		25.74	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Field Test Data	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)
					0				SAND, GRAVEL, AND COBBLE	
					0					
					0					
					0					
					0					
					0					
35					0		4			35
						End of exploration at 35 feet.	5			
40										
45										
50										
55										
60										

REMARKS

4 - TW-8 installed to 35 ft with PVC riser (0-25 ft) and screen (25-35 ft).
5 - End of boring at 35 feet bgs.
No odor/staining observed.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SB-9/TW-5

GZA TEMPLATE GEOPROBE; 1/31/2020; 4:47:28 PM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: MW-4
SHEET: 1 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: Z. Shu
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 30.04
Final Geoprobe Depth (ft.): 35
Date Start - Finish: 6/22/2021 - 6/22/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
06/22/2021	01:25 PM		25.26	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark
		0.0-5.0	60	36		0-1'6": Brown F-M COBBLES.	1
						1'6"-5': Brown F SAND.	
		5.0-10.0	60	24		5'-10': Brown F SAND.	
		10.0-15.0	60			10'-15': Brown F SAND.	
		15.0-20.0	60			15'-20': Brown F SAND.	

Elev. (ft.) | Stratum Description | Depth (ft.)

COBBLES — 1.5
SAND — 5
SAND — 10
SAND — 15
SAND — 20

Equipment Installed: 0.010" PVC Riser

REMARKS

1 - No Soil Sample Collected.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

MW-4

GZA TEMPLATE GEOPROBE W/EQUIP: 7/13/2021; 11:08:51 AM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: MW-4
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: Z. Shu
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 30.04
Final Geoprobe Depth (ft.): 35
Date Start - Finish: 6/22/2021 - 6/22/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
06/22/2021	01:25 PM		25.26	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
22		20.0-25.0	60			20'-25': Brown F SAND.			SAND		
24											
26		25.0-30.0	60			25'-30': Brown F SAND and GRAVEL.			SAND AND GRAVEL		
28											
30		30.0-35.0	60			30'-35': Brown F SAND and GRAVEL, no odor.			SAND AND GRAVEL		0.010" PVC Screen, Sand Pack
32											
34											
36						End of exploration at 35 feet.	2				
38											
40											

REMARKS

2 - End of boring at 35' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

MW-4

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:08:51 AM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc. *Engineers and Scientists*	**Preferred Builders** **205 Park Avenue Rl** **205 Park Avenue, Brooklyn, NY**	**EXPLORATION NO.: MW-5** **SHEET: 1 of 2** **PROJECT NO: 12.0076834.00** **REVIEWED BY:**

Logged By: **Drilling Co.:** EPhase2 **Foreman:** L. Reiss	**Geoprobe Location:** See Plan **Ground Surface Elev. (ft.):** 34.10 **Final Geoprobe Depth (ft.):** 40 **Date Start - Finish:** 6/15/2021 - 6/15/2021	**H. Datum:** **V. Datum:**
Type of Rig: Geoprobe **Rig Model:** 6712DT **Drilling Method:** Direct Push	**Sampler Type:** SS **Sampler O.D. (in.):** 2.0 **Sampler Length (in.):** 24 **Rock Core Size:**	

Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
06/22/2021	01:55 PM		29.3	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft)	Equipment Installed
0		0.0-5.0	60				1				
2											
4											
6		5.0-10.0	60								
8											
10		10.0-15.0	60								
12											
14											
16		15.0-20.0	60								0.010" PVC Riser
18											
20											

REMARKS

1 - No Soil Sample Collected.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

MW-5

GZA TEMPLATE GEOPROBE W/EQUIP; 7/30/2021; 12:47:23 PM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: MW-5
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By:
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 34.10
Final Geoprobe Depth (ft.): 40
Date Start - Finish: 6/15/2021 - 6/15/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
06/22/2021	01:55 PM		29.3	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
20		20.0-25.0	60								
22											
24											
25		25.0-30.0	60								
26											
28											
30		30.0-35.0	60								
32											
34											
35		35.0-40.0	60				2				0.010" PVC Screen, Sand Pack
36											
38											
40							3				

REMARKS

2 - Boring not logged due to EPhase2 drilling straight down to 40' bgs.
3 - End of boring at 40' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

MW-5

GZA TEMPLATE GEOPROBE W/EQUIP; 7/30/2021; 12:47:23 PM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: MW-6
SHEET: 1 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By:
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 28.78
Final Geoprobe Depth (ft.): 35
Date Start - Finish: 6/15/2021 - 6/15/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
06/22/2021	09:05 AM		23.95	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
0		0.0-5.0	60				1				
2											
4											
6		5.0-10.0	60								
8											
10		10.0-15.0	60								
12											0.010" PVC Riser
14											
16		15.0-20.0	60								
18											
20											

REMARKS

1 - No Soil Sample Collected.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

MW-6

GZA TEMPLATE GEOPROBE W/EQUIP: 7/15/2021; 8:44:02 AM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: MW-6
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By:
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 28.78
Final Geoprobe Depth (ft.): 35
Date Start - Finish: 6/15/2021 - 6/15/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
06/22/2021	09:05 AM		23.95	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
22		20.0-25.0	60								
24											
26		25.0-30.0	60								
28											
30		30.0-35.0	60								0.010" PVC Screen
32											Sand Pack
34							2				
36							3				
38											
40											

REMARKS

2 - Boring not logged due to EPhase2 drilling straight down to 35' bgs.
3 - End of boring at 35' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

MW-6

GZA TEMPLATE GEOPROBE W/EQUIP; 7/15/2021; 8:44:02 AM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-1/MW-1
SHEET: 1 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: C. McGuffy
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 29.69
Final Geoprobe Depth (ft.): 35
Date Start - Finish: 6/15/2021 - 6/15/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
06/18/2021	02:20 PM		24.76	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
0		0.0-5.0	60	49	0.0	0-2'3": FILL (Brown/grey F-M Sand, some C Sand and F Gravel, brick, asphalt, and concrete), no odor.			FILL		
2					0.0					2.25	
					0.0	2'3"-5': Brown F-M SAND, some C Sand, some F Gravel, no odor.	1		SAND		
4					0.0						
					0.0					5	
		5.0-10.0	60	29	0.0	5'-10': Brown F-M SAND, some C Sand, trace F gravel, no odor.					
6					0.0						
					0.0						
					0.0				SAND		
8					0.0						
					0.0						
					0.0						
					0.0						
10					0.0					10	
		10.0-15.0	60	17	0.0	10'-15': FILL (Asphalt, F-C Gravel, Concrete fragments).					
					0.0						
					0.0						
12					0.0				FILL		0.010" PVC Riser
					0.0						
					0.0						
					0.0						
14					0.0						
					0.0						
					0.0					15	
		15.0-20.0	60	42	0.0	15'-16': FILL (Brown F-M Sand, trace brick and asphalt), no odor.			FILL		
16					0.0					16	
					0.0	16'-17'6": FILL (Grey F-M Sand, some C Sand, some Concrete fragments, trace brick), no odor.			FILL		
					0.0						
					0.0					17.5	
18					0.0	17'6"-17'7": Green F SAND, no odor.			SAND	17.58	
					0.0	17'7"-18'6": Brown F-M SAND, no odor.			SAND	18.5	
					0.0	18'6"-20': Brown F-M SAND, some C Sand.					
					0.0				SAND		
20					0.0					20	

REMARKS

1 - Soil sample SRI-1 (3-3.5) collected at 1115.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-1/MW-1

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:08:54 AM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-1/MW-1
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: C. McGuffy
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 29.69
Final Geoprobe Depth (ft.): 35
Date Start - Finish: 6/15/2021 - 6/15/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
06/18/2021	02:20 PM		24.76	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		20.0-25.0	60	41	0.0	20'-22': Brown F-M SAND, trace C sand, no odor.			SAND		
22					0.1					22	
					0.2						
					0.1						
					0.0	22'-22'6": FILL (Brown/grey F-C SAND,trace asphalt, concrete, brick), no odor.			FILL	22.5	
					0.0						
					0.0	22'6"-25': Brown F-M SAND, some C Sand, moist, no odor.			SAND		
24					0.0						
					0.0						
					0.0						
		25.0-30.0	60	49	0.0	25'-27': Brown F-M SAND, some C Sand, trace F gravel and brick, moist, no odor.	2			26	
26					0.0				SAND		
					0.0						
					0.0						
					0.0	27'-30': Brown F-C SAND, wet, no odor.				27	
28					0.0				SAND		
					0.0						
					0.0						
					0.0						
					0.0						
30					0.0					30	0.010" PVC Screen
		30.0-35.0	60	60	0.1	30'-30'6": Brown F-M SAND, some C Sand, trace F-C gravel, wet, no odor.			SAND	30.5	Sand Pack
					0.0						
					0.0	30'6"-35': Brown F-C SAND, wet, no odor.					
32					0.0						
					0.0						
					0.0				SAND		
					0.0						
34					0.0						
					0.0						
					0.0					35	
						End of exploration at 35 feet.	3				
36											
38											
40											

REMARKS

2 - Soil sample SRI-1 (25-25.5) collected at 1120. Duplicate sample DUP-1 collected from this interval.
3 - End of boring at 35' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-1/MW-1

GZA TEMPLATE GEOPROBE W/EQUIP: 7/13/2021; 11:08:55 AM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue RI
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-2/MW-2
SHEET: 1 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: C. McGuffy
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 29.35
Final Geoprobe Depth (ft.): 35
Date Start - Finish: 6/15/2021 - 6/15/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
06/18/2021	01:00 PM		24.32	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		0.0-5.0	60	38	0.9	0-1'6": FILL (Brown F-M Sand, some Silt and C Sand, some F-M Gravel), no odor.	1		FILL	1.5	
2					0.0	1'6"- 3'6": FILL (Red Brick, some F-C Gravel), no odor.			FILL	3.5	
4					0.0	3'6"-4'7": Grey/white GRAVEL,some Cobbles.			GRAVEL	4.58	
					0.1	4'7"-5': Brown F-M SAND, some C Sand, some Silt, trace F gravel, no odor.			SAND	5	
		5.0-10.0	60	46	0.0	5'-5'3": Brown F-M SAND, some C Sand, some Silt, trace F gravel, no odor.			SAND	5.25	
6					0.0	5'3"-5'6": Red BRICK fragments.			FILL	5.5	
					0.0	5'6"-8'6": Brown F-M SAND, some Silt, trace C sand and F gravel, trace brick, no odor.			SAND		
8					0.0					8.5	
					0.0	8'6"-8'7": Purple COBBLES.			COBBLES	8.58	
					0.0	8'7"-10': Brown F-M SAND, trace C sand, no odor.			SAND		
10		10.0-15.0	60	42	0.0	10'-11'6": Brown F-M SAND, some C Sand and red Brick fragments, trace F gravel, no odor.			SAND	10	
					0.0					11.5	
12					0.0	11'6"-13'7": Brown F-M SAND, no odor.			SAND		0.010" PVC Riser
					0.0					13.58	
14					0.0	13'7"-14': Light purple COBBLES.			COBBLES	14	
					0.0	14'-15': Brown F-C SAND, some F Gravel, no odor.			SAND		
		15.0-20.0	60	34	0.0					15	
16					0.0	15'-20': FILL (Brown F-C Sand and F Gravel, some M Gravel and Brick fragments, trace C gravel), no odor.			FILL		
					0.0						
18					0.0						
					0.0						
					0.0						
20					0.0					20	

REMARKS

1 - Soil sample SRI-2 (0-0.5) collected at 0920.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-2/MW-2

GZA TEMPLATE GEOPROBE W/EQUIP: 7/13/2021; 11:08:58 AM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-2/MW-2
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: C. McGuffy
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 29.35
Final Geoprobe Depth (ft.): 35
Date Start - Finish: 6/15/2021 - 6/15/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
06/18/2021	01:00 PM		24.32	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
22		20.0-25.0	60	46	0.0	20'-22'6": FILL (Brown F-C Sand, some F Gravel, trace M-C gravel, trace brick fragments), moist, no odor.			FILL	22.5	
24					0.0	22'6-25': Brown F-M SAND, trace C sand, moist, no odor.			SAND	25	
26		25.0-30.0	60	23	0.0	25'-30': FILL (Brown F-M Sand, some C Sand and F Gravel, trace brick and concrete), moist, no odor.			FILL		
28					0.0						
30		30.0-35.0	60	45	0.0	30'-31'6": FILL (Brown F-M Sand, some C Sand and F Gravel, trace M gravel and brick), moist, no odor.	2		FILL	30	0.010" PVC Screen Sand Pack
32					0.0	31'6"-35': Brown F-M SAND, some C Sand, trace F gravel, wet, no odor.			SAND	31.5	
34					0.0						
36						End of exploration at 35 feet.	3			35	
38											
40											

REMARKS

2 - Soil sample SRI-2 (30-30.5) collected at 0930.
3 - End of boring at 35' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-2/MW-2

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:08:58 AM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-3/MW-3
SHEET: 1 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: P. Benya
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 29.33
Final Geoprobe Depth (ft.): 35
Date Start - Finish: 6/14/2021 - 6/14/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)

Date	Time	Stab. Time	Water	Casing
06/18/2021	09:45 AM		24.98	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		0.0-5.0	60	48	5.5	0-6": Brown SILT, some Gravel.			SILT	0.5	
					0.5	6"-1': ASPHALT and GRAVEL.			ASPHALT	1	
					0.0	1'-2': Light tan F-C SAND,GRAVEL, and ASPHALT.			FILL	2	
2					0.0						
					0.0						
					0.0	2'-5': Brown F-M SAND, trace clay, trace cobbles.	1				
					0.0						
4					0.0				SAND		
					0.0						
					0.0						
		5.0-10.0	60	60	0.0	5'-5'6": Brown/dark tan F-M SAND.			SAND	5.5	
6					0.0	5'6"-6'6": Brown/grey F-M SAND and GRAVEL, some Asphalt fragments.			SAND AND GRAVEL	6.5	
					4.7						
					0.1	6'6"-9': Brown F-C SAND, trace silt.					
					0.1						
8					0.0				SAND		
					0.0						
					0.0					9	
					0.0	9'-10': Brown/tan F-C SAND, some Gravel, trace brick fragments.			SAND		
					0.0					10	
10		10.0-15.0	60	45	0.0	10'-11': Brown F-C SAND, some Gravel, trace clay.			SAND		
					0.0					11	
					0.0	11'-11'6": Grey M-C SAND and GRAVEL, trace cobbles.			SAND AND GRAVEL	11.5	
12					0.0						
					0.0						0.010" PVC Riser
					0.0	11'6"-14'6": Brown/orange M-C SAND, trace silt.			SAND		
					0.0						
14					0.0						
					0.0					14.5	
					0.0	14'6"-15': Brown M-C SAND, some Gravel, trace silt.			SAND	15	
		15.0-20.0	60	30	0.0	15'-16': Brown/orange M-C SAND, some Gravel.			SAND		
16					0.0					16	
					0.0						
					0.0	16'-19': Brown/grey F-C SAND and GRAVEL, trace brick fragments, trace asphalt.			SAND AND GRAVEL		
18					0.0						
					0.0						
					0.0					19	
					0.0	19'-20': Tan/light brown M-C SAND.			SAND		
20					0.0					20	

REMARKS

1 - Soil sample SRI-3 (2-2.5) collected at 1250.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-3/MW-3

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:01 AM

MONITORING WELL LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-3/MW-3
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: P. Benya
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.): 29.33
Final Geoprobe Depth (ft.): 35
Date Start - Finish: 6/14/2021 - 6/14/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
06/18/2021	09:45 AM		24.98	

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		20.0-25.0	60	36	0.0	20'-21': Brown/grey F-C SAND, trace gravel, trace silt.			SAND	21	
22					0.0	21'-21'6": Grey F-M SAND and GRAVEL.			SAND AND GRAVEL	21.5	
					0.0	21'6"-24': Brown/dark tan F-C SAND, trace gravel.			SAND		
24					0.0					24	
					0.0	24'-25': Dark tan M-C SAND, some Gravel.			SAND		
		25.0-30.0	60	12	0.0	25'-30': Dark brown/dark tan/brown F-M SAND, some Silt, trace gravel, wet at 28'6".				26	
26					0.0						
					0.0						
					0.0						
					0.0						
28					0.0				SAND		
					0.0		2				
					0.0						
					0.0						
					0.0						
30					0.0					30	0.010" PVC Screen
		30.0-35.0	60	45	0.0	30'-32': Brown F-C SAND, trace gravel, trace silt.			SAND		Sand Pack
					0.0						
					0.0						
32					0.0					32	
					0.0	32'-35': Brown/dark tan M-C SAND, trace silt.					
					0.0						
					0.0						
34					0.0				SAND		
					0.0						
					0.0						
						End of exploration at 35 feet.	3			35	
36											
38											
40											

REMARKS

2 - Soil sample SRI-3 (28-28.5) collected at 1300.
3 - End of boring at 35' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-3/MW-3

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:02 AM

BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-4
SHEET: 1 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: C. McGuffy
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start - Finish: 6/14/2021 - 6/14/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
Not Measured				

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		0.0-5.0	60	43	0.0	0-1'6": FILL (Brown F Sand, some M Sand and Silt, Some F Gravel), no odor.					No Equipment Installed
					0.0				FILL		
					0.0		1			1.5	
2					0.0	1'6"-2'7": FILL (Red Brick fragments).			FILL		
					0.1					2.58	
					0.1	2'7"-3'6": FILL (White/grey Gravel, some Asphalt).			FILL		
					0.1					3.5	
4					0.1	3'6'-4'6": FILL (Brown F Sand and Silt), no odor.			FILL		
					0.1					4.5	
					0.1	4'6"-5': FILL (Red Brick fragments and Asphalt), no odor.			FILL	5	
		5.0-10.0	60	60	0.1						
6					0.1	5'-6'6": FILL (White/grey Gravel, Brick			FILL		
					0.9	fragments, Asphalt, Wood fragments), no odor.				6.5	
					0.2				GRAVEL	7	
					0.2	6'6"-7': White GRAVEL.					
8					0.2	7'-10': Light brown F-M SAND, some C Sand,					
					0.2	trace brick fragments, no odor.			SAND		
					0.2						
					0.2						
10					0.2					10	
		10.0-15.0	60	48	0.2	10'-15': Light brown F-M SAND, some C Sand,					
					0.3	trace F gravel, no odor.					
					0.3						
12					0.2				SAND		
					0.2						
					0.2						
					0.2						
14					0.2						
					0.2						
					0.2					15	
		15.0-20.0	60	44	0.1	15'-16'6": Light brown F-M SAND, some C Sand,					
16					0.1	trace F gravel, no odor.			SAND		
					0.1					16.5	
					0.1	16'6"-18': Light brown F-C SAND, trace F gravel,					
					0.1	no odor.			SAND		
18					0.1					18	
					0.1	18'-20': Light brown F-M SAND, some C Sand,					
					0.1	no odor.			SAND		
					0.1						
20					0.1					20	

REMARKS

1 - Soil sample SRI-4 (1-1.5) collected at 1046.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-4

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:05 AM

BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-4
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: C. McGuffy
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start - Finish: 6/14/2021 - 6/14/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
Not Measured				

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
22		20.0-25.0	60	47	0.0	20'-22': Light brown F-M SAND, some C Sand, no odor.			SAND		
					0.2					22	
					0.1	22'-22'3": Brown SILT, some F Sand, moist, no odor.			SILT	22.25	
					0.1	22'3"-23': Brown M-C SAND, some F Sand, no odor.			SAND	23	
24					0.1						
					0.1	23'-25': Brown F-M SAND, some C Sand, moist at 24'6", no odor.			SAND		
					0.1					25	
		25.0-30.0	60	60	0.1	25'-27': Brown F-M SAND, some C Sand, trace F gravel and trace C sand, moist, no odor.			SAND		
26					0.1						
					0.1		2			27	
					0.1	27'-30': Brown F-C SAND, trace F gravel, wet, no odor.			SAND		
28					0.1						
					0.1						
					0.1						
					0.1						
30					0.0					30	
						End of exploration at 30 feet.	3				
32											
34											
36											
38											
40											

REMARKS

2 - Soil sample SRI-4 (26.5-27) collected at 1055.
3 - End of boring at 30' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-4

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:05 AM

BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-5
SHEET: 1 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: C. McGuffy
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start - Finish: 6/14/2021 - 6/14/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
Not Measured				

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		0.0-5.0	60	34	0.0	0-2'6": FILL (Brown F Sand and Silt, trace gravel and brick), no odor.			FILL		No Equipment Installed
2					0.0		1				
					0.0	2'6"-2'7": FILL (Gravel, Asphalt, and Brick fragments).			FILL	2.5 / 2.58	
4					0.0	2'7"-4'6": Brown F SAND and SILT, no odor.			SAND AND SILT		
					0.0	4'6"-5': GRAVEL, some Asphalt.			GRAVEL	4.5 / 5	
6		5.0-10.0	60	36	0.0	5'-10': Brown F-M SAND, some C Sand, trace F gravel, no odor.					
8					0.0				SAND		
10					0.0					10	
		10.0-15.0	60	60	0.0	10'-11'6": Brown F SAND and SILT, some M Sand, no odor.			SAND AND SILT		
12					0.0	11'6"-15': Brown F-M SAND, trace C sand, no odor.				11.5	
14					0.0				SAND		
		15.0-20.0	60	47	0.1	15'-17': Brown F-M SAND, trace C sand, no odor.				15	
16					0.1				SAND		
					0.0	17'-18': Brown F-C SAND, trace F gravel, no odor.				17	
18					0.0	18'-18'3": Grey GRAVEL.			SAND	18	
					0.0	18'3"-19': Brown F-C SAND, trace F gravel, no odor.			GRAVEL	18.25	
					0.0				SAND	19	
20					0.0	19'-20': Brown F-M SAND, trace C sand and F gravel, no odor.			SAND	20	

REMARKS

1 - Soil sample SRI-5 (1.5-2) collected at 1140.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-5

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:08 AM

BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-5
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: C. McGuffy
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start - Finish: 6/14/2021 - 6/14/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
Not Measured				

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
22		20.0-25.0	60	39	0.1	20'-20'6": Brown F-M SAND, some C Sand and F Gravel, no odor.			SAND	20.5	
					0.1						
					0.1						
					0.1	20'6"-22'6": Brown F-M SAND, some F Silt, no odor.			SAND		
					0.1						
					0.1						
					0.1	22'6"-22'8": BRICK fragments.				22.5	
					0.1				FILL	22.67	
24					0.1	22'8"-25': FILL (Brown F-C Sand, some Gravel, some Brick), no odor.			FILL		
					0.1						
					0.1						
					0.1					25	
26		25.0-30.0	60	27	0.1	25'-28': Brown F-M SAND, some C Sand, no odor.					
					0.2						
					0.2						
					0.2				SAND		
					0.1		2				
28					0.1						
					0.1	28'-30': Brown F-C SAND, moist to wet.				28	
					0.1						
					0.1				SAND		
30					0.1					30	
						End of exploration at 30 feet.	3				
32											
34											
36											
38											
40											

REMARKS

2 - Soil sample SRI-5 (27-27.5) collected at 1155.
3 - End of boring at 30' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-5

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:08 AM

BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-6
SHEET: 1 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: P. Benya
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start - Finish: 6/14/2021 - 6/14/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
Not Measured				

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		0.0-5.0	60	48	0.0	0-6": Brown F-M SAND, trace silt.			SAND	0.5	No Equipment Installed
					0.0	6"-1': FILL (Asphalt, Gravel, Cobbles).			FILL	1	
					0.0	1'-2': Dark brown M-C SAND, some Gravel, trace silt.			SAND		
2					0.0					2	
					0.0	2'-2'6": BRICK fragments.	1		FILL	2.5	
					0.0	2'6"-3'5": Grey F-M SAND and GRAVEL.			SAND AND GRAVEL	3.5	
					0.0						
4					0.0	3'5"-5': Brown F-M SAND, trace clay, trace silt.					
					0.0				SAND		
					0.0					5	
		5.0-10.0	60	60	0.0	5'-5'6": Brown F-M SAND and GRAVEL.			SAND AND GRAVEL	5.5	
6					0.1	5'6"-6': Grey F-M SAND and GRAVEL, some Cobbles.				6	
					0.2				SAND AND GRAVEL	6.5	
					0.1	6'-6'6": Light brown F-M SAND, trace gravel, trace brick fragments.				7	
					0.1				SAND		
8					0.1	6'6"-7': Grey F-M SAND, some Clay, some Brick fragments.			SAND		
					0.1						
					0.1	7'-10': Brown F-C SAND, trace gravel, trace silt.			SAND		
					0.1						
10					0.1					10	
		10.0-15.0	60	60	0.0	10'-11'6": FILL (Brown M-C Sand, trace gravel).					
					0.0				FILL		
					0.0					11.5	
12					0.0	11'6"-12': Dark brown F-C SAND and GRAVEL.			SAND AND GRAVEL	12	
					0.0	12'-15': Brown M-C SAND, trace gravel.					
					0.0						
					0.0				SAND		
14					0.0						
					0.0						
					0.0					15	
		15.0-20.0	60	60	0.0	15'-16': Brown M-C SAND, trace gravel.			SAND		
16					0.0					16	
					0.0	16'-17': Dark brown F-C SAND, some Gravel.			SAND		
					0.1	17'-20': FILL (Brown M-C Sand).				17	
					0.1						
18					0.1				FILL		
					0.1						
					0.1						
					0.1						
20					0.1					20	

REMARKS

1 - Soil sample SRI-6 (2-2.5) collected at 0950.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-6

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:11 AM

BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-6
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: P. Benya
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start - Finish: 6/14/2021 - 6/14/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
Not Measured				

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		20.0-25.0	60	60	0.1	20'-20'6": Brown F-C SAND.			SAND	20.5	
					0.1	20'6"-21': Brown F-C SAND, some Silt, trace			SAND	21	
					0.1	gravel.					
22					0.1	21'-22': Brown F-M SAND, trace gravel.			SAND	22	
					0.1	22'-22'6": Dark brown F-C SAND and GRAVEL.			SAND AND	22.5	
					0.1	22'6"-25': Brown M-C SAND.			GRAVEL		
					0.1						
24					0.1				SAND		
					0.1						
					0.1					25	
		25.0-30.0	60	48	0.0	25'-26': Brown/dark brown F-C SAND, trace silt,			SAND		
26					0.0	trace gravel.				26	
					0.0	26'-27': Brown F-C SAND.	2		SAND		
					0.0					27	
					0.0	27'-30': Brown/dark brown/tan M-C SAND,					
28					0.0	wet at 27'.					
					0.0				SAND		
					0.0						
					0.0						
30					0.0					30	
						End of exploration at 30 feet.	3				
32											
34											
36											
38											
40											

REMARKS

2 - Soil sample SRI-6 (26.5-27) collected at 1000.
3 - End of boring at 30' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-6

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:12 AM

BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-7
SHEET: 1 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: C. McGuffy
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start - Finish: 6/14/2021 - 6/14/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
Not Measured				

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		0.0-5.0	60	38	0.0	0-1'6": Brown F-M SAND, some C Sand, some F-M Gravel, no odor.			SAND		No Equipment Installed
2					0.0	1'6"-5': FILL (Red Brick, F-M Gravel, some Asphalt), no odor.	1			1.5	
4					0.0				FILL		
		5.0-10.0	60	34	0.0	5'-5'6": GRAVEL and red BRICK fragments.	4			5	
6					0.0	5'6"-10': Brown F-M SAND, some C Sand, trace gravel, cobbles, and brick, no odor.			FILL	5.5	
8					0.0				SAND		
10		10.0-15.0	60	29	0.0	10'-15': Brown F-C SAND, some F-M Gravel, no odor.				10	
12					0.0				SAND		
14					0.0						
		15.0-20.0	60	44	0.0	15'-17': Brown F-C SAND, some F-M Gravel, trace C gravel, no odor, wet.				15	
16					0.0				SAND		
					0.0	17'-18'6": Brown F-C SAND, some F-M Gravel, trace C gravel, no odor, moist.				17	
18					0.0				SAND		
					0.0	18'6"-18'8": White/grey GRAVEL.				18.5	
					0.0	18'8"-20': Brown F-M SAND, some C Sand, no odor.			GRAVEL	18.67	
20					0.0				SAND	20	

REMARKS

1 - Soil sample SRI-7 (1.5-2) collected at 1500.
4 - Boring was third attempt - stepped out three times due to refusal at 5' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-7

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:14 AM

BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-7
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: C. McGuffy
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start - Finish: 6/14/2021 - 6/14/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
Not Measured				

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
22		20.0-25.0	60	37	0.0	20'-22'6": Brown F-C SAND, some F Gravel, moist, no odor.			SAND		
24					0.0	22'6"-22'8": Purple COBBLES.			COBBLES	22.5 / 22.67	
					0.0	22'8"-25': Brown F-M SAND, some C Sand, moist, no odor.			SAND		
26		25.0-30.0	60	40	0.0	25'-27': Brown F-M SAND, some C Sand, trace F-M gravel, trace brick, wet, no odor.	2		SAND	25	
28					0.0	27'-30': Brown F-C SAND, trace F gravel, wet, no odor.			SAND	27	
30					0.0					30	
32						End of exploration at 30 feet.	3				
34											
36											
38											
40											

REMARKS

2 - Soil sample SRI-7 (24.5-25) collected at 1530.
3 - End of boring at 30' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-7

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:14 AM

BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-8
SHEET: 1 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: P. Benya
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start - Finish: 6/15/2021 - 6/15/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
Not Measured				

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		0.0-5.0	60	60	0.0	0-6": ASPHALT.			ASPHALT	0.5	No Equipment Installed
					0.0	6"-1': Tan M-C SAND and GRAVEL, some Cobble.			SAND AND GRAVEL	1 / 1.5	
2					0.0	1'-1'6": Brown F-M SAND and black SILT, some Brick fragments.			SAND AND SILT	2.5	
					0.0	1'6"-2'6": White F-M SAND and black SILT, some Asphalt, some Cobbles.					
4					0.0	2'6"-5': Brown F-M SAND, some Silt, trace gravel.	1		SAND		
					0.0					5	
		5.0-10.0	60	36	0.0	5'-5'6": Brown F-M SAND, some Silt, trace asphalt fragments.			SAND	5.5	
6					0.0				SAND AND SILT	6	
					0.0	5'6"-6': Black F-M SAND and SILT, some Gravel.					
					0.0	6'-10': Brown F-M SAND, some Silt, trace gravel, trace cobbles.					
8					0.0				SAND		
					0.0						
					0.0						
					0.0						
10					0.0					10	
		10.0-15.0	60	36	0.0	10'-11': Brown/black F-C SAND and SILT, some Gravel, trace brick fragments.			SAND AND SILT	11	
					0.0						
					0.0	11'-15': Brown/tan F-C SAND, trace gravel.					
12					0.0						
					0.0				SAND		
					0.0						
					0.0						
14					0.0						
					0.0						
					0.0					15	
		15.0-20.0	60	36	0.0	15'-15'6": Brown F-M SAND, trace gravel.			SAND	15.5	
16					0.0	15'6"-16': Dark brown F-M SAND, some Silt, trace gravel.			SAND	16	
					0.0				SAND		
					0.0	16'-17': Tan F-C SAND, some Gravel.				17	
					0.0						
18					0.0	17'-20': Tan F-M SAND, trace gravel.					
					0.0				SAND		
					0.0						
					0.0						
20					0.0					20	

REMARKS

1 - Soil sample SRI-8 (3.5-4) collected at 1315.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-8

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:17 AM

BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Preferred Builders
205 Park Avenue Rl
205 Park Avenue, Brooklyn, NY

EXPLORATION NO.: SRI-8
SHEET: 2 of 2
PROJECT NO: 12.0076834.00
REVIEWED BY:

Logged By: P. Benya
Drilling Co.: EPhase2
Foreman: L. Reiss

Geoprobe Location: See Plan
Ground Surface Elev. (ft.):
Final Geoprobe Depth (ft.): 30
Date Start - Finish: 6/15/2021 - 6/15/2021

H. Datum:
V. Datum:

Type of Rig: Geoprobe
Rig Model: 6712DT
Drilling Method: Direct Push

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)				
Date	Time	Stab. Time	Water	Casing
Not Measured				

Depth (ft)	Sample No.	Sample Depth (ft.)	Pen. (in.)	Rec. (in.)	PID (ppm)	Sample Description Modified Burmister	Remark	Elev. (ft.)	Stratum Description	Depth (ft.)	Equipment Installed
		20.0-25.0	60	30	0.0	20'-22'6": Brown F-C SAND, trace silt.					
					0.0						
					0.0						
22					0.0				SAND		
					0.0						
					0.0					22.5	
					0.0	22'6"-25': Light brown/tan F-C SAND, trace silt,					
					0.0	trace gravel.					
24					0.0				SAND		
					0.0						
					0.0					25	
		25.0-30.0	60		0.0	25'-26': Brown/grey F-C SAND, some Gravel.			SAND		
26					0.0	26'-29': Tan/light tan F-M SAND, trace cobbles.				26	
					0.0						
					0.0						
					0.0						
28					0.0				SAND		
					0.0						
					0.0					29	
					0.0	29'-30': Dark brown F-C SAND, trace silt,					
30					0.0	wet at 30'.	2		SAND	30	
						End of exploration at 30 feet.	3				
32											
34											
36											
38											
40											

REMARKS

2 - Soil sample SRI-8 (29.5-30) collected at 1325. Duplicate sample DUP-2 collected from this interval.
3 - End of boring at 30' bgs.

Field Screening performed with PID equipped with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard.See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

SRI-8

GZA TEMPLATE GEOPROBE W/EQUIP; 7/13/2021; 11:09:18 AM

APPENDIX I
COMMUNITY AIR MONITORING PLAN

Proactive by Design

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

GZA GeoEnvironmental of NY
104 West 29th Street
10th Floor
New York, NY 10001
T: 212.594.8140
F: 212.279.8180
www.gza.com

Appendix I
New York State Department of Health
Generic Community Air Monitoring Plan
Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. A periodic monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

APPENDIX J

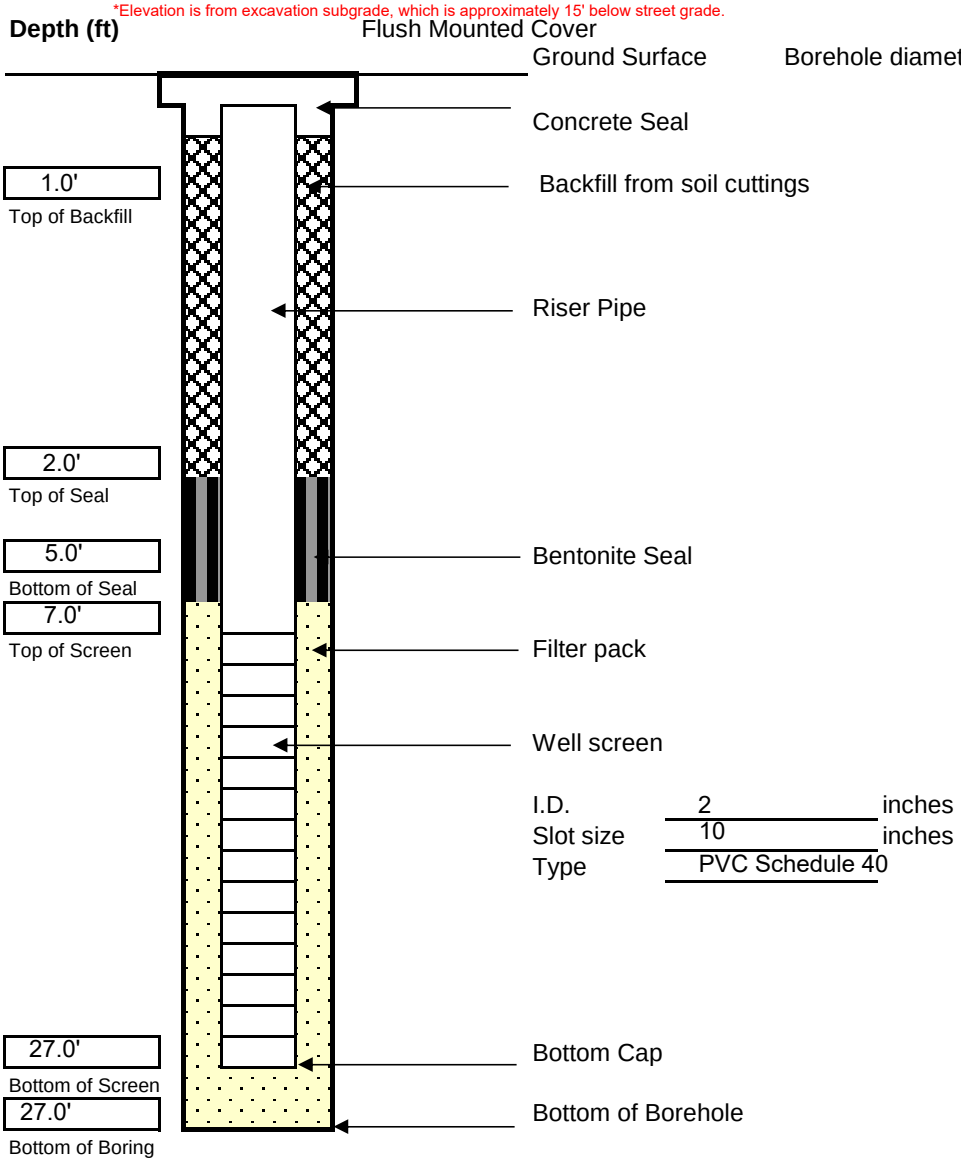
MONITORING WELL BORING AND CONSTRUCTION LOGS

GZA GEOENVIRONMENTAL OF NEW YORK

Well No. MW-1

Project: 205 Park Avenue, Brooklyn, NY		Page 1 of 1		
Project No.:		Water Levels		
Surface Elevation:	Driller: ADT	Date	Time	Depth
Top of PVC		5/2/22	10:00	12.0'
Casing Elevation:	GZA Rep: Chris and Rob	5/2/22	12:00	11.50'
Datum: NA	Date of Completion: : 5/2/2022			

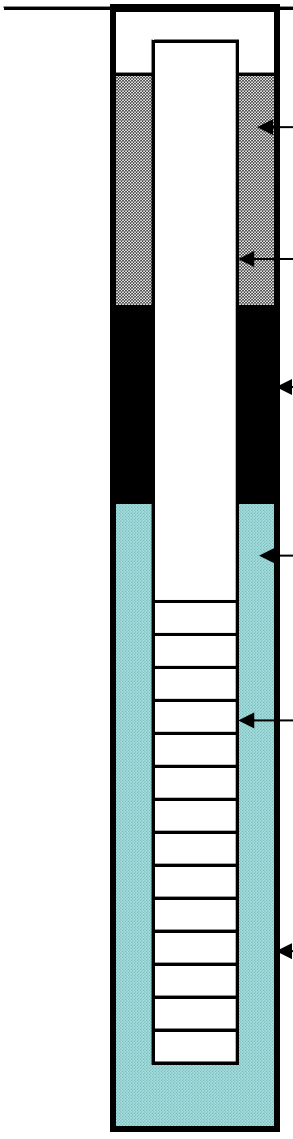
*Stickup on 5-2-2022, but will be flush mount with basement floor slab upon completion of the building.
*Elevation is from excavation subgrade, which is approximately 15' below street grade.



Note: All measurements in depths based on ground surface at 0 feet.
(NOT TO SCALE)

GZA GEOENVIRONMENTAL OF NEW YORK **Well No. MW-2**

Project: 205 Park Avenue	Location: Brooklyn, NY	Page 1 of 1		
Project No.: 12.0076834.10	Contractor: ADT	Water Levels		
Surface Elevation:	Driller: Chris/ Rob	Date	Time	Depth
Top of PVC	Well Permit No.:	5/5/2022	10:30:00 AM	13.78
Casing Elevation:	GZA Rep.:	5/5/2022	11:30:00 AM	13.52
Datum:	Date of Completion:	5/5/2022	TOC	13.54



*stickup 2.59 ft above grade, to be leveled with slab upon completion

Concrete Seal, from _____ ft. to _____ ft.

Cement-bentonite grout from 0.0 ft. to 6.0 ft.

Riser Pipe from 0.0 ft. to 9.0 ft.

Bentonite seal from 0.0 ft. to 6.0 ft.

Filter pack from 7.0 ft. to 29.0 ft.

Sand Size _____

Well screen from 9.0 ft. to 29.0 ft.

Diameter 2 inches
Slot size 10 inches
Type _____ PVC schedule 40

Borehole diameter: 8 inches

Bottom Cap at 30.4 ft.

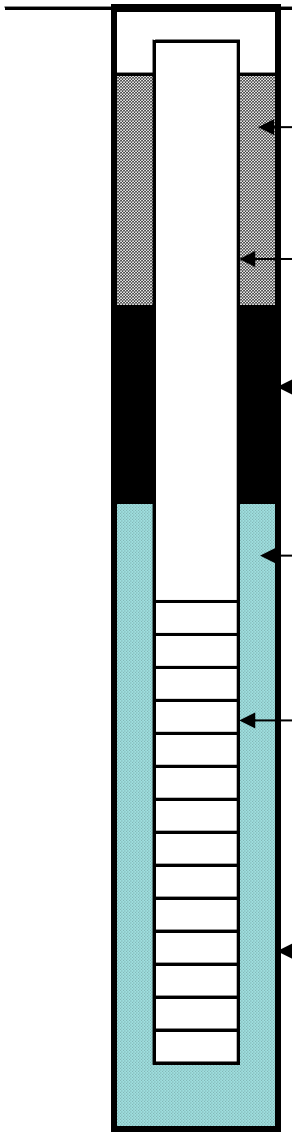
Bottom of Borehole at 33.0 ft.

Note: All measurements based on ground surface at 0 feet. (+) above grade. (-) below grade.

(NOT TO SCALE)

GZA GEOENVIRONMENTAL OF NEW YORK **Well No. MW-3**

Project: 205 Park Avenue	Location: Brooklyn, NY	Page 1 of 1		
Project No.: 12.0076834.10	Contractor: ADT	Water Levels		
Surface Elevation:	Driller: Chris/ Rob	Date	Time	Depth
Top of PVC	Well Permit No.:	5/5/2022	7:50:00 AM	14.65
Casing Elevation:	GZA Rep.:	5/5/2022	8:50:00 AM	13.33
Datum:	Date of Completion:	5/5/2022	TOC	13.36



Flush Mount Protective Cap

*stickup 2.59 ft above grade, to be leveled with slab upon completion

Ground Surface

Concrete Seal, from _____ ft. to _____ ft.

Cement-bentonite grout from 0.0 ft. to 6.0 ft.

Riser Pipe from 0.0 ft. to 9.0 ft.

Bentonite seal from 0.0 ft. to 6.0 ft.

Filter pack from 7.0 ft. to 29.0 ft.

Sand Size _____

Well screen from _____ ft. to _____ ft.

Diameter 2 inches
Slot size 10 inches
Type _____ PVC schedule 40

Borehole diameter: 8 inches

Bottom Cap at 30.4 ft.

Bottom of Borehole at 30.4 ft.

Note: All measurements based on ground surface at 0 feet. (+) above grade. (-) below grade.

(NOT TO SCALE)

APPENDIX K
OPERATIONS AND MAINTENANCE MANUAL

SSDS OPERATIONS AND MAINTENANCE MANUAL

205 PARK AVENUE
KINGS COUNTY
BROOKLYN, NEW YORK
NYSDEC Site Number: C224319

PREPARED FOR:

462 Lexington LLC
89 Bartlett St. Brooklyn, NY 11206

PREPARED BY:
Goldberg-Zoino Associates of New York P.C.
d/b/a GZA GeoEnvironmental of New York (GZA)
104 West 29th Street, 10th Floor
New York, NY 10001
212-594-8140

File No. 12.0076834.10

Table of Contents

Section 1 Sub-Slab Depressurization Systems 1

1.1 Purpose 1

1.2 Site Operation and Maintenance Plan Requirements 1

Section 2 Implementation of the O&M Plan 2

2.1 Parties Responsible for implementation of the O&M Plan 2

2.2 Contact Information 2

2.3 Sub Slab Depressurization System Description 2

2.3.2 Vapor Conveyance Pipe 2

2.3.3 Blower, Wiring, Panels, and Breakers 3

2.3.4 Monitoring System 3

Section 3 Maintenance 4

Appendices

Appendix A Inspection Schedule and Documentation Form

Section 1 Sub-Slab Depressurization Systems

1.1 Purpose

The purpose of this document is to ensure the proper operation and maintenance of the active sub-slab depressurization system (SSDS) installed at 205 Park Avenue, Brooklyn, New York.

1.2 Site Operation and Maintenance Plan Requirements

This operations and maintenance (O&M) Plan has been prepared for the site to address in detail the institutional and engineering controls required for the site.

Provisions covered by this plan include:

- Parties responsible for implementation of the O&M Plan;
- Contact Information to be posted at the site for residents in case a need arises;
- SSDS operation and maintenance requirements in accordance with most recent NYSDOH guidance document, "Guidance for Evaluating Soil Vapor Intrusion in the State of New York";
- Schedule of inspections and applicable testing in accordance with guidance or annually whichever is more frequent along with applicable inspections forms for use; and
- Copies of all equipment manuals, product materials guides or manuals.

A copy of the O&M Plan shall be maintained on site and in the property manager's offices. Original inspection forms shall be maintained at the offices of the Owners: 462 Lexington LLC, 89 Bartlett Street, Brooklyn, NY 11206.

Section 2 Implementation of the O&M Plan

2.1 Parties Responsible for implementation of the O&M Plan

462 Lexington LLC is responsible for operation and maintenance of the SSDS installed at 205 Park Avenue, in Brooklyn, New York.

2.2 Contact Information

You can always call 911 if you are in an emergency. If it can wait, to report an issue, you should contact 462 Lexington LLC at Joel Blum office@lrealtycapital.com.

2.3 Sub Slab Depressurization System Description

The building already under construction onsite has had piping for a SSDS (without the blower) and a vapor barrier installed beneath its basement floor slabs. A blower has not been installed to the system yet. The active SSDS, with a blower, will be completed and operated under the Site Management Plan (SMP). The piping, placed for a SSDS installed beneath the vapor barrier will intercept any potential residual vapors from contaminants remaining in the groundwater before entering the building. Specifically, slotted schedule 40 PVC pipe was installed in a minimum 10-inch thick gas permeable aggregate layer beneath the respective building's basement floor slab. A cushion geotextile and then a vapor barrier was placed on top of the aggregate layer. Then vertical riser pipes and suction fan will be installed under the SMP program before the building is occupied.

2.3.2 Vapor Conveyance Pipe

The information will be provided upon completed installation of SSDS.

2.3.3 Blower, Wiring, Panels, and Breakers

The information will be provided upon completed installation of SSDS.

2.3.4 Monitoring System

The information will be provided upon completed installation of SSDS.

Section 3 Maintenance

Vapor Intrusion Mitigation Systems should be inspected annually. Maintenance on the SSDS system shall be performed by qualified maintenance personnel. Due to the installation of the remote monitoring system at this site, if no abnormalities are observed and if the system is operating within the intended performance range, inspections may be performed on an annual basis.

The following are the items to be checked on the scheduled inspection basis:

- **Sealing:** Floor and wall penetration sealing should remain in good condition, and all openings should be sealed. If floor caulking is damaged or missing, system performance could be compromised.

- **Pipe**: Pipe should be checked to ensure no damage or leaks have occurred. All exposed interior and exterior pipe should be inspected.

- **Blower**: The blower should be checked for any visual signs of damage. Applied vacuum and system airflow should be recorded.

- **Gate Valves:** Gate valves should be visually inspected for cracks. The position of each gate valve should be recorded to ensure no changes have been made. The position should be recorded as the approximate percentage open**.**

- **Vapor Guardian and Sensors**: Sensors should be manually "zeroed" and checked against the remote login terminal values.

- **Permanent Sub Slab Vacuum Ports**: Sub slab vacuum should be recorded at all permanent sub slab test ports.

Appendix A Inspection Schedule and Documentation Form

System component	Date	Condition/readings	
Sealing			
Pipe			
	Date	Average airflow (cfm)	Average Static Vacuum ("W.C.)
Blower			
Sub Slab Vacuum Port	Date	Gate Valve Position (% open)	Average Vacuum ("W.C.)
Riser#1			
Riser#2			
	Date	Average Vacuum ("W.C.)	
MP-1			
MP-2			
MP-3			
MP-4			
MP-5			
MP-6			
MP-7			
MP-8			

APPENDIX L

REMEDIAL SYSTEM OPTIMIZATION REPORT

REMEDIAL SYSTEM OPTIMIZATION REPORT

1. **Introduction**

    1.1 Report Objectives

    1.2 Report Organization

2. **Site Description and History**

    2.1 Site Location, Ownership, and Description

    2.2 Site History

    2.3 Previous Investigations/Remedial Actions

3. **Regulatory Requirements and Cleanup Goals**

    3.1 Remedial Action Objectives

    3.2 Cleanup Goals

4. **Summary of Supplemental Investigation and Findings**

    4.1 Summary of Supplemental Investigation

    4.2 Nature and Extent of Contamination

5. **Conceptual Site Model**

    5.1 Surface and Subsurface Characteristics

    5.2 Contaminant Sources

5.3 Contaminants of Concern

5.4 Extent of Contamination

5.5 Exposure Pathways

6. Description of Remedy

6.1 Remedial Systems Overview

6.2 Operation, Maintenance, and Monitoring Program

7. Remedial System Performance

7.1 System Runtime/Downtime Summary

7.2 Contaminant Mass Recovery Assessment

7.3 Regulatory Compliance

7.4 Health and Safety Records

7.5 Assessment of Cleanup Progress/Achievement of Remedial Action Objectives

7.6 Operations, Maintenance, and Monitoring Costs

8. Conclusions and Recommendations

9. Corrective Measure