601-607 UNION STREET

KINGS, COUNTY

BROOKLYN, NEW YORK

Remedial Action Work Plan

NYSDEC BCP Number: C224392

Prepared for:

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NOVEMBER 2025

CERTIFICATION STATEMENT

I, Ariel Czemerinski, certify that I am currently a NYS registered professional engineer and that this Remedial Action Work 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) and Green Remediation (DER-31).



076508 — NYS Professional Engineer #

11/26/25 — Date

Signature

(final report will be certified)

REMEDIAL ACTION WORK PLAN

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LIST OF ACRONYMS

ACRONYM	DEFINITION
AOC	Area of Concern
AWQS	Ambient Water Quality Standards
AGV	Air Guidance Value
ASP	Analytical Services Protocol
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BGS	Below Grade Surface
CAMP	Community Air Monitoring Program
COC	Chain of Custody
CPP	Citizen Participation Program
CSM	Conceptual Site Model
CVOC	Chlorinated Volatile Organic Compounds
DER-10	Department of Remediation Technical Guidance
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
GPS	Global Positioning System
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IRM	Interim Remedial Measures
MCL	Maximum Contaminant Limit
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NAPL	Non-aqueous Phase Liquid
ng/L	Nanograms per Liter
NYCRR	New York Codes Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethylene
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PID	Photo Ionization Detector

PPB	Parts per Billion
PPM	Parts per Million
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/ Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
REC	Recognized Environmental Condition
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
RL	Reporting Limit
RRSCO	Restricted Residential Use Soil Cleanup Objective
SCG	Standards, Criteria and Guidance
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SVOC	Semi-volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compounds List
TCLP	Toxicity Characteristic Leaching Procedure
TOGS	Technical and Operational Guidance Series
µg/L	Micrograms per Liter
$\mu g/m^3$	Micrograms per Cubic Meter
USGS	United States Geological Survey
UST	Underground Storage Tank
UUSCOs	Unrestricted Use Soil Cleanup Objectives
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

This Remedial Action Work Plan (RAWP) was prepared on behalf of 601 Union Street Owner LLC (the "Volunteer"), who entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) to investigate and remediate the property located at 601-607 Union Street, in the Gowanus neighborhood of Kings County, New York (the "Site"). A BCA was executed on January 26, 2024, and the Applicant was accepted into the BCP as a Volunteer. The New York State Brownfield Cleanup Agreement Index Number is C224392-11-23, and the Site Number is C224392.

This RAWP summarizes the nature and extent of contamination determined during previous investigations and provides an evaluation of a Track 1 cleanup (Alternative 1), and a Track 2 cleanup (Alternative 2), their associated costs, and the preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10, DER-31, and complies with all applicable standards, criteria, and guidance. The remedy described in this document also complies with all applicable federal, state, and local laws, regulations, and requirements.

Site Description/Physical Setting/Site History

The Site, addressed as 601–607 Union Street, is located on the east side of Third Avenue between Sackett Street to the north and Union Street to the south in the Borough of Brooklyn, Kings County, New York. The Site comprises two adjacent tax lots (Tax Block 440, Lots 1 and 12) with a combined area of approximately 37,553 square feet. The tax lots will be reconfigured into three new lots for the purposes of redevelopment.

The western parcel: Lot 1 (21,055 square feet) consists of a 1-story warehouse with a partial cellar (approximately 500 square feet) situated in the northeastern portion of the lot. One 550-gallon and one 3,000-gallon aboveground storage tank (AST), containing #2 fuel oil, are located in the cellar. The slab-on-grade and cellar areas are predominantly covered with concrete, except for a small, exposed area resulting from historic tank removal or other intrusive work. The warehouse occupies the entirety of the tax lot in the western portion of the Site. The building is improved with concrete slab floors, and the partial cellar is located below the northeastern portion.

Utility infrastructure is present along the street frontage, including municipal gas, sewer, and electric connections.

The eastern parcel: Lot 12 (16,498 square feet) is used as an open parking and storage yard, fully covered with asphalt. This lot contains no structures and is entirely paved for vehicle parking and storage.

The Site is secured with fencing and gated entrances. The Site is currently vacant, with occasional parking. Prior to vacancy, Lot 1 was most recently used for warehouse and vehicle repair operations by a petroleum trucking and management company, and Lot 12 served as parking and storage.

Both parcels of the Site were undeveloped as early as 1888. Lot 1 of the Site was developed with a lumber yard (Ross & Snyder), including one- and two-story lumber sheds located in the western portion between 1906 and 1926. The lumber yard operations continued between 1906 until at least 1950s. By 1951, Lot 1 was redeveloped as the current warehouse with a partial cellar, and utilized as offices, a machine shop, and a repair station for trucks and buses. Lot 12 of the Site was developed with 4-story residential dwellings between 1906 and 126. These structures were demolished, and a one-story warehouse was built at Lot 12 circa 1951. This structure was demolished sometime between 1965 and 1978, and remained vacant until 2003, when it was utilized as truck parking.

Summary of the Remedial Investigation

A Remedial Investigation (RI) was completed at the Site in July and August 2025.

The RI included the following scope of work from July 1, 2025, through July 16, 2025:

- Geophysical survey to locate unidentified underground storage tanks (USTs) and identify utilities in the vicinity of the boring locations,
- Installation of fourteen (14) soil borings to 15 feet bgs across the Site and collection of thirty-two (32) soil samples and additional quality assurance /quality control (QA/QC) samples,

- Installation of six (6) soil borings to 20-30 feet bgs across the Site and collection of fifty-two (52) soil samples for delineation purposes,
- Installation of eight (8) monitoring wells and collection of eight (8) groundwater samples from the newly installed on-Site wells, the collection of two (2) groundwater samples from existing monitoring wells in the adjacent sidewalks, and additional QA/QC samples, and
- Installation of five (5) soil vapor points and collection of five (5) soil vapor samples including one duplicate soil vapor sample, installation of one sub-slab vapor point and collection of one (1) sub-slab soil gas sample, and collection of one co-located indoor air sample.

During the same mobilization as the RI in July 2025, a waste characterization sampling event was conducted to pre-determine soil disposal facilities for the future remedial excavation. Based on the elevated concentrations of metals, including hazardous concentrations of lead, identified during the waste characterization sampling, a supplemental delineation sampling event was conducted in August 2025. At which time, soil borings were advanced to depths between 20 and 30 feet below grade surface to determine the clean soil elevation at the Site for remedial alternatives analysis.

The supplemental borings as part of the RI included the following scope of work in August 2025:

- Installation of six (6) soil borings to 20-30 feet at Select soil boring locations (25SB-4X, 25SB-5X, 25SB-6X, 25SB-9X, and 25SB-10X) were installed to 30 feet below grade and 25SB-11X was installed to 20 feet below grade utilizing direct push Geoprobe® 6011DT for vertical delineation at their original locations (25SB-4, 25SB-6, 25SB-6, 25SB-9, 25SB-10, and 25SB-11). Samples were collected at 1-foot or 2-foot intervals at these locations.

<u>Soil Findings</u>

- A historic urban fill layer extending to a maximum of 15 feet below grade surface (bgs) was identified across most of the Site. The fill material predominantly consists of brick, concrete, and miscellaneous debris underlain by silty sand with varying amounts of fine- to coarse-grained gravel. The underlying soils generally consist of medium-dense silty

sand with trace to some gravel and clay. Saturated conditions were observed at approximately 12 to 13 feet below grade underlain by medium-dense silty sand with some gravel from 15 feet to 21 feet, followed by intervals of lean clay, gravel and organics

- Two VOCs, acetone and 2-butanone, were detected above UUSCOs. Acetone is a common laboratory artifact and was detected in several samples at low concentrations. 2-Butanone was detected slightly above its UUSCO in one soil sample 25SB-6 (11-12) located in the northern portion of the Site. No VOCs were detected above RRSCOs.
- Eleven SVOCs were detected above UUSCOs. Of these, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, ad indeno(1,2,3-cd)pyrene also exceeded their respective RRSCOs, and four SVOCs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene also exceeded their respective PGWSCOs in twenty soil samples between grade and 13 feet across the Site.
- One pesticide, 4,4'-DDT, was detected slightly exceeding its respective UUSCO but below its RRSCO in one shallow soil sample, 25SB-5 (0-2') located in the southwestern portion of the Site.
- No PCBs, PFAS, or1,4-dioxane were detected above regulatory standards in soil samples.
- One or more of up to nine metals, including arsenic, barium, cadmium, copper, lead, mercury, nickel, selenium, and zinc, were detected at concentrations exceeding their respective UUSCOs in all soil samples. Of these, arsenic, barium, lead, and mercury also exceeded their respective RRSCOs in 27 soil samples across the Site.
- Hazardous concentrations of lead were identified in 13 soil samples extending to 12 feet across the Site.
- Soil results showed no exceedances of UUSCOs at approximately 28 feet below grade surface.

- SVOCs (PAHs) impacts in soil and groundwater, historic fill source material present, hazardous lead impacts to soil, not localized consistent with urban fill and historical industrial activities.

Groundwater Findings

- Ground surface elevation is relatively level at the Site, ranging from approximately 18.55 feet (NAVD88) in the southwest portion to 20.09 feet (NAVD88) in the central portion. Average depth to groundwater was observed as 6.58 (NAVD88).
- Groundwater beneath the Site generally flows from southwest to northeast.
- One petroleum-related VOC, benzene, was detected in one on-Site groundwater sample slightly above its AWQS. However, three CVOCs specifically cis-1,2-dichloroethene, tetrachloroethene (PCE) and trichloroethene (TCE) were detected above their respective AWQS in the off-site groundwater samples collected from the two monitoring wells located on the adjacent sidewalks. Therefore, the presence of CVOCs in groundwater is likely due to an off-site source.
- Five SVOCs were detected in groundwater samples across the Site above their respective AWQS. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, benzo(k)flouranthene and chrysene were detected above AWQS in 25MW-4. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, and chrysene were detected above AWQS in 25MW-5, and benzo(a)anthracene was detected above AWQS in 25MW-7 and 25MW-8. Due to the lack of SVOCs in off-Site monitoring wells, and presence of SVOCs in soil across the Site, the presence of SVOCs in groundwater could be attributed to the Site soils.
- No herbicides, pesticides, or PCBs were detected in the groundwater samples above laboratory reporting limits.
- Four dissolved metals, all of which are naturally occurring metals including iron, magnesium, manganese and sodium, were detected at concentrations exceeding their respective AWQS. It should be noted that naturally occurring metal contaminants in groundwater are not Site-specific contaminants of concern and will not be addressed by a remedy.

- A total of twelve total metals, including barium, copper, iron, magnesium, manganese, nickel, selenium, and sodium, and three heavy metals, arsenic, chromium, mercury, and lead, were identified at concentrations exceeding their respective AWQS in the on-Site groundwater samples. None of the heavy metals were identified in the off-Site groundwater samples. Only four naturally occurring total metals, iron, magnesium, manganese, and sodium were identified at concentrations exceeding their respective AWQS in the off-Site groundwater samples. Due to the absence of dissolved heavy metals in on-site groundwater samples, the Site soils were not deemed as the source.
- Two PFAS compounds, PFOS and PFOA, were detected above the regulatory limits, PFOS in four samples and PFOA in nine groundwater samples. PFAS samples were not detected in any of the soil samples above laboratory reporting limits. The presence of PFAS in groundwater is likely due to an off-site source.

Soil Vapor Findings

- Soil vapor and sub-slab vapor results showed low to moderate concentrations of CVOCs detected across the Site. When the one sub-slab vapor sample and co-located indoor air sample results are evaluated against the NYSDOH Decision Matrices, no further action is required. The highest detection of PCE was identified in soil vapor sample 25SV-2 located in the western portion of the property at 46.8 $\mu g/m^3$. On the southeastern portion of the Site, in soil vapor sample 25SV-4, PCE was detected at 7.8 $\mu g/m^3$. On the northern portions of the Site, in soil vapor samples 25SV-1 and 25SV-3, PCE was not detected. Although CVOCs were not in soil samples above UUSCOs, they were detected in the off-site groundwater samples.
- Results showed low concentrations of petroleum-related VOCs, with the single exception of 2,2,4-Trimethylpentane, which was detected at 4,500 $\mu g/m^3$ in soil vapor sample 25SV-1. BTEX was identified between 18.50 $\mu g/m^3$ in 25SV-4 to 154.8 $\mu g/m^3$ in 25SV-3. Soil vapor sample 25SV-1, located on the northwestern portion of the property, showed an elevated detection of isooctane (2,2,4-trimethylpentane) at 4,500 $\mu g/m^3$ as well as other elevated petroleum compound detections. Soil vapor sample 25SV-3, located on the northeastern portion of the property, showed low to moderate detections of petroleum and

BTEX compounds. Soil vapor samples 25SV-2 and 25SV-4, located on the southwestern and southeastern portions of the Site, appear to have relatively lower detections of petroleum and BTEX compounds. In general, petroleum compound detections appear to be more elevated in the northern portion of the Site along Sackett Street. However, it should be noted that these VOCs were not detected in soil or groundwater samples, except for benzene in one groundwater sample.

Qualitative Human Health Exposure Assessment

This qualitative assessment evaluates potential human exposure pathways to contaminants detected in soil, groundwater, and soil vapor at the Site. The qualitative exposure assessment identified potential routes of exposure to on-site workers through inhalation, ingestion, and dermal contact of VOCs, SVOCs, and heavy metals during excavation activities. The Health and Safety Plan (HASP) prepared for the Site identifies such exposures and provides instructions for on-Site workers to minimize potential exposure.

The five elements of an exposure pathway are the (1) source of contamination; (2) environmental media and transport mechanisms; (3) point of exposure; (4) route of exposure; (5) receptor population based on past, present or future events.

Media	Potential Receptor(s)	Exposure Mechanism	Pathway Status / Comments
Soil	Construction workers, future residents	Incidental ingestion, dermal contact, inhalation of dust	Potentially complete during construction; mitigated post-construction by hardscape.
Groundwater	Construction workers	Dermal contact or incidental ingestion	Incomplete. Groundwater not used for potable supply; exposure limited by construction health and safety controls.
Soil Vapor	Construction workers, future residents	Inhalation of vapors migrating to indoor air	Low potential. No significant chlorinated VOCs detected; future building will include a cover system.
Air / Dust	On-site workers, nearby community	Inhalation of fugitive dust during excavation	Short-term, controllable pathway managed through CAMP and dust suppression measures.

Current Conditions

Based on the analytical results of the remedial investigations, the primary contaminants of concern for the site are SVOCs, specifically PAHs, metal, including hazardous lead, impacts in soil, and chlorinated VOCs in soil vapor. Human exposure is unlikely under the current Site conditions as the Site is currently vacant, capped with concrete slabs or asphalt pavement, and groundwater within Kings County is not used as a potable source of water. Direct contact, ingestion, or dust inhalation exposure pathways are incomplete under current use.

Construction/Remediation

During construction and remediation activities, including but not limited to soil excavation, dewatering, disturbance of the contaminant sources (i.e.: soil and soil vapor) would create a potential exposure pathway to on-site workers and, to a lesser extent, the public and residents adjacent to the Site. Although the potential for complete exposure exists during construction and remediation, it is short term and controllable. The exposure will be minimized by implementation of a site-specific HASP to protect on-site workers and a site-specific Community Air Monitoring Program (CAMP).

Future Conditions

Once the remedial activities are completed, contaminant sources are expected to be removed. In the event that any residual contamination remains at the Site after remediation, institutional and engineering controls will be in place to prevent and mitigate completion of exposure pathways.

Based on the results of the QHHEA, this RAWP, which includes a site-specific HASP to protect on-site workers and a site-specific CAMP to protect the surrounding community, will be implemented during the remedial action and construction of the proposed Site buildings to ensure that the potential exposure pathways identified do not become complete. The proposed Track 2 remedy will effectively mitigate the soil impacts identified during the RI. Following remedy implementation, no significant human health exposure pathways will remain complete, and the Site will meet the remedial action objectives for protection of public health and the environment.

Fish and Wildlife Assessment (FWIA)

The Site provides no wildlife habitat or food value. There are no natural waterways, wetlands, resources, or critical habitants of endangered species present on or adjacent to the Site. The Site was evaluated in accordance with the Fish and Wildlife Resources Impact Analysis (FWRIA) Decision Key provided in DER-10, Appendix 3C, to determine if an FWRIA was required. It was determined that an FWRIA was not required.

Summary of the Remedy

The selected remedy Alternative 2 – Track 2, would include the following:

1. A remedial program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

    - Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
    - Reducing direct and indirect greenhouse gases and other emissions;
    - Increasing energy efficiency and minimizing use of non-renewable energy;
    - Conserving and efficiently managing resources and materials;
    - Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
    - Maximizing habitat value and creating habitat when possible;
    - Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
    - Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and

- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

As part of the remedial program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis will be completed. The environmental footprint analysis will be completed using an accepted environmental footprint analysis calculator such as SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA), SiteWise™ (available in the Sustainable Remediation Forum [SURF] library) or similar Department accepted tool. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use will be estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be incorporated into the remedial program, as appropriate. The project will include detailed requirements to achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the Final Engineering Report (FER), including a comparison to the goals established during the remedial program.

Additionally, the remedial program will include a climate change vulnerability assessment, to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise will be identified, and the remedial program will incorporate measures to minimize the impact of climate change on potential identified vulnerabilities.

2. Development and implementation of a Construction Health and Safety Plan (CHASP) for the protection of on-site workers, and a Community Air Monitoring Plan (CAMP) for

protection of community/residents and the environment during remediation and construction activities;

3. Demolition of on-site building and removal of existing cover at the Site;
4. Excavation, stockpiling, and disposal of soil/fill exceeding Track 2 SCOs and Protection of Groundwater SCOs listed in Table 1. During the remedial excavation, the top 15 feet of soil/fill be excavated and approximately 20,865 cubic yards of soil/fill will be removed;
5. Design and installation of support of excavation (SOE) elements to enable excavation of contaminated soil to achieve a Track 2 cleanup;
6. Decommissioning of on-site monitoring wells in accordance with NYSDEC CP-43 Policy;
7. Dewatering of impacted groundwater in compliance with city, state, and federal laws and regulations. Dewatered fluids will be treated prior to discharge to the local sewer system under required discharge permits;
8. Removal of one 550-gallon and one 3,000-gallon ASTs, containing #2 fuel oil, located in the existing cellar, and if encountered, removal and decommissioning of any underground storage tanks (USTs) in accordance with applicable regulations;
9. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
10. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 2 SCOs. If endpoint samples do not meet RRSCOs, further excavation will be completed until they are met, otherwise a Track 4 Site Specific SCO will be pursued;
11. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal;
12. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in Table 1, (2) all Federal, State and local rules and regulations for handling and transport of material;

13. Recording of an Environmental Easement, including Institutional Controls, to prevent future exposure to any residual contamination remaining at the Site;

14. Publication of a Site Management Plan 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;

15. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations.

REMEDIAL ACTION WORK PLAN

1.0 INTRODUCTION

601 Union Street Owner LLC entered into a Brownfield Cleanup Agreement (BCA) with the New York State Department of Environmental Conservation (NYSDEC) in January 2024, to investigate and remediate a 0.862-acre property located at 601-607 Union Street in the Gowanus neighborhood of Kings County, New York. 601 Union Street Owner LLC is a Volunteer in the Brownfield Cleanup Program. Site usage type, Restricted Residential use, is proposed for the property. When completed, the Site will contain two 8-story mixed residential and commercial use buildings with full cellars and one one-story commercial building. Refer to the Brownfield Cleanup Program (BCP) application for additional details.

This Remedial Action Work Plan (RAWP) summarizes the nature and extent of contamination as determined from data gathered during the Remedial Investigation (RI), performed between July and August 2025. It provides an evaluation of a Track 1 cleanup and other applicable Remedial Action alternatives, their associated costs, and the recommended and preferred remedy. The remedy described in this document is consistent with the procedures defined in DER-10, DER-31, and complies with all applicable standards, criteria and guidance. The remedy described in this document also complies with all applicable Federal, State and local laws, regulations and requirements. The NYSDEC and New York State Department of Health (NYSDOH) have not yet determined whether this Site poses a significant threat to human health and the environment. The RI for this Site did not identify fish and wildlife resources.

A formal Remedial Design document will not be prepared.

1.1 Site Location and Description

The Site is located in the County of Kings, Brooklyn, New York and is identified as Block 440, Lots 1 and 12 on the New York City Tax Map. The United States Geological Survey (USGS) topographical Brooklyn quadrangle map (Figure 1) shows the Site location. The tax lots will be reconfigured as three new tax lots as part of the development. The Site is situated on an approximately 0.862-acre area bounded to the north by Sackett Street, followed by commercial

and industrial warehouses; to the south by Union Street, followed by mixed residential, commercial, and industrial uses (i.e., auto repair shop); to the east by an eight-story commercial building; and to the west by Third Avenue, followed by a new nine-story mixed residential and commercial use building and additional commercial and mixed-use buildings. (see Figure 2). A boundary map is attached to the BCA as required by Environmental Conservation Law (ECL) Title 14 Section 27-1419. The 0.862-acre property is fully described in Appendix A – Metes and Bounds. A global positioning system coordinate for the starting point is included.

1.2 Contemplated Redevelopment Plan

The Remedial Action to be performed under the RAWP is intended to make the Site protective of human health and the environment consistent with the contemplated end use. The proposed redevelopment plan and end use is described here to provide the basis for this assessment. However, the Remedial Action contemplated under this RAWP may be implemented independent of the proposed redevelopment plan.

The proposed redevelopment includes the demolition of the current building at the Site, and construction of two 8-story mixed residential and commercial use buildings with full cellars and a one-story commercial building. The north building will contain 40 apartments, approximately 5,000 gross square feet (GSF) of amenity use, and 4,500 GSF of retail space. The south building will contain 87 apartments, with approximately 10,500 GSF of amenity use and 10,500 GSF of retail space. The new buildings will contain a mix of mandatory inclusionary housing and market-rate housing.

1.3 Description of Surrounding Property

North	Sackett Street, followed by a two-story warehouse (215 3rd Avenue), a one-story warehouse (597 Sackett Street), and a one-and two-story warehouse (615 Sackett Street)
South	Union Street, followed by a four-story mixed residential and commercial use building (251 3rd Avenue), four four-story walk-up buildings (570, 572, 578. and 580 Union Street), a one-story auto repair shop (576 Union Street),
West	Third Avenue, followed by a new nine-story mixed residential and commercial use building (585 Union Street)
East	One eight-story commercial hotel (628 Sackett Street and 625 Union Street)

The Site is bounded to the north by Sackett Street, followed by commercial and industrial warehouses; to the south by Union Street, followed by mixed residential, commercial, and industrial uses (i.e., auto repair shop); to the east by an eight-story commercial building; and to the west by Third Avenue, followed by a new nine-story mixed residential and commercial use building and additional commercial and mixed-use buildings.

The nearest ecological receptor is the Gowanus Canal, located approximately 900 feet west of the Site. Other sensitive receptors, as defined in DER-10, within a half mile of the Site include the following:

Educational Facilities:

- PS 372 The Children's School (512 Carroll Street, Brooklyn, NY 11215)
- Brooklyn Secondary School for Collaborative Studies (610 Henry Street, Brooklyn, NY 11231)
- PS 32 Samuel Mills Sprole School (317 Hoyt Street, Brooklyn, NY 11231)
- The Al Noor School (675 4th Avenue, Brooklyn, NY 11232)
- St. Agnes Academic School (433 Sackett Street, Brooklyn, NY 11231)

Childcare/Daycare Facilities:

- Beansprouts Nursery School (453 6th Avenue, Brooklyn, NY 11215)
- Rivendell School (277 3rd Avenue, Brooklyn, NY 11215)
- Good Shepherd Preschool (742 Carroll Street, Brooklyn, NY 11215)
- Park Slope North Child Development Center (255 4th Avenue, Brooklyn, NY 11215)

Parks and Recreational Areas:

- Thomas Greene Playground (Degraw Street & 3rd Avenue, Brooklyn, NY 11217)
- St. Mary's Playground (Smith Street & Nelson Street, Brooklyn, NY 11231)
- Carroll Park (Carroll Street & Court Street, Brooklyn, NY 11231)

2.0 DESCRIPTION OF REMEDIAL INVESTIGATION FINDINGS

The Site was investigated in accordance with the scope of work presented in the NYSDEC-approved Remedial Investigation (RI) Work Plan dated February 2025 submitted by HydroTech. The investigation was conducted between July and August 2025. The RI was submitted to NYSDEC on October 15, 2025 and pending approval by NYSDEC.

2.1 Summary Remedial Investigations Performed

The RI completed at the Site consisted of the collection of soil, groundwater and soil vapor samples for laboratory analysis as follows:

1. Geophysical survey to locate unidentified underground storage tanks (USTs) and identify utilities in the vicinity of the boring locations,
2. Installation of fourteen (14) soil borings to 15 feet bgs across the Site and collection of thirty-two (32) soil samples and additional quality assurance /quality control (QA/QC) samples,
3. Installation of six (6) soil borings to 20-30 feet bgs across the Site and collection of fifty-two (52) soil samples for delineation purposes,
4. Installation of eight (8) monitoring wells and collection of eight (8) groundwater samples from the newly installed on-Site wells, the collection of two (2) groundwater samples from existing monitoring wells in the adjacent sidewalks, and additional QA/QC samples, and
5. Installation of five (5) soil vapor points and collection of five (5) soil vapor samples including one duplicate soil vapor sample, installation of one sub-slab vapor point and collection of one (1) sub-slab soil gas sample, and collection of one co-located indoor air sample.

During the same mobilization as the RI in July 2025, a waste characterization sampling event was conducted to pre-determine soil disposal facilities for the future remedial excavation. Based on the elevated concentrations of metals, including hazardous concentrations of lead, identified

during the waste characterization sampling, a supplemental delineation sampling event was conducted in August 2025. At which time, soil borings were advanced to depths between 20 and 30 feet below grade surface to determine the clean soil elevation at the Site for remedial alternatives analysis.

The supplemental borings as part of the RI included the following scope of work in August, 2025:

1. Installation of six (6) soil borings to 20-30 feet at Select soil boring locations (25SB-4X, 25SB-5X, 25SB-6X, 25SB-9X, and 25SB-10X) were installed to 30 feet below grade and 25SB-11X was installed to 20 feet below grade utilizing direct push Geoprobe® 6011DT for vertical delineation at their original locations (25SB-4, 25SB-6, 25SB-6, 25SB-9, 25SB-10, and 25SB-11). Samples were collected at 1-foot or 2-foot intervals at these locations.

2.1.1 Geophysical Investigation

Prior to intrusive sampling, a geophysical survey was conducted by Coastal Environmental Solutions (Coastal) Medford, New York on July 1, 2025. The purpose of the geophysical surveys was to identify anomalies indicative of potential USTs, locate buried utilities, and clear boring locations prior to intrusive drilling. Coastal utilized a ImpulseRadar PinPointR UWB GPR which utilizes a dual band 400/800 MHz HS antenna mounted to a stroller frame; a vLoc3-Pro Receiver which is a hand-operated antenna capable of detecting electromagnetic (EM) fields emitted from a source; and a TW-6 Pipe and Cable Locator which is a handheld magnetometer which utilizes a transmitter-receiver pair attached to opposite ends of a handle. The locations of underground utilities were marked and identified. No anomalies were observed during the GPR survey. A copy of the geophysical report is included in RIR.

2.1.2 Soil Investigation

Fourteen (14) soil borings, designated as 25SB-1 through 25SB-14, were advanced to 15 feet below grade surface (bgs) by Coastal Environmental Solutions, Inc. (Coastal) to evaluate and classify the soil beneath the Site during the RI. Soil borings were installed utilizing direct push Geoprobe® 6011DT or Geoprobe® 420M drill rigs. The location of soil borings is shown on Figures 3 and 4.

Soil samples were collected continuously into 5-foot-long acetate sleeves. Continuous soil samples were collected from each boring and field screened for presence of VOCs with a photoionization detector (PID) and were inspected for visual and olfactory evidence of contamination. Generally, elevated PID readings were not identified during this RI, except for a detection of 50 parts per million (ppm) in 25SB-1 at a depth of 9 feet bgs. All soil samples were collected using a dedicated, disposable sampling scoop to prevent cross-contamination.

A total of 32 soil samples and two matrix spike/matrix spike duplicate (MS/MSD) samples were collected for chemical analysis during the RI. One soil sample was collected from the surface fill layer at 0 to 2 feet bgs and one sample was collected from immediately above the groundwater table. Additionally, a third, intermediate depth sample was collected from 25SB-4 and 25SB-14. Based on field observations, a third sample was also collected from 25SB-1 and 25SB-6.

During the same mobilization as RI in July 2025, a waste characterization sampling event was conducted to pre-determine soil disposal facilities for the future remedial excavation. Based on the elevated concentrations of metals, including hazardous concentrations of lead, identified during the waste characterization sampling, a supplemental delineation sampling event was conducted in August 2025. At which time, soil borings were advanced to depths between 20 and 30 feet below grade surface to determine the clean soil elevation at the Site for remedial alternatives analysis. Select soil borings, 25SB-4X, 25SB-5X, 25SB-6X, 25SB-9X, and 25SB-10X were installed to 30 feet below grade and 25SB-11X was installed to 20 feet below grade utilizing direct push Geoprobe® 6011DT for vertical delineation at their original locations (25SB-4, 25SB-6, 25SB-6, 25SB-9, 25SB-10, and 25SB-11). Samples were collected at 1-foot or 2-foot intervals at these locations.

A total of 55 additional soil samples were collected for chemical analysis during the supplemental boring phase of the RI. Of these, 45 soil samples were activated for total and TCLP lead, and total and TCLP mercury. Furthermore, of the 45 soil samples, three soil samples were activated for SVOCs based on the results.

2.1.3 Groundwater Investigation

Eight (8) permanent groundwater monitoring wells designated as 25MW-1 through 25MW-8 were installed across the Site between July 2 and July 8, 2025. Six (6) of these monitoring wells

were installed via a direct push Geoprobe® 6011DT drill rig to approximate maximum depths of 20 feet bgs. The remaining two monitoring wells (25MW-4 and 25MW-5) were installed with a limited-access direct-push Geoprobe® 420M drill rig to approximately 17.5 and 16.5 feet bgs, respectively. The monitoring wells were constructed of polyvinyl chloride (PVC) and had a 10-foot well screen set at various terminal depths. The location of monitoring wells is shown on Figure 5.

A total of ten groundwater samples were collected from each of the eight on-Site and two off-Site monitoring wells.

2.1.4 Soil Vapor Investigation

A total of four soil vapor samples designated 25SV-1 through 25SV-4, one sub-slab soil vapor sample designated 25SS-1 and one co-located indoor air sample designated 25AI-1 were collected during the RI. The construction of the vapor points followed the design of the NYSDOH "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006 with updates. Prior to testing, the integrity of the seal was tested with a tracer gas. The location of the soil vapor, sub-slab vapor, and air samples are shown on Figure 6.

2.1.5 Chemical Analytical Work Performed

The analyses performed on soil, groundwater, soil vapor, sub-slab vapor, indoor air, and ambient air samples are summarized below.

Soil

- Part 375 Target Compound List (TCL) volatile organic compounds (VOCs) by EPA Method 8260,
- TCL semi-volatile organic compounds (SVOCs) by EPA Method 8270,
- Pesticides by EPA Method 8081,
- Polychlorinated biphenyls (PCBs) by EPA Method 8082,
- Target Analyte List (TAL) metals including mercury by EPA Methods 6010 and 7471,
- 1,4-Dioxane by EPA Method 8270SIM, and
- 40 Per- and polyfluoroalkyl substances (PFAS) compounds via EPA Method 1633.

- Soil samples with total lead concentrations over 100 ppm were also analyzed for toxicity characteristic leaching procedure (TCLP) lead, and the soil samples with total mercury concentrations over 3 ppm were also analyzed for TCLP mercury.

Groundwater

- TCL VOCs by EPA Method 8260,
- TCL SVOCs by EPA Method 8270,
- Pesticides by EPA Method 8081,
- Herbicides via EPA Method 8151,
- PCBs by EPA Method 8082,
- TAL metals (total and dissolved) via EPA Method 6010 and 7471,
- 40 Per- and polyfluoroalkyl substances (PFAS) compounds via EPA Method 1633,
- 1,4-Dioxane via 8270SIM.

Soil vapor, sub-slab vapor, and air

- VOCs via USEPA Method TO-15.

2.1.5 Best Management Practices

Assessment of best management practices (BMP) implemented during the RI was performed in accordance with NYSDEC's *Green and Sustainable Remediation and Climate Resiliency Fact Sheet, dated June 2023*, and EPA's *Green Remediation BMPs fact sheet, dated September 2016*. The BMPs that were implemented during the RI included the following:

1. To help minimize mobilization for the RI, use of direct sensing equipment to collect real-time field measurements were used. Field equipment such as a PIDs, water quality meters, and interface probes were utilized.
2. The RI used minimally invasive drilling techniques such as direct-push or sonic technology in order to reduce drilling duration, avoid, or minimize use of water, and prevent or reduce generation of cuttings and associated disposal of investigative derived waste (IDW).

3. Whenever possible, all coordination meetings were held virtually to reduce energy consumption and air pollutants, and
4. Permanent monitoring wells were installed in a way that will allow maximum reuse for future groundwater sampling, monitoring, or remediation.

A SEFA footprint analysis of the activities completed under the Remedial Investigation generated the following wastes:

- Energy used (on and off-site): 47.7 MMBtu's
- Total NOx, SOx, and PM emissions: 278 pounds
- Total HAP emissions: 18.6 pounds
- Total greenhouse gas emissions: 3.2 tons CO^2e

2.1.6 Documentation

Below is a summary of RI findings.

2.1.6.1 Soil

Soil results were compared to the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (SCOs), Restricted Residential Use SCOs, and Protection of Groundwater SCOs (PGWSCOs). Emerging contaminant results were compared to the guidance values established in the NYSDEC Guidance Document for Part 375 Remedial Programs. Table 2 shows exceedances of Track 1 and Track 2 SCOs in soil/fill samples. The location of soil borings is shown on Figures 3 and 4.

Volatile Organic Compounds

No VOCs were detected above Unrestricted Use SCOs with the exception of acetone (max. of 0.27 ppm), which was detected above its UUSCO of 0.05 ppm in eight soil samples, and 2-butanone (0.28 ppm), which was detected above its UUSCO of 0.12 ppm in one soil sample 25SB-6 (11'-12'). Acetone, which is a common laboratory artifact, was detected in several samples at low concentrations.

Pesticides & Herbicides

One pesticide, 4,4'-DDT (0.00384 ppm), was detected at a concentration slightly exceeding its respective UUSCO (0.0033 ppm) but below its RRSCO in one soil sample 25SB-5 (0-2'). No other pesticides were detected in the soil samples above laboratory reporting limits. No herbicides were detected in the soil samples above laboratory reporting limits.

Polychlorinated Biphenyls

PCBs were not detected in any of the soil samples.

Semi-Volatile Organic Compounds

Eleven SVOCs, 2-methylphenol, 3-methylphenol/4-methylphenol, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, and phenol were detected at concentrations exceeding their respective UUSCOs. Of these, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, ad indeno(1,2,3-cd)pyrene also exceeded their respective RRSCOs. Furthermore, four SVOCs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene also exceeded their respective PGWSCOs in twenty of the soil samples. The table below provides concentration ranges of these exceedances.

SVOCs	Minimum Detected Concentration > SCOs		Maximum Detected Concentration> SCOs		UUSCO (ppm)	RRSCO (ppm)	PGWSCO (ppm)
2-Methylphenol	0.48	25SB-7 (12'-13')	0.48	25SB-7 (12'-13')	0.33	100	N/A
3-Methylphenol/ 4-Methylphenol	0.62	25SB-4 (12'-13')	2.5	25SB-9 (0-2')	0.33	100	N/A
Acenaphthene	34	25SB-12 (11'-12')	34	25SB-12 (11'-12')	20	100	N/A
Benzo(a)anthracene	**1**	25SB-5 (0-2')	**20**	25SB-7 (12'-13')	1	1	**1**
Benzo(a)pyrene	**1**	25SB-5 (0-2'), 25SB-7 (0-2')	**20**	25SB-11 (0-2')	1	**1**	22
Benzo(b)fluoranthene	**1.1**	25SB-3 (0-2'), 25SB-4 (7'-9')	**22**	25SB-7 (12'-13')	1	**1**	**1.7**
Benzo(k)fluoranthene	0.88	25SB-3 (12'-13')	**5.6**	25SB-4 (0-2')	0.8	**3.9**	1.7
Chrysene	**1.1**	25SB-4 (7'-9), 25SB-5 (0-2'), 25SB-7 (0-2')	**20**	25SB-7 (12'-13')	1	**3.9**	**1**

SVOCs	Minimum Detected Concentration > SCOs		Maximum Detected Concentration> SCOs		UUSCO (ppm)	RRSCO (ppm)	PGWSCO (ppm)
Dibenzo(a,h) anthracene	**0.39**	25SB-6 (7'-9')	**2.4**	25SB-7 (12'-13')	0.33	**0.33**	N/A
Indeno(1,2,3-cd)pyrene	**0.59**	25SB-12 (0-2')	**12**	25SB-11 (0-2')	0.5	**0.5**	N/A
Naphthalene	31	25SB-10 (11'-12')	44	25SB-12 (11'-12')	12	100	N/A
Phenol	0.53	25SB-7 (12'-13')	0.53	25SB-7 (12'-13')	0.33	100	N/A

- All concentrations are reported in parts per million (ppm).
- N/A: Not applicable since the compound was not detected in groundwater above AWQS.
- Underscored concentrations are above UUSCOs.
- **Bold concentrations are above RRSCOs.**
- **Underscored and bold concentrations are above PGWSCOs**

Metals

One or more of up to nine metals, including arsenic, barium, cadmium, copper, lead, mercury, nickel, selenium, and zinc, were detected at concentrations exceeding their respective UUSCOs in all soil samples. Of these, arsenic, barium, lead, and mercury also exceeded their respective Track 2 RRSCOs in 27 soil samples. The table below provides concentration ranges of these exceedances.

Contaminant	Minimum Detected Concentration > SCOs		Maximum Detected Concentration > RRSCOs		UUSCO (ppm)	RRSCO (ppm)
Arsenic	14.1	25SB-12 (0-2')	**35.2**	25SB-13 (0-2')	13	**16**
Barium	**418**	25SB-7 (12'-13')	**1270**	25SB-14 (0-2')	350	**400**
Cadmium	3.62	25SB-10 (0-2')	3.62	25SB-10 (0-2')	2.5	4.3
Copper	57.4	25SB-13 (0-2')	181	25SB-6 (11'-12')	50	270
Lead	97.2	25SB-9 (11'-12')	**10000**	25SB-4 (12'-13')	63	**400**
Mercury	0.324	25SB-1 (0-2')	**9.05**	25SB-1 (12'-13')	0.18	**0.81**
Nickel	35.2	25SB-9 (11'-12')	40.3	25SB-10 (0-2')	30	310
Selenium	5.97	25SB-9 (0-2')	17.3	25SB-7 (12'-13')	3.9	180
Zinc	109	25SB-8 (1'-3')	898	25SB-10 (0-2')	109	10000

- All concentrations are reported in parts per million (ppm).
- Underscored concentrations are above UUSCOs.
- **Bold concentrations are above RRSCOs.**

Hazardous Lead

Due to the high lead and mercury concentrations identified in soil samples, a supplemental delineation sampling event was conducted. Borings were installed in the central north, northwest, southwest, northern, central and southern portions of the Site to horizontally and vertically delineate these heavy metals. Before the delineation event, the soil samples with total lead concentrations over 100 ppm were activated for TCLP lead, and the soil samples with total mercury concentrations over 3 ppm were activated for TCLP mercury.

Based on the results, no hazardous concentrations of mercury were identified in any of the soil samples. However, hazardous concentrations of lead were identified in five soil borings. The table below provides concentration ranges of these exceedances.

Metals	**Minimum Detected Concentration > SCOs**		**Maximum Detected Concentration> SCOs**		**UUSCO (ppm)**	**RRSCO (ppm)**	**EPA TCLP Level (mg/L)**
Total Lead	76.8	25SB-11X (18'-20')	**10000**	25SB-4 (12'-13')	63	**400**	N/A
TCLP Lead	**5.47**	25SB-6 (7'-9')	**99.1**	25SB-9 (0-2')	N/A	N/A	**5**
Total Mercury	0.576	25SB-9 (0-2')	**8.83**	25SB-11 (11'-12')	0.18	**0.81**	N/A
TCLP Mercury	-	-	-	-	N/A	N/A	0.2

Once the metals delineation was completed at approximately 28 feet bgs, the three borings that showed SVOCs exceedances during the initial RI were activated for SVOCs to complete the vertical delineation. No SVOCs were detected above UUSCOs in 25SB-4X (29'-30'), 25SB-6X (26'-28'), or 25SB-10X (28'-30').

Emerging Contaminants

1,4-dioxane were not detected in any of the soil samples above laboratory reporting limits or SCOs. PFAS compounds were not detected in any of the soil samples above UUSCOs.

2.1.6.2 Groundwater

Volatile Organic Compounds

One VOC, benzene (1.7 ppb in 25MW-8), was detected above its respective AWQS in the on-site groundwater samples.

Three chlorinated VOCs (CVOCs), cis-1,2-dichloroethene, tetrachloroethene (PCE), and trichloroethene (TCE), were detected above its respective AWQS in the off-site groundwater samples as follows:

Contaminant (VOC)	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
cis-1,2-Dichloroethene	B10D	29	5
Tetrachloroethene	B8DW	6.2	
	B10D	22	
Trichloroethene	B10D	10	

Semi-Volatile Organic Compounds

Five SVOCs, were detected in groundwater samples across the Site above their respective AWQS. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and chrysene were detected above AWQS in 25MW-4 located in the western portion of the Site. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and chrysene were detected above AWQS in 25MW-5 located in the southwestern portion of the Site, and benzo(a)anthracene was detected above AWQS in 25MW-7 and 25MW-8 located in the eastern and southern portions of the Site, respectively. No SVOCs were identified above AWQS in the off-site monitoring wells.

Contaminant (SVOC)	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Benzo(a)anthracene	25MW-4	0.9	0.002
	25MW-5	0.23	
	25MW-7	0.03	
	25MW-8	0.55	
Benzo(a)pyrene	25MW-4	0.93	0.002
	25MW-5	0.25	
Benzo(b)fluoranthene	25MW-4	1.2	0.002
	25MW-5	0.32	
Benzo(k)fluoranthene	25MW-4	0.32	0.002

Contaminant (SVOC)	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Chrysene	25MW-4	0.92	0.002
	25MW-5	0.19	

Pesticides & Herbicides

No pesticides or herbicides were detected in the groundwater samples above laboratory reporting limits.

Polychlorinated Biphenyls

No PCBs were detected in the groundwater samples above laboratory reporting limits.

Total Metals

A total of twelve total metals, including barium, copper, iron, magnesium, manganese, nickel, selenium, and sodium, and three heavy metals, arsenic, chromium, mercury, and lead, were identified at concentrations exceeding their respective AWQS in the on-site groundwater samples as follows:

Total Metals	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Arsenic, total	25MW-5	48.64	25
Barium, total	25MW-5	1073	1000
Chromium, total	25MW-5	64.72	50
Copper, total	25MW-5	384.9	200
Iron, total	25MW-1	35,100	300
	25MW-2	55,300	
	25MW-3	21,400	
	25MW-4	25,200	
	25MW-5	59,800	
	25MW-6	32,100	
	25MW-7	3,730	
	25MW-8	16,200	
Lead, total	25MW-3	26.84	25
	25MW-4	579.9	
	25MW-5	2707	
	25MW-8	312.6	
Magnesium, total	25MW-1	49,000	35,000
	25MW-4	46,400	
	25MW-5	37,000	
	25MW-6	40,100	

Total Metals	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Manganese, total	25MW-1	920.5	300
	25MW-2	2,667	
	25MW-3	1,253	
	25MW-4	1,488	
	25MW-5	3,698	
	25MW-6	1,148	
	25MW-7	379.5	
	25MW-8	678.1	
Mercury, total	25MW-4	3	0.7
	25MW-5	9.92	
	25MW-8	1.1	
Nickel, total	25MW-5	104	100
Selenium, total	25MW-5	19.8	10
Sodium, total	25MW-1	188,000	20,000
	25MW-2	543,000	
	25MW-3	117,000	
	25MW-4	540,000	
	25MW-5	392,000	
	25MW-6	324,000	
	25MW-7	22,200	
	25MW-8	369,000	

Only four naturally occurring total metals, iron, magnesium, manganese, and sodium were identified at concentrations exceeding their respective AWQS in the off-site groundwater samples as follows:

Total Metals	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Iron, total	B8DW	5,160	300
	B10D	3,050	
Magnesium, total	B8DW	62,800	35,000
	B10D	69,100	
Manganese, total	B8DW	1,175	300
Sodium, total	B8DW	198,000	20,000
	B10D	234,000	

Dissolved Metals

A total of four dissolved metals, all of which are naturally occurring, including iron, magnesium, manganese and sodium, were detected at concentrations exceeding their respective AWQS in both on-site and off-site groundwater samples as follows:

Dissolved Metals	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Iron, dissolved	25MW-1	2,120	300
	25MW-2	1,560	
	25MW-3	1,960	
	25MW-5	501	
	25MW-6	1,330	
	25MW-7	921	
	B8DW	1,500	
	B10D	805	
Magnesium, dissolved	25MW-1	56,600	35000
	B8DW	60,500	
	B10D	68,900	
Manganese, dissolved	25MW-1	768.4	300
	25MW-2	1,798	
	25MW-3	1016	
	25MW-5	1643	
	25MW-6	932.1	
	25MW-7	311.5	
	25MW-8	462.5	
	B8DW	822.9	
Sodium, dissolved	25MW-1	203000	20000
	25MW-2	536000	
	25MW-3	188000	
	25MW-5	341000	
	25MW-6	190000	
	25MW-8	369000	
	B8DW	185000	
	B10D	229000	

Emerging Contaminants

Two PFAS compounds, perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), and 1,4-dioxane were detected above the Part 375 Remedial Program Guidance Values (GV) for Water as follows:

Emerging Contaminants	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
1,4-Dioxane	25MW-2	0.381	0.35
	25MW-8	0.37	

Emerging Contaminants	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
PFOS	25MW-5	0.0292	0.0027
	25MW-7	0.00474	
	25MW-8	0.00967	
	B8DW	0.0036	
PFOA	25MW-1	0.032	0.0067
	25MW-2	0.107	
	25MW-3	0.0364	
	25MW-5	0.0236	
	25MW-6	0.0484	
	25MW-7	0.0114	
	25MW-8	0.0361	
	B8DW	0.0386	
	B10D	0.0573	

2.1.6.3 Soil Vapor

Results showed low concentrations of petroleum-related VOCs, with the single exception of 2,2,4-Trimethylpentane, which was detected at 4,500 µg/m^3 in soil vapor sample 25SV-1. BTEX was identified between 18.50 µg/m^3 in 25SV-4 to 154.8 µg/m^3 in 25SV-3. The highest concentrations of CVOCs detected were of PCE at 25SV-2 (46.80 µg/m^3) and 14.2 µg/m^3 in 25SV-DUP-1 (collected from the 25SV-2 location), and TCE at 25AI-1 (0.193 µg/m^3), which is located in the western portion of the Site.

When the results of the one sub-slab vapor sample and the co-located indoor air sample are evaluated against the NYSDOH Decision Matrices, no further action is required.

Soil vapor sample 25SV-1, located on the northwestern portion of the property, showed an elevated detection of isooctane (2,2,4-trimethylpentane) at 4,500 µg/m^3 as well as other elevated petroleum compound detections. Soil vapor sample 25SV-3, located on the northeastern portion of the property, showed low to moderate detections of petroleum and BTEX compounds. Soil vapor samples 25SV-2 and 25SV-4, located on the southwestern and southeastern portions of the Site, appear to have relatively lower detections of petroleum and BTEX compounds. In general, petroleum compound detections appear to be more elevated in the northern portion of the Site along Sackett Street. However, it should be noted that these VOCs were not detected in soil or groundwater samples, except for benzene in one groundwater sample.

The highest detection of PCE was identified in soil vapor sample 25SV-2 located in the southwestern portion of the property at 46.8 µg/m^3. On the southeastern portion of the Site, in soil vapor sample 25SV-4, PCE was detected at 7.8 µg/m^3, and on the northern portions of the Site, in soil vapor samples 25SV-1 and 25SV-3, PCE was not detected. Although CVOCs were not in soil samples above UUSCOs, they were detected in the off-site groundwater samples.

2.2 Significant Threat

A significant threat determination to human health and the environment has not yet been made. Upon determination, notice will be provided for public review.

2.3 Site History

2.3.1 Past Uses and Ownership

Both parcels of the Site were undeveloped as early as 1888. Lot 1 of the Site was developed with a lumber yard (Ross & Snyder), including one- and two-story lumber sheds located in the western portion between 1906 and 1926. The lumber yard operations continued between 1906 until at least 1950s. By 1951, Lot 1 was redeveloped as the current warehouse with a partial cellar, and utilized as offices, a machine shop, and a repair station for trucks and buses.

Lot 12 of the Site was developed with 4-story residential dwellings between 1906 and 126. These structures were demolished, and a one-story warehouse was built at Lot 12 circa 1951. This structure was demolished sometime between 1965 and 1978, and remained vacant until 2003, when it was utilized as truck parking.

According to the New York City Department of Finance's Automated City Register Information System (ACRIS), the ownership of the Site is vested in Union Street Owner LLC d/b/a 601 Union Street Owner, LLC (the Applicant) since December 24, 2024.

2.3.2 Phase I and Phase II Reports

Phase I Environmental Site Assessment at 601-607 Union Street, Brooklyn, New York by Athenica Environmental Services, July 2022

- Athenica Environmental Services, Inc. (Athenica) prepared this report on behalf of Aniska Realty I, LLC, in accordance with ASTM Standard E1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment (ESA) Process.
- The following Recognized Environmental Conditions (RECs) were identified during the Phase I:
    - The presence of E-Designation for hazardous materials at the Site.
    - The historic industrial, manufacturing, auto repair, and fuel oil storage/handling uses of the Site.
    - The historic and/or current industrial, automotive service, and gasoline station uses of the surrounding properties.
    - Presence of open Spill #2009932 that was reported on March 9, 2021, approximately 50 feet west of the Site at 585 Union Street, where investigations identified contamination in soil and groundwater.
    - Presence of an open Spill #9605719 that was reported on August 2, 1996, approximately 315 feet east of the Site at 204-222 4th Avenue, where investigations identified contamination in soil vapor and groundwater.
    - The potential for vapor intrusion from Site operations, and off-Site properties with documented releases to soil vapor and groundwater.

Phase II Investigation Report at 601-607 Union Street, Brooklyn, New York by Hydro Tech Environmental Engineering and Geology, DPC, September 2022

- Based on the review of available Phase I ESA Reports summarized above, Hydro Tech Environmental Engineering and Geology, DPC (Hydro Tech) recommended a Phase II Environmental Site Assessment to evaluate whether historic industrial operations had adversely impacted the subsurface conditions beneath the Site prior to redevelopment.

- A Phase II investigation consisting of a geophysical survey, installation and sampling of seventeen (17) soil borings, installation and sampling of eight (8) temporary groundwater monitoring wells, and the installation and sampling of two (2) soil vapor points, and six (6) sub-slab vapor points was conducted at the Site in September 2022.
- The subsurface materials were generally described as a layer of black silty sand with pebbles and crushed concrete or asphalt pieces from the surface down to 2-6 feet, underlain by brown and black silty sand with or without rocks and pebbles.
- The geophysical survey did not identify any anomalies or areas of concern indicative of underground storage tanks, except for the oil/water separator located in the existing building.
- Seventeen soil borings, SP-1 through SP-17, were installed to 12 feet bgs (i.e., groundwater table), and seventeen soil samples were collected to be analyzed at the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory for the presence of Part 375 Target Compound List (TCL) volatile organic compounds (VOCs) by United States Environmental Protection Agency (EPA) Method 8260, TCL semi-volatile organic compounds (SVOCs) by EPA Method 8270, Target Analyte List (TAL) Metals by EPA Method 6000/7000, Pesticides by EPA Method 8081, PCBs by EPA Method 8082. Four of the soil samples were analyzed for PFAS compounds using EPA Method 537, and 1,4-dioxane using EPA Method 8270SIM.
- No photoionization detector (PID) readings were detected in the soil samples, except for two soil borings: SP-10 at the 8-10 feet interval and SP-11 at the 10-12 feet interval, which were detected as 428.1 parts per million (ppm) and 465.1 ppm, respectively.
- Petroleum related VOCs were identified most abundant in deeper soil between 8 to 12 feet from the vicinity of the oil/water separator in the mid-northern portion of the existing building, which might be indicative of impact of leakage from the associated subgrade equipment.
- Several SVOCs and metals were detected in shallow and deep soil at concentrations exceeding UUSCOs. Several SVOCs and metals including arsenic, barium, lead, zinc and mercury also exceeded their respective RRSCOs. Lead and mercury also exceeded their respective PGWSCOs. Although the presence of the PAHs and the metals were attributed

to the presence of urban fill material beneath the Site during the 2022 Phase II, the presence of elevated concentrations of metals could be attributed to historic Site operations.

- Groundwater was encountered at a range of approximately 12.3 feet to 13.75 feet below grade.
- During the initial investigation in 2022, eight temporary monitoring wells were installed, and eight groundwater samples were collected to be analyzed for the presence of TCL VOCs via USEPA Method 8260, TCL SVOCs via USEPA Method 8270, Target Analyte List (TAL) Metals by EPA Method 6000/7000, Pesticides by EPA Method 8081, PCBs by EPA Method 8082, PFAS compounds vie EPA Method 537, and 1,4-Dioxane by EPA Method 8270SIM. These groundwater samples were collected from temporary groundwater wells in 2022, and their results are considered non-representative of subsurface groundwater conditions at the Site and therefore, will not be included in the evaluation of the remedial data.
- attributed to regional groundwater quality or urban fill during the 2022 Phase II.
- During the 2022 Phase II ESA, two soil vapor points were installed to 10 feet, and six sub-slab vapor points were installed 3 inches below the existing building slab, and two soil vapor samples, and six sub-slab vapor samples were collected to be analyzed for VOCs via EPA Method TO-15.

2.3.3 Sanborn Maps

Both parcels of the Site were undeveloped as early as 1888. Lot 1 of the Site was developed with a lumber yard (Ross & Snyder), including one- and two-story lumber sheds located in the western portion between 1906 and 1926. The lumber yard operations continued between 1906 until at least 1950s. By 1951, Lot 1 was redeveloped as the current warehouse with a partial cellar, and utilized as offices, a machine shop, and a repair station for trucks and buses.

Lot 12 of the Site was developed with 4-story residential dwellings between 1906 and 126. These structures were demolished, and a one-story warehouse was built at Lot 12 circa 1951. This structure was demolished sometime between 1965 and 1978, and remained vacant until 2003, when it was utilized as truck parking.

All Sanborn Maps available for this Site were reviewed prior to preparation of the RAWP.

2.4 Geologic and Hydrogeologic Conditions

Based on the findings of the RI, a historic urban fill layer extending to a maximum of 15 feet below grade surface (bgs) was identified across most of the Site. The fill material predominantly consists of brick, concrete, and miscellaneous debris underlain by silty sand with varying amounts of fine- to coarse-grained gravel. The underlying soils generally consist of medium-dense silty sand with trace to some gravel and clay. Saturated conditions were observed at approximately 12 to 13 feet below grade underlain by medium-dense silty sand with some gravel from 15 feet to 21 feet, followed by intervals of lean clay, gravel and organics. Bedrock was not encountered during the RI or the geotechnical investigation. Depth to bedrock is anticipated to be greater than 100 feet bgs. Geologic sections are shown in Figures 7A and 7B.

Ground surface elevation is relatively level at the Site, ranging from approximately 18.55 feet (NAVD88) in the southwest portion to 20.09 feet (NAVD88) in the central portion. Average depth to groundwater was observed as 6.58 (NAVD88) during the RI. Groundwater elevation beneath the Site ranges from approximately 6.13 feet to 7.42 feet (NAVD88). Based on the synoptic groundwater gauging event, groundwater beneath the Site generally flows from southwest to northeast. Regionally, groundwater is expected to flow west-southwest towards the Gowanus Canal. Groundwater contour map is provided in Figure 8.

2.5 Contamination Conditions

The information collected during the RI was compared to the respective regulatory standards and are evaluated to determine the nature and extent of contamination at the Site.

2.5.1 Conceptual Model of Site Contamination

Prior to the urban development of the Site and the surrounding area, the Gowanus Canal area consisted of tidal creeks with wetlands and lowland marshes. Fill material was placed in these areas during construction of the Canal and the general development of the Site area. The subsurface deposits below the fill are generally composed of alluvial sand, silt, clay and organic materials

(marsh deposits) which were identified in some on-Site soil borings. The development of the Site and the surrounding Gowanus area is the expected source for the urban fill identified at the Site.

2.5.2 Description of Areas of Concern

The following areas of concern (AOCs) were identified at the Site:

- AOC 1: SVOCs (PAHs) impacts in Soil and Groundwater
- AOC 2: Hazardous Lead and Metals Impacts in Soil
- AOC 3: Chlorinated VOC Impacts in Soil Vapor

2.5.2.1 AOC 1 – SVOCs (PAHs) Impacts in Soil and Groundwater

Contaminants associated with urban fill from unknown sources were identified across the Site. Varying amounts of historic fill were identified from the surface down to 15 feet below grade. The fill material predominantly consists of brown and dark brown fine to medium sand with varying amounts of gravel, concrete, asphalt, glass, and silt.

Analytical results from soil samples collected from shallow (0-2') and intermediate (7-9', 11-12' and 12-13') depth intervals across the Site, identified exceedances of SVOCs, specifically PAHs, above UUSCOs, RRSCOs, and Protection of Groundwater SCOs.

Additionally, SVOCs, specifically PAHs, exceedances in groundwater samples were identified in 25MW-4, 25MW-5, 25MW-7 and 25MW-8 across the Site, indicating that urban fill is likely the source of contamination at the Site.

2.5.2.2 AOC 2 – Hazardous Lead and Metals Impacts in Soil

Total lead concentrations ranged from 97.2 ppm to 10,000 ppm throughout the Site at varying depths with exceedances of both UUSCOs (63 ppm) and RRSCOs (400 ppm). Toxicity Characteristic Leaching Procedure (TCLP) results for lead ranged from non-detect to 99.1 mg/L, with multiple samples exceeding its respective EPA Hazardous Waste Limit (5 mg/L). Based on the vertical and horizontal distribution, lead is considered a primary contaminant of concern in Site soils. Furthermore, other metals, including arsenic, barium, lead, and mercury also exceeded their respective RRSCOs in 27 soil samples across the Site. This distribution suggests that the lead

impacts are not localized to a single source area but are consistent with urban fill and historical industrial activities.

Metals concentrations appear to achieve UUSCOs around 28 feet below grade surface, and the hazardous lead appears to be limited to the top 14 feet.

2.5.2.3 AOC 3 – Chlorinated VOC Impacts in Soil Vapor

Soil vapor and sub-slab vapor results showed low to moderate concentrations of CVOCs detected across the Site. When the one sub-slab vapor sample and co-located indoor air sample results are evaluated against the NYSDOH Decision Matrices, no further action is required. The highest detection of PCE was identified in soil vapor sample 25SV-2 located in the southwestern portion of the property at 46.8 µg/m^3. On the southeastern portion of the Site, in soil vapor sample 25SV-4, PCE was detected at 7.8 µg/m^3.

Three CVOCs, PCE, TCE, and cis-1,2-dichloroethene were detected at concentrations ranging from 6.2 µg/L to 29.0 µg/L, exceeding their respective AWQS of 5 ug/L in two off-site groundwater monitoring wells. PCE exceedances were observed in two off-site groundwater monitoring wells. B8DW (6.2 ug/L) and B10D (22 ug/L), located in the sidewalk adjacent to the southwest and south of the Site, respectively. TCE exceedance was detected above its AWQS in off-site monitoring well B10D (10 ug/L). No CVOCs were identified in the on-site groundwater samples or soil samples at concentrations exceeding regulatory standards. Based on these findings, the CVOCs present in soil vapor are attributed to off-site sources rather than on-site impacts.

2.5.3 Identification of Standards, Criteria and Guidance

The following remedial the Standards, Criteria and Guidance (SCGs) apply to the project and are the performance criteria used to determine if the RAOs have been met:

- 6 NYCRR Part 375-6 Soil Cleanup Objectives;
- NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation – May 2010;
- NYSDEC Draft BCP Guide – May 2004;
- NYSDOH Generic CAMP;

- NYSDOH Site-Specific CAMP;
- NYS Waste Transporter Permits – 6 NYCRR Part 364;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364;
- DER-23 (January 2010);
- 6 NYCRR Part 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998);
- 6 NYCRR Subpart 374-1 – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998);
- 6 NYCRR Subpart 374-3 – Standards for Universal Waste (November 1998);
- 6 NYCRR Part 375 – Environmental Remediation Programs (December 2006);
- 6 NYCRR Part 612 – Registration of Petroleum Storage Facilities (February 1992);
- 6 NYCRR Part 613 – Handling and Storage of Petroleum (February 1992);
- 6 NYCRR Part 614 – Standards for New and Substantially Modified Petroleum Storage Tanks (February 1992);
- 40 CFR Part 280 – Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks;
- 29 CFR Part 1910.120 – Hazardous Waste Operations and Emergency Response;
- 40 CFR Part 144 – Underground Injection Control Program;
- NYSDOH Soil Vapor Intrusion Matrix – NYSDOH Sub-Slab Vapor Concentration which may require monitoring or mitigation as presented in the Matrix A, Matrix B, and Matrix C tables of the Final Guidance in the State of New York, dated October 2006 ("NYSDOH Vapor Intrusion Guidance Document"), updated May 2017; and
- Guidelines for Sampling, Analysis, and Assessment of PFAS Under NYSDEC's Part 375 Remedial Programs (Updated in June 2021).

Additional regulations and guidance may be applicable, relevant, and appropriate to the remedial alternatives and will be complied with in connection with implementation of the remedial program. However, the list above is intended to represent the principal SCGs, which should be considered in evaluating the remedial alternatives for the BCP Site.

2.5.4 Soil/Fill Contamination

A historic urban fill layer, consisting of brick, concrete, and miscellaneous debris underlain by silty sand with varying amounts of fine- to coarse-grained gravel, was identified extending to 15 feet below grade surface (bgs) across the Site. The underlying soils generally consist of medium-dense silty sand with trace to some gravel and clay. Saturated conditions were observed at approximately 12 to 13 feet below grade underlain by medium-dense silty sand with some gravel from 15 feet to 21 feet, followed by intervals of lean clay, gravel and organics.

The contaminants of concern in soil include metals and SVOCs in soil, which are generally consistent with historic fill material observed throughout NYC. However, the SVOCs exceedances in both soil and groundwater samples also indicate that non-native urban fill source material is present at the Site.

2.5.4.1 Summary of Soil/Fill Data

- Thirty-two (32) soil samples, and a set of MS/MSD samples were analyzed for full-suite TCL analysis during the RI, forty-five (45) soil samples were analyzed for TCLP lead and/or TCLP mercury, and three soil samples were analyzed for TCL SVOCs.
- Two VOCs, acetone and 2-butanone, were detected above UUSCOs. Acetone is a common laboratory artifact and was detected in several samples at low concentrations. 2-Butanone was detected slightly above its UUSCO in one soil sample 25SB-6 (11-12) located in the northern portion of the Site. No VOCs were detected above RRSCOs.
- Eleven SVOCs were detected above UUSCOs. Of these, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, ad indeno(1,2,3-cd)pyrene also exceeded their respective RRSCOs, and four SVOCs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene also exceeded their respective PGWSCOs in twenty soil samples between grade and 13 feet across the Site.
- One pesticide, 4,4’-DDT, was detected slightly exceeding its respective UUSCO but below its RRSCO in one shallow soil sample, 25SB-5 (0-2’) located in the southwestern portion of the Site.
- No PCBs, PFAS, or1,4-dioxane were detected above regulatory standards in soil samples.
- One or more of up to nine metals, including arsenic, barium, cadmium, copper, lead, mercury, nickel, selenium, and zinc, were detected at concentrations exceeding their

respective UUSCOs in all soil samples. Of these, arsenic, barium, lead, and mercury also exceeded their respective RRSCOs in 27 soil samples across the Site.

- Hazardous concentrations of lead were identified in 13 soil samples extending to 12 feet across the Site.
- Soil results showed no exceedances of UUSCOs at approximately 28 feet below grade surface.

2.5.4.2 Comparison of Soil/Fill with SCGs

Soil results were compared to the NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs), Restricted Residential Use SCOs (RRSCOs), and Protection of Groundwater Soil Cleanup Objectives (PGWSCOs) if also identified in groundwater. Emerging contaminant results were compared to the guidance values as established in the NYSDEC Guidance Document for Part 375 Remedial Programs. In-text Table 1 (included below) provides soil boring and soil sample collection summary.

In-text Table 1: Soil Boring and Soil Sample Summary

Sample ID	Sample Intervals
25SB-1	0-2 feet bgs, 9-11 feet bgs, 12-13 feet bgs
25SB-2	0-2 feet bgs, 12-13 feet bgs
25SB-3	0-2 feet bgs, 12-13 feet bgs
25SB-4	0-2 feet bgs, 7-9 feet bgs, 12-13 feet bgs
25SB-5	0-2 feet bgs, 11-12 feet bgs
25SB-6	0-2 feet bgs, 7-9 feet bgs, 11-12 feet bgs
25SB-7	0-2 feet bgs, 12-13 feet bgs
25SB-8	1-3 feet bgs, 11-12 feet bgs
25SB-9	0-2 feet bgs, 11-12 feet bgs
25SB-10	0-2 feet bgs, 11-12 feet bgs
25SB-11	0-2 feet bgs, 11-12 feet bgs
25SB-12	0-2 feet bgs, 11-12 feet bgs
25SB-13	0-2 feet bgs, 11-12 feet bgs
25SB-14	0-2 feet bgs, 7-9 feet bgs, 11-12 feet bgs
MS/MSD Samples	25SB-5 from 0-2 feet bgs

The RI documented that the Site is underlain by urban fill up to depths of 15 feet bgs. In addition to anthropogenic material, the fill contained PAHs and metals exceeding the UUSCOs as well as the RRSCOs and/or Protection of Groundwater SCOs.

No VOCs were detected above Unrestricted Use SCOs with the exception of acetone (max. of 0.27 ppm), which was detected above its UUSCO of 0.05 ppm in eight soil samples, and 2-butanone (0.28 ppm), which was detected above its UUSCO of 0.12 ppm in one soil sample 25SB-6 (11'-12'). Acetone, which is a common laboratory artifact, was detected in several samples at low concentrations.

Eleven SVOCs, 2-methylphenol, 3-methylphenol/4-methylphenol, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, and phenol were detected at concentrations exceeding their respective UUSCOs. Of these, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene also exceeded their respective RRSCOs. Furthermore, four SVOCs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene also exceeded their respective PGWSCOs in twenty of the soil samples. The table below provides concentration ranges of these exceedances.

SVOCs	Minimum Detected Concentration > SCOs		Maximum Detected Concentration> SCOs		UUSCO (ppm)	RRSCO (ppm)	PGWSCO (ppm)
2-Methylphenol	0.48	25SB-7 (12'-13')	0.48	25SB-7 (12'-13')	0.33	100	N/A
3-Methylphenol/ 4-Methylphenol	0.62	25SB-4 (12'-13')	2.5	25SB-9 (0-2')	0.33	100	N/A
Acenaphthene	34	25SB-12 (11'-12')	34	25SB-12 (11'-12')	20	100	N/A
Benzo(a)anthracene	**1**	25SB-5 (0-2')	**20**	25SB-7 (12'-13')	1	1	**1**
Benzo(a)pyrene	**1**	25SB-5 (0-2'), 25SB-7 (0-2')	**20**	25SB-11 (0-2')	1	**1**	22
Benzo(b)fluoranthene	**1.1**	25SB-3 (0-2'), 25SB-4 (7'-9')	**22**	25SB-7 (12'-13')	1	**1**	**1.7**
Benzo(k)fluoranthene	0.88	25SB-3 (12'-13')	**5.6**	25SB-4 (0-2')	0.8	**3.9**	1.7
Chrysene	**1.1**	25SB-4 (7'-9), 25SB-5 (0-2'), 25SB-7 (0-2')	**20**	25SB-7 (12'-13')	1	**3.9**	**1**
Dibenzo(a,h) anthracene	**0.39**	25SB-6 (7'-9')	**2.4**	25SB-7 (12'-13')	0.33	**0.33**	N/A
Indeno(1,2,3-cd)pyrene	**0.59**	25SB-12 (0-2')	**12**	25SB-11 (0-2')	0.5	**0.5**	N/A
Naphthalene	31	25SB-10 (11'-12')	44	25SB-12 (11'-12')	12	100	N/A
Phenol	0.53	25SB-7 (12'-13')	0.53	25SB-7 (12'-13')	0.33	100	N/A

- All concentrations are reported in parts per million (ppm).
- N/A: Not applicable since the compound was not detected in groundwater above AWQS.
- Underscored concentrations are above UUSCOs.
- **Bold concentrations are above RRSCOs.**
- **Underscored and bold concentrations are above PGWSCOs**

One pesticide, 4,4'-DDT (0.00384 ppm), was detected at a concentration slightly exceeding its respective UUSCO (0.0033 ppm) but below its RRSCO in one soil sample 25SB-5 (0-2'). No other pesticides were detected in the soil samples above laboratory reporting limits.

No herbicides or PCBs were detected in the soil samples above laboratory reporting limits.

One or more of up to nine metals, including arsenic, barium, cadmium, copper, lead, mercury, nickel, selenium, and zinc, were detected at concentrations exceeding their respective UUSCOs in all soil samples. Of these, arsenic, barium, lead, and mercury also exceeded their respective RRSCOs in 27 soil samples. The table below provides concentration ranges of these exceedances.

Contaminant	Minimum Detected Concentration > SCOs		Maximum Detected Concentration > RRSCOs		UUSCO (ppm)	RRSCO (ppm)
Arsenic	14.1	25SB-12 (0-2')	**35.2**	25SB-13 (0-2')	13	**16**
Barium	**418**	25SB-7 (12'-13')	**1270**	25SB-14 (0-2')	350	**400**
Cadmium	3.62	25SB-10 (0-2')	3.62	25SB-10 (0-2')	2.5	4.3
Copper	57.4	25SB-13 (0-2')	181	25SB-6 (11'-12')	50	270
Lead	97.2	25SB-9 (11'-12')	**10000**	25SB-4 (12'-13')	63	**400**
Mercury	0.324	25SB-1 (0-2')	**9.05**	25SB-1 (12'-13')	0.18	**0.81**
Nickel	35.2	25SB-9 (11'-12')	40.3	25SB-10 (0-2')	30	310
Selenium	5.97	25SB-9 (0-2')	17.3	25SB-7 (12'-13')	3.9	180
Zinc	109	25SB-8 (1'-3')	898	25SB-10 (0-2')	109	10000

- All concentrations are reported in parts per million (ppm).
- Underscored concentrations are above UUSCOs.
- **Bold concentrations are above RRSCOs.**

1,4-dioxane were not detected in any of the soil samples above laboratory reporting limits or SCOs. PFAS compounds were not detected in any of the soil samples above UUSCOs. Table 2 shows exceedances from Track 1 Unrestricted SCOs for all soil/fill at the Site. Figures 3 and 4 shows the RI sampling locations and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill.

2.5.5 On-Site and Off-Site Groundwater Contamination

2.5.5.1 Summary of Groundwater Data

During the RI a total of ten groundwater samples were collected from ten groundwater monitoring wells. Eight (8) of the groundwater samples were collected from newly installed groundwater monitoring wells and two (2) groundwater samples were collected from pre-existing off-Site wells located in the sidewalk adjacent to the Site. In-text Table 2 (included below) provides soil boring and soil sample collection summary.

In-text Table 2: Groundwater Monitoring Wells and Sampling Summary

Monitoring Well ID	TOC** Elevation (NAVD88)	Depth to Water*	Groundwater Elevation (NAVD88)	Bottom of Screen *	Top of Screen *	Total Screen Depth *
25MW-1	18.97	12.60	6.37	19.20	9.20	10
25MW-2	19.12	12.48	6.64	18.80	8.80	10
25MW-3	19.35	13.22	6.13	19.20	9.20	10
25MW-4	21.69	15.28	6.41	17.46	7.46	10
25MW-5	20.14	12.72	7.42	16.50	6.50	10
25MW-6	19.37	13.15	6.22	19.02	9.02	10
25MW-7	19.10	12.52	6.58	19.25	9.25	10
25MW-8	19.52	12.63	6.89	19.21	9.21	10

One VOC, benzene, was detected above its respective AWQS in the groundwater samples at the Site as follows:

On-Site Groundwater VOC Analytical Results			
Contaminant (VOC)	**Monitoring Well ID**	**Concentration (ppb)**	**AWQS (ppb)**
Benzene	25MW-8	1.7	1

Three chlorinated VOCs (CVOCs), cis-1,2-dichloroethene, tetrachloroethene (PCE), and trichloroethene (TCE), were detected above its respective AWQS in the off-Site groundwater samples as follows:

Off-Site Groundwater VOC Analytical Results			
Contaminant (VOC)	**Monitoring Well ID**	**Concentration (ppb)**	**AWQS (ppb)**
cis-1,2-Dichloroethene	B10D	29	5
Tetrachloroethene	B8DW	6.2	5
	B10D	22	
Trichloroethene	B10D	10	5

Five SVOCs, were detected in groundwater samples across the Site above their respective AWQS. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and chrysene were detected above AWQS in 25MW-4 located in the western portion of the Site. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and chrysene were detected above

AWQS in 25MW-5 located in the southwestern portion of the Site, and benzo(a)anthracene was detected above AWQS in 25MW-7 and 25MW-8 located in the eastern and southern portions of the Site, respectively. No SVOCs were identified above AWQS in the off-Site monitoring wells. The findings were as follows:

Contaminant (SVOC)	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Benzo(a)anthracene	25MW-4	0.9	0.002
	25MW-5	0.23	
	25MW-7	0.03	
	25MW-8	0.55	
Benzo(a)pyrene	25MW-4	0.93	0.002
	25MW-5	0.25	
Benzo(b)fluoranthene	25MW-4	1.2	0.002
	25MW-5	0.32	
Benzo(k)fluoranthene	25MW-4	0.32	0.002
Chrysene	25MW-4	0.92	0.002
	25MW-5	0.19	

No herbicides, pesticides or PCBs were detected in the groundwater samples above laboratory reporting limits.

A total of twelve total metals, including barium, copper, iron, magnesium, manganese, nickel, selenium, and sodium, and three heavy metals, arsenic, chromium, mercury, and lead, were identified at concentrations exceeding their respective AWQS in the on-Site groundwater samples as follows:

Total Metals	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Arsenic, total	25MW-5	48.64	25
Barium, total	25MW-5	1073	1000
Chromium, total	25MW-5	64.72	50
Copper, total	25MW-5	384.9	200
Iron, total	25MW-1	35,100	300
	25MW-2	55,300	
	25MW-3	21,400	
	25MW-4	25,200	
	25MW-5	59,800	
	25MW-6	32,100	
	25MW-7	3,730	
	25MW-8	16,200	

Total Metals	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Lead, total	25MW-3	26.84	25
	25MW-4	579.9	
	25MW-5	2707	
	25MW-8	312.6	
Magnesium, total	25MW-1	49,000	35,000
	25MW-4	46,400	
	25MW-5	37,000	
	25MW-6	40,100	
Manganese, total	25MW-1	920.5	300
	25MW-2	2,667	
	25MW-3	1,253	
	25MW-4	1,488	
	25MW-5	3,698	
	25MW-6	1,148	
	25MW-7	379.5	
	25MW-8	678.1	
Mercury, total	25MW-4	3	0.7
	25MW-5	9.92	
	25MW-8	1.1	
Nickel, total	25MW-5	104	100
Selenium, total	25MW-5	19.8	10
Sodium, total	25MW-1	188,000	20,000
	25MW-2	543,000	
	25MW-3	117,000	
	25MW-4	540,000	
	25MW-5	392,000	
	25MW-6	324,000	
	25MW-7	22,200	
	25MW-8	369,000	

Only four naturally occurring total metals, iron, magnesium, manganese, and sodium were identified at concentrations exceeding their respective AWQS in the off-Site groundwater samples as follows:

Total Metals	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Iron, total	B8DW	5,160	300
	B10D	3,050	
Total Metals	**Monitoring Well ID**	**Concentration (ppb)**	**AWQS (ppb)**
Magnesium, total	B8DW	62,800	35,000
	B10D	69,100	
Manganese, total	B8DW	1,175	300
Sodium, total	B8DW	198,000	20,000
	B10D	234,000	

A total of four dissolved metals, all of which are naturally occurring, including iron, magnesium, manganese and sodium, were detected at concentrations exceeding their respective AWQS in both on-Site and off-Site groundwater samples as follows:

Dissolved Metals	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
Iron, dissolved	25MW-1	2,120	300
	25MW-2	1,560	
	25MW-3	1,960	
	25MW-5	501	
	25MW-6	1,330	
	25MW-7	921	
	B8DW	1,500	
	B10D	805	
Magnesium, dissolved	25MW-1	56,600	35000
	B8DW	60,500	
	B10D	68,900	
Manganese, dissolved	25MW-1	768.4	300
	25MW-2	1,798	
	25MW-3	1016	
	25MW-5	1643	
	25MW-6	932.1	
	25MW-7	311.5	
	25MW-8	462.5	
	B8DW	822.9	
Sodium, dissolved	25MW-1	203000	20000
	25MW-2	536000	
	25MW-3	188000	
	25MW-5	341000	
	25MW-6	190000	
	25MW-8	369000	
	B8DW	185000	
	B10D	229000	

Two PFAS compounds, perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), and 1,4-dioxane were detected above the Part 375 Remedial Program Guidance Values (GV) for Water as follows:

Emerging Contaminants	Monitoring Well ID	Concentration (ppb)	AWQS (ppb)
1,4-Dioxane	25MW-2	0.381	0.35
	25MW-8	0.37	
PFOS	25MW-5	0.0292	0.0027
	25MW-7	0.00474	
	25MW-8	0.00967	
	B8DW	0.0036	
PFOA	25MW-1	0.032	0.0067
	25MW-2	0.107	
	25MW-3	0.0364	
	25MW-5	0.0236	
	25MW-6	0.0484	
	25MW-7	0.0114	
	25MW-8	0.0361	
	B8DW	0.0386	
	B10D	0.0573	

2.5.5.2 Comparison of Groundwater with SCGs

Contaminants associated with urban fill from unknown sources were identified across the Site. Varying amounts of historic fill were identified from the surface down to 15 feet below grade. The fill material predominantly consists of brown and dark brown fine to medium sand with varying amounts of gravel, concrete, asphalt, glass, and silt.

Analytical results from soil samples collected from shallow (0-2') and intermediate (7-9', 11-12' and 12-13') depth intervals across the Site, identified exceedances of SVOCs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene] above UUSCOs, RRSCOs, and Protection of Groundwater SCOs.

Additionally, SVOCs exceedances in groundwater samples were identified in 25MW-4, 25MW-5, 25MW-7 and 25MW-8 across the Site, indicating that urban fill is likely the source of contamination at the Site.

A table that indicates exceedances of Class GA Ambient Water Quality Standards (AWQS) in monitoring wells prior to the remedy is shown in Table 3. A spider map that indicates the location(s) of and summarizes exceedances of AWQS prior to the remedy is shown in Figure 5.

2.5.6 On-Site Soil Vapor Contamination

Total concentrations of petroleum-related benzene, toluene, ethylbenzene, and xylenes (BTEX) ranged from 18.65 µg/m^3 in 25SV-4 to 154.8 µg/m^3 in 25SV-3 beneath the Site and were detected at a total concentration of 33.54 µg/m^3 in the indoor air sample (25AI-1). Results further showed concentrations of tetrachloroethene (PCE) in two soil vapor samples, one sub-slab soil vapor sample, and one indoor air sample. The highest concentration of PCE detected was 46.8 µg/m^3 in SV-2, located in the southeastern portion of the Site. When the one sub-slab vapor sample and co-located indoor air sample results are evaluated against the NYSDOH Decision Matrices, no further action is required. In-text Table 3 (included below) provides soil vapor points and soil vapor sample collection summary.

In-text Table 3: Soil Vapor Points and Sampling Summary

Soil Vapor Point ID	Sample Interval
25SV-1	10 fbg
25SV-2	10 fbg
25SV-3	10fbg
25SV-4	10fbg
25SS-1	0.5-1 fbg
25DUP-1 (25SV-2)	10 fbg
25AI-1	(indoor ambient air-breathing zone)

A summary table of the detected NYSDOH Decision Matrix compounds is provided below:

Matrix	Compound	Minimum Detection (ug/m^3)	Maximum Detection (ug/m^3)
B	Tetrachloroethene	7.8 (25SV-4)	46.8 (25SV-2)
	1,1,1-Trichloroethane	1.26 (25SV-4)	31.1 (25SV-1)
D	Benzene	2.44 (25SS-1)	56.2 (25SV-3)
	Ethylbenzene	1.91 (25SV-4)	21.6 (25SV-3)
	Napthalene	3.68 (25SV-2)	4.21 (25SS-1)
	Cyclohexane	1.41 (25SS-1)	164 (25SV-1)
	Isooctane (2,2,4-trimethylpentane)	4.1 (25DUP-1)	4,500 (25SV-1)
	1,2,4-trimethylbenzene	2.89 (25SV-4)	14.8 (25SV-2)
	1,3,5-trimethylbenzene	1.3 (25SV-4)	4.44 (25SV-2)
	o-Xylene	5.21 (25SV-4)	13.9 (25SV-3)
E	m,p-xylenes	9.21 (25SV-4)	50.8 (25SV-1)
	heptane	3.11 (25SV-4)	23.4 (25SV-1)
	hexane	1.39 (25SV-4)	161 (25SV-1)
F	Toluene	1.68 (25SV-4)	37 (25SV-3)

2.5.6.1 Comparison of Soil Vapor with SCGs

Results showed low concentrations of petroleum-related VOCs, with the single exception of 2,2,4-Trimethylpentane, which was detected at 4,500 µg/m^3 in soil vapor sample 25SV-1. BTEX was identified between 18.50 µg/m^3 in 25SV-4 to 154.8 µg/m^3 in 25SV-3. The highest concentrations of CVOCs detected were of PCE at 25SV-2 (46.80 µg/m^3) and 14.2 µg/m^3 in 25SV-DUP-1 (collected from the 25SV-2 location), and TCE at 25AI-1 (0.193 µg/m^3), which is located in the western portion of the Site.

When the results of the one sub-slab vapor sample and the co-located indoor air sample are evaluated against the NYSDOH Decision Matrices, no further action is required.

Soil vapor sample 25SV-1, located on the northwestern portion of the property, showed an elevated detection of isooctane (2,2,4-trimethylpentane) at 4,500 µg/m^3 as well as other elevated petroleum compound detections. Soil vapor sample 25SV-3, located on the northeastern portion of the property, showed low to moderate detections of petroleum and BTEX compounds. Soil vapor samples 25SV-2 and 25SV-4, located on the southwestern and southeastern portions of the Site, appear to have relatively lower detections of petroleum and BTEX compounds. In general, petroleum compound detections appear to be more elevated in the northern portion of the Site along Sackett Street. However, it should be noted that these VOCs were not detected in soil or groundwater samples, except for benzene in one groundwater sample.

- The highest detection of PCE was identified in soil vapor sample 25SV-2 located in the southwestern portion of the property at 46.8 µg/m^3. On the southeastern portion of the Site, in soil vapor sample 25SV-4, PCE was detected at 7.8 µg/m^3, and on the northern portions of the Site, in soil vapor samples 25SV-1 and 25SV-3, PCE was not detected. Although CVOCs were not in soil samples above UUSCOs, they were detected in the off-site groundwater samples.

A table of soil vapor data collected prior to the remedy is shown in Table 4. A spider map that indicates the location(s) of and summarizes soil vapor data prior to the remedy is shown in Figure 6.

2.6 Environmental and Public Health Assessments

2.6.1 Qualitative Human Health Exposure Assessment

This qualitative assessment evaluates potential human exposure pathways to contaminants detected in soil, groundwater, and soil vapor at the Site. The qualitative exposure assessment identified potential routes of exposure to on-site workers through inhalation, ingestion, and dermal contact of VOCs, SVOCs, and heavy metals during excavation activities. The Health and Safety Plan (HASP) prepared for the Site identifies such exposures and provides instructions for on-Site workers to minimize potential exposure.

The five elements of an exposure pathway are the (1) source of contamination; (2) environmental media and transport mechanisms; (3) point of exposure; (4) route of exposure; (5) receptor population based on past, present or future events.

Media	Potential Receptor(s)	Exposure Mechanism	Pathway Status / Comments
Soil	Construction workers, future residents	Incidental ingestion, dermal contact, inhalation of dust	Potentially complete during construction; mitigated post-construction by hardscape.
Groundwater	Construction workers	Dermal contact or incidental ingestion	Incomplete. Groundwater not used for potable supply; exposure limited by construction health and safety controls.
Soil Vapor	Construction workers, future residents	Inhalation of vapors migrating to indoor air	Low potential. No significant chlorinated VOCs detected; future building will include a cover system.
Air / Dust	On-site workers, nearby community	Inhalation of fugitive dust during excavation	Short-term, controllable pathway managed through CAMP and dust suppression measures.

Current Conditions

Based on the analytical results of the remedial investigations, the primary contaminants of concern for the site are SVOCs, specifically PAHs, metal, including hazardous lead, impacts in

soil, and chlorinated VOCs in soil vapor. Human exposure is unlikely under the current Site conditions as the Site is currently vacant, capped with concrete slabs or asphalt pavement, and groundwater within Kings County is not used as a potable source of water. Direct contact, ingestion, or dust inhalation exposure pathways are incomplete under current use.

Construction/Remediation

During construction and remediation activities, including but not limited to soil excavation, dewatering, disturbance of the contaminant sources (i.e.: soil and soil vapor) would create a potential exposure pathway to on-site workers and, to a lesser extent, the public and residents adjacent to the Site. Although the potential for complete exposure exists during construction and remediation, it is short term and controllable. The exposure will be minimized by implementation of a site-specific HASP to protect on-site workers and a site-specific Community Air Monitoring Program (CAMP).

Future Conditions

Once the remedial activities are completed, contaminant sources are expected to be removed. In the event that any residual contamination remains at the Site after remediation, institutional and engineering controls will be in place to prevent and mitigate completion of exposure pathways.

Based on the results of the QHHEA, this RAWP, which includes a site-specific HASP to protect on-site workers and a site-specific CAMP to protect the surrounding community, will be implemented during the remedial action and construction of the proposed Site buildings to ensure that the potential exposure pathways identified do not become complete. The proposed Track 2 remedy will effectively mitigate the soil impacts identified during the RI. Following remedy implementation, no significant human health exposure pathways will remain complete, and the Site will meet the remedial action objectives for protection of public health and the environment.

2.6.2 Fish & Wildlife Remedial Impact Analysis

The Site provides no wildlife habitat or food value. There are no natural waterways, wetlands, resources, or critical habitants of endangered species present on or adjacent to the Site. Therefore, a fish and wildlife resource impact analysis is not required.

2.7 Remedial Action Objectives

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site.

2.7.1 Groundwater

RAOs for Public Health Protection

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

RAOs for Environmental Protection

- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

2.7.2 Soil

RAOs for Public Health Protection

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

RAOs for Environmental Protection

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

2.7.3 Soil Vapor

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

3.0 DESCRIPTION OF REMEDIAL ACTION PLAN

This section presents an analysis of the two proposed remedial alternatives that can be potentially achieved. The following alternatives were developed and are designed to satisfy the RAOs:

Alternative 1 – Track 1 Unrestricted Use Cleanup

This alternative requires removal of all soil/full exceeding Track 1 Unrestricted Use SCOs. It is expected that a Track 1 cleanup will be achieved by remedial excavation to approximately 28 to 30 feet below grade across the Site. This alternative would include excavation and removal of the hazardous lead and urban fill identified to a depth of approximately 15 feet and additional metals exceedances which appear to achieve UUSCOs at approximately 28-30 feet bgs. Implementation of Alternative 1 would require extensive SOE and dewatering in order to achieve the required remedial excavation depth.

Alternative 2 – Track 2 Restricted Residential SCOs

This alternative requires removal of all soil/full exceeding Track 2 Restricted Residential SCOs in the top 15 feet below grade. This alternative would include excavation and removal of all historic fill and hazardous lead. Alternative 2 does not allow for the use of Institutional/Engineering Controls to achieve remedial action objectives. However, the residual contamination below 15 feet will be subject to a Site Management Plan (SMP). Therefore, this alternative will require an Environmental Easement. In any areas that do not achieve Track 2 RRSCOs, a composite cover system will be constructed in areas that achieve a Track 4 cleanup. The composite cover system would consist of a minimum of 6-inch-thick concrete building slab over 5 to 6 inches of clean gravel to prevent human exposure to residual contaminated soil/fill remaining at the Site. Figure 13 provides the layout and detail composite cover system to be installed if required.

3.1 Evaluation of remedial alternatives

The goal of the remedy selection process under the BCP is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the property. The remedy selection process begins by establishing remedial action objectives (RAOs) for media in which chemical constituents were found in exceedance of NYSDEC standards, criteria, and guidance values (SCGs). The following performance measures were used to complete the evaluation of remedial alternatives:

- Protection of human health and the environment;
- Compliance with standards, criteria, and guidelines (SCGs);
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume of contaminated material;
- Implementability;
- Cost effectiveness;
- Community Acceptance;
- Green and Sustainable Remediation (including climate resiliency); and
- Land use.

The following remedial SCGs apply to the project and are the performance criteria used to determine if the RAOs have been met:

- 6 NYCRR Part 375-6 Soil Cleanup Objectives;
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOG 1.1.1;
- NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation – May 2010;
- NYSDEC Draft BCP Guide – May 2004;
- NYSDOH Generic CAMP;

- NYSDEC Groundwater Qualtiy Standandards – 6 NYCRR Part 703;
- NYSDOH Site-Specific CAMP;
- NYS Waste Transporter Permits – 6 NYCRR Part 364;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364;
- DER-23 (January 2010);
- 6 NYCRR Part 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998);
- 6 NYCRR Subpart 374-1 – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998);
- 6 NYCRR Subpart 374-3 – Standards for Universal Waste (November 1998);
- 6 NYCRR Part 375 – Environmental Remediation Programs (December 2006);
- 6 NYCRR Part 612 – Registration of Petroleum Storage Facilities (February 1992);
- 6 NYCRR Part 613 – Handling and Storage of Petroleum (February 1992);
- 6 NYCRR Part 614 – Standards for New and Substantially Modified Petroleum Storage Tanks (February 1992);
- 40 CFR Part 280 – Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks;
- 29 CFR Part 1910.120 – Hazardous Waste Operations and Emergency Response;
- 40 CFR Part 144 – Underground Injection Control Program;
- Guidelines for Sampling, Analysis, and Assessment of PFAS Under NYSDEC's Part 375 Remedial Programs (Updated in June 2021).

Additional regulations and guidance may be applicable, relevant, and appropriate to the remedial alternatives and will be complied with in connection with implementation of the remedial program. However, the list above is intended to represent the principal SCGs, which should be considered in evaluating the remedial alternatives for the BCP Site.

3.1.1 Technical Description of Alternative 1 – Conditional Track 1

Alternative 1, conditional Track 1 remedy, would include the following:

1. Development and implementation of a Health and Safety Plan (HASP) for the protection of on-site workers, and a Community Air Monitoring Plan (CAMP) for protection of community/residents and the environment during remediation and construction activities.
2. Demolition of on-site building and removal of existing cover at the Site;
3. Excavation, stockpiling, and off-site disposal of contaminated soil/fill, hazardous lead impacted soil, and native soil exceeding Track 1 Unrestricted Use SCOs. It is expected that a Track 1 cleanup will be achieved by remedial excavation to approximately 28 to 30 feet. It is estimated that 38,950 to 41,725 cubic yards of materials will be removed from the Site in accordance with all Federal, State, and local rules and regulations for handling, transport, and disposal;
4. Design and installation of support of excavation (SOE) elements to enable excavation of contaminated soil to achieve a Track 1 cleanup;
5. Decommissioning of on-site monitoring wells in accordance with NYSDEC CP-43 Policy;
6. Dewatering of impacted groundwater in compliance with city, state, and federal laws and regulations. Dewatered fluids will be treated prior to discharge to the local sewer system under required discharge permits;
7. Removal of one 550-gallon and one 3,000-gallon ASTs, containing #2 fuel oil, located in the existing cellar, and if encountered, removal and decommissioning of any underground storage tanks (USTs) in accordance with applicable regulations;
8. Screening for indications of contamination (by visual means, odor, and monitoring with a PID) of all excavated soil during any intrusive Site work.
9. Collection and laboratory analysis of post-excavation endpoint samples to evaluate the performance of the remedy with respect to attainment of Track 1 Unrestricted Use SCOs (UUSCOs).
10. Import of clean material (i.e.: soil meeting UUSCOs, virgin stone, native crushed stone) to backfill over-excavated areas to development depth.
11. Green remediation principles and techniques will be implemented, as the Green Remediation Implementation Plan, to the extent feasible in the design, implementation,

and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

As part of the remedial program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis was completed. The environmental footprint analysis was completed using an accepted environmental footprint analysis calculator, SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA). Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction, and material use were estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for

minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be incorporated into the remedial program as the Green Remediation Implementation Plan. The project includes detailed requirements to achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics will be tracked during the implementation of the remedial action, under the Green Remediation Implementation Plan, and reported in the Final Engineering Report (FER), including a comparison to the goals established during the remedial program.

Additionally, the remedial program will include a climate change vulnerability assessment to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress, and drought), flooding, and sea level rise will be identified, and the remedial program will incorporate measures to minimize the impact of climate change on potential identified vulnerabilities.

The extent of Alternative 1 remedial excavation is provided in Figure 10.

3.1.2 Technical Description of Alternative 2 – Track 2

Alternative 2, a Track 2 remedy, would include the following:

1. Development and implementation of a Health and Safety Plan (HASP) for the protection of on-site workers, and a Community Air Monitoring Plan (CAMP) for protection of community/residents and the environment during remediation and construction activities.
2. Excavation, stockpiling, and off-site disposal of all soil/fill exceeding RRSCOs in the top 15 feet to achieve Track 2 remedy, with a contingent Track 4 cleanup. It is expected that a Track 2 remedy will be achieved by excavating the entire Site to depths of 15 feet Site-wide. It is estimated that 20,865 cubic yards of materials during the remedial excavation will be removed from the Site in accordance with all Federal, State, and local rules and regulations for handling, transport, and disposal;
3. Demolition of on-site building and removal of existing cover at the Site;

4. Design and installation of support of excavation (SOE) elements to enable excavation of contaminated soil to achieve a Track 2 cleanup;
5. Decommissioning of on-site monitoring wells in accordance with NYSDEC CP-43 Policy;
6. Dewatering of impacted groundwater in compliance with city, state, and federal laws and regulations. Dewatered fluids will be treated prior to discharge to the local sewer system under required discharge permits;
7. Removal of one 550-gallon and one 3,000-gallon ASTs, containing #2 fuel oil, located in the existing cellar, and if encountered, removal and decommissioning of any underground storage tanks (USTs) in accordance with applicable regulations;
8. Screening for indications of contamination (by visual means, odor, and monitoring with a PID) of all excavated soil during any intrusive Site work;
9. Collection and laboratory analysis of post-excavation endpoint samples to evaluate the performance of the remedy with respect to attainment of Track 2 Restricted Residential Use SCOs (RRSCOs). If endpoint samples do not meet RRSCOs, further excavation will be completed until they are met (as demonstrated by the collection of additional endpoint samples).
10. Import of clean material (i.e.: soil meeting UUSCOs or RRSCOs, virgin stone, native crushed stone) to backfill over-excavated areas to development depth, if required.
11. In areas that do not achieve Track 2 RRSCOs, a composite cover system will be constructed in areas that achieve a Track 4 cleanup.
12. Recording of an Environmental Easement (EE), including Institutional Control, to prevent future exposure to any residual contamination remaining at the Site.
13. Development and implementation a Site Management Plan (SMP) for long term management of residual contamination as required by the EE, including plans for: (1) Institutional and Engineering Controls, (2) monitoring, (3) operation and maintenance, and (4) reporting. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
- Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

As part of the remedial program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis was completed. The environmental footprint analysis was completed using an accepted environmental footprint analysis calculator, SEFA (Spreadsheets for Environmental Footprint Analysis, USEPA). Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction, and material use were estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be incorporated into the remedial program as the Green Remediation Implementation Plan. The project includes detailed requirements to

achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics will be tracked during the implementation of the remedial action, under the Green Remediation Implementation Plan, and reported in the Final Engineering Report (FER), including a comparison to the goals established during the remedial program.

Additionally, the remedial program will include a climate change vulnerability assessment to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress, and drought), flooding, and sea level rise will be identified, and the remedial program will incorporate measures to minimize the impact of climate change on potential identified vulnerabilities.

The extent of Alternative 2 remedial excavation is provided in Figure 11. The RRSCOs required to achieve Alternative 2 –Track 2 cleanup are provided in Table 1.

3.2 Selection of the Preferred Remedy

The preferred remedy for the Site is Alternative 2, Track 2 cleanup.

3.2.1 Compliance with Remedial Goals, SCGs, and RAOs

Alternative 1 will achieve compliance with the remedial goals, SCGs, and RAOs for soil through removal to UUSCOs to 28-30 feet below grade.

Alternative 2 will achieve compliance with the remedial goals, SCGs, and RAOs for soil through removal to RRSCOs in the top 15 feet below grade.

3.2.2 Long Term Effectiveness and Permanence

Alternative 1 achieves long term effectiveness and permanence by permanently removing and/or remediating all impacted soil/fill material above Track 1 UUSCOs by excavating to a depth of 28-30 feet bgs site wide. Long-term exposure to contaminated soil vapor would be prevented by the vapor barrier system. Groundwater contamination would achieve a bulk reduction in on-site groundwater contaminant concentrations due to removal of all source material (i.e., soil/fill above

UUSCOs and PGWSCOs, as applicable) and extensive dewatering. The Site would not have use restriction under this Alternative.

Alternative 2 achieves long term effectiveness and permanence by permanently removing all soil/fill above RRSCOs within the top 15 feet bgs site wide. However, since residual contamination will be left at the Site, and the Site will be subject to an EE and SMP for long term management. The Site would have use restrictions under this Alternative.

3.2.3 Reduction in Toxicity, Mobility, or Volume through Treatment

Remedial Alternative 1 achieves a greater reduction in the toxicity, mobility, and volume of contaminants present in soil and soil vapor through the excavation of a larger volume of impacted material. Contaminants in groundwater would be reduced through extensive dewatering.

Remedial Alternative 2 provides a reduction in the toxicity, mobility, and volume of contaminants in soil through the removal of fill materials exceeding RRUSCOs and PGWSCOs, as applicable, above and slightly below the groundwater table. Residual contamination remaining at the Site will be subject to an SMP.

3.2.4 Short Term Effectiveness

There is the potential for short-term adverse impacts and risks to workers, the community, and the environment during the implementation of both Alternatives. Short-term exposure to on-site workers during excavation and loading activities will be addressed with a HASP and mitigated through the use of personal protective equipment, monitoring and engineering controls. Potential short-term exposure to the surrounding community will be addressed through the use of odor and dust-suppression techniques and through the implementation of a CAMP which will require air monitoring activities during all excavation and soil disturbance activities.

Other potential impacts to the community such as construction-related noise, vibrations and traffic, will be controlled and regulated under the terms of the NYS Department of Buildings issued building permit which can place a Stop Work Order on the property for unsafe conditions, community impacts or violation of the terms and conditions of the permit. Decontamination procedures of equipment, including trucks transporting soil to off-site disposal facilities, will

minimize the potential for impacted soil to be dispersed beyond the Site boundary. A truck traffic plan has also been prepared to minimize disturbance to the local roads and community.

3.2.5 Implementability

The techniques, materials, and equipment to implement both Alternatives are readily available and have been proven effective in remediating the contaminants associated with the Site. Excavation for the remediation of soils is both a "low tech" and reliable method which has a long and proven track record on the remediation of contaminated properties. Under both Alternatives, treatment of groundwater with activated carbon and discharging into the NYC combined sewer system during dewatering is a feasible method.

3.2.6 Cost

Costs associated with Alternative 1 are estimated at approximately $18,959,076. This cost estimate is based on the following elements and assumptions:

- Excavation and removal of soil/fill exceeding Track 1 Unrestricted Use SCOs to 28-30 feet below grade. It is expected that a Track 1 cleanup will be achieved by remedial excavation across the entire footprint of the Site.
- Storage tank removal,
- Design and installation of SOE to accommodate remedial excavation to a depth of 28-30 feet,
- Dewatering, treatment, and discharge of groundwater to the NYC sewer system,
- Off-site disposal of approximately 41,725 cubic yards of soil/fill,
- Import of 20,000 cubic yards of stone/backfill to return the site to development grade,
- Waste characterization and post-excavation endpoint verification sampling and analysis,
- HASP and CAMP monitoring for the duration of the remedial activities.

Potential costs associated with Alternative 1 are provided in Table 5.

Costs associated with Alternative 2 are lower than Alternative 1 as costs associated with the extent of excavation and dewatering are reduced. The estimated cost of Alternative 2 is $11,281,536. This cost estimate is based on the following elements and assumptions:

- Excavation and removal of soil/fill exceeding RRSCOs to 15 feet below grade.
- Design and installation of SOE to accommodate remedial excavation to a depth of 15 feet,
- Dewatering, treatment, and discharge of groundwater to the NYC sewer system,
- Off-site disposal of approximately 20,865 cubic yards of soil/fill,
- Import of 1,000 cubic yards of stone/backfill,
- Waste characterization and post-excavation endpoint verification sampling and analysis,
- HASP and CAMP monitoring for the duration of the remedial activities,
- Final Engineering Report, PRR, and
- Recording an Environmental Easement, and Site Management Plan.

Potential costs associated with Alternative 2 are provided in Table 6.

3.2.7 Compatibility with Land Use

The proposed redevelopment of the Site is compatible with its current zoning. Following remediation, the Site is expected to achieve Track 2 RRSCOs, which is appropriate for its planned restricted residential use. In the event that Alternative 2 is not achieved in all portions of the Site, achieving a Track 4 cleanup with Site Specific SCOs would still make the Site compatible with its current zoning.

3.2.8 Community Acceptance

This RAWP will be subject to a 45-day public comment period to determine if the community had comments on the presented remedial alternatives and selected remedy.

3.2.9 Zoning

The Site zoning is M14/R7A and G (Gowanus Special Use District)– which allows for mixed commercial and residential development, and therefore, consisting with proposed use of the property. The preferred remedy will comply with current zoning.

3.2.10 Applicable Comprehensive Community Master Plans or Land Use Plans

The proposed redevelopment plan is consistent with land use patterns in the surrounding area. There are no applicable community master plans or land use plans for the Site area.

3.2.11 Surrounding Property Uses

The Site is located in an urban, mixed industrial, commercial, and residential neighborhood with some institutional uses, including a public school. The proposed new residential building is compatible with the surrounding property uses.

3.2.12 Citizen Participation

The CPP provides for ongoing updates to the public regarding the investigation and remediation and allows for involvement regarding the environmental investigation and cleanup of the Site. A Citizen Participation Plan has been prepared and is available for public review at the identified document repositories (Crown Heights Branch of the New York Public Library, Brooklyn Community Board 9).

3.2.13 Environmental Justice

The Site is not located in an Environmental Justice Area. Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice efforts focus on improving the environment in communities, specifically minority and low-income communities, and addressing disproportionate adverse environmental impacts that may exist in those communities.

Since the goal of the remedy will achieve a level of cleanup that will remove contaminated materials from the community, the remedy poses no environmental justice concerns.

3.2.14 Proximity to Natural Resources

The Gowanus Canal (Superfund Site (Site Number: 224133) is located approximately 900 feet west of the Site, which is accessible via public transportation located near the Site or by walking. The proposed remedy will not negatively impact natural resources.

3.2.15 Off-Site Groundwater Impacts

Three CVOCs, PCE, TCE, and cis-1,2-dichloroethene were detected at concentrations exceeding their respective AWQS of 5 ug/L in two off-site groundwater monitoring wells. PCE exceedances were observed in two off-site groundwater monitoring wells. B8DW (6.2 ug/L) and B10D (22 ug/L), located in the sidewalk adjacent to the southwest and south of the Site, respectively. TCE was detected above its AWQS in off-site monitoring well B10D (10 ug/L). Cis-1,2-dichloroethene was detected above its AWQS in off-site monitoring well B10D (29 ug/L). No CVOCs were identified in the on-site groundwater samples or soil samples at concentrations exceeding regulatory standards. Based on these findings, the CVOCs present in soil vapor are likely attributable to off-site sources rather than on-site impacts. No impacts from the Site to off-site groundwater is present.

Municipal water supply wells are not present in this area of New York City; therefore, groundwater from the Site does not affect municipal water supplies. Groundwater is not a source of drinking water in Brooklyn.

3.2.16 Proximity to Floodplains

According to the FEMA National Flood Hazard Layer (NFHL), the Site is not within a special flood hazard area.

3.2.17 Current Institutional Controls

There are currently no Institutional Controls (ICs) at the Site.

3.3 Summary of selected Remedial Actions

The selected Track 2 remedy (Alternative 2), would include the following:

1. A remedial program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

    - Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
    - Reducing direct and indirect greenhouse gases and other emissions;
    - Increasing energy efficiency and minimizing use of non-renewable energy;
    - Conserving and efficiently managing resources and materials;
    - Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
    - Maximizing habitat value and creating habitat when possible;
    - Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;
    - Integrating the remedy with the end use where possible and encouraging green and sustainable re-development; and
    - Additionally, to incorporate green remediation principles and techniques to the extent feasible in the future development at this site, any future on-site buildings shall be constructed, at a minimum, to meet the 2020 Energy Conservation Construction Code of New York (or most recent edition) to improve energy efficiency as an element of construction.

As part of the remedial program, to evaluate the remedy with respect to green and sustainable remediation principles, an environmental footprint analysis will be completed. The environmental footprint analysis will be completed using an accepted environmental footprint analysis calculator such as SEFA (Spreadsheets for Environmental

Footprint Analysis, USEPA), SiteWise™ (available in the Sustainable Remediation Forum [SURF] library) or similar Department accepted tool. Water consumption, greenhouse gas emissions, renewable and non-renewable energy use, waste reduction and material use will be estimated, and goals for the project related to these green and sustainable remediation metrics, as well as for minimizing community impacts, protecting habitats and natural and cultural resources, and promoting environmental justice, will be incorporated into the remedial program, as appropriate. The project will include detailed requirements to achieve the green and sustainable remediation goals. Further, progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the Final Engineering Report (FER), including a comparison to the goals established during the remedial program.

Additionally, the remedial program will include a climate change vulnerability assessment, to evaluate the impact of climate change on the project site and the proposed remedy. Potential vulnerabilities associated with extreme weather events (e.g., hurricanes, lightning, heat stress and drought), flooding, and sea level rise will be identified, and the remedial program will incorporate measures to minimize the impact of climate change on potential identified vulnerabilities.

2. Development and implementation of a Construction Health and Safety Plan (CHASP) for the protection of on-site workers, and a Community Air Monitoring Plan (CAMP) for protection of community/residents and the environment during remediation and construction activities;
3. Demolition of on-site building and removal of existing cover at the Site;
4. Excavation, stockpiling, and disposal of soil/fill exceeding Track 2 SCOs listed in Table 1;
5. Design and installation of support of excavation (SOE) elements to enable excavation of contaminated soil to achieve a Track 2 cleanup;
6. Decommissioning of on-site monitoring wells in accordance with NYSDEC CP-43 Policy;

7. Dewatering of impacted groundwater in compliance with city, state, and federal laws and regulations. Dewatered fluids will be treated prior to discharge to the local sewer system under required discharge permits;
8. Removal of one 550-gallon and one 3,000-gallon ASTs, containing #2 fuel oil, located in the existing cellar, and if encountered, removal and decommissioning of any underground storage tanks (USTs) in accordance with applicable regulations;
9. Screening for indications of contamination (by visual means, odor, and monitoring with PID) of all excavated soil during any intrusive Site work;
10. Collection and analysis of end-point samples to evaluate the performance of the remedy with respect to attainment of Track 2 SCOs. If endpoint samples do not meet RRSCOs, further excavation will be completed until they are met, otherwise a Track 4 Site Specific SCO will be pursued;
11. Appropriate off-Site disposal of all material removed from the Site in accordance with all Federal, State and local rules and regulations for handling, transport, and disposal. To achieve a Track 2 Restricted Residential remedy, it is estimated approximately 20,865 cubic yards of soil/fill be removed;
12. Import of materials to be used for backfill and cover in compliance with: (1) chemical limits and other specifications included in Table 1, (2) all Federal, State and local rules and regulations for handling and transport of material;
13. Recording of an Environmental Easement, including Institutional Controls, to prevent future exposure to any residual contamination remaining at the Site;
14. Publication of a Site Management Plan 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;

15. All responsibilities associated with the Remedial Action, including permitting requirements and pretreatment requirements, will be addressed in accordance with all applicable Federal, State and local rules and regulations.

4.0 REMEDIAL ACTION PROGRAM

4.1 Governing Documents

During the remedial program, the following governing documents will be implemented as required:

- Health and Safety Plan
- Community Air Monitoring Plan
- Quality Assurance Project Plan
- Construction Quality Assurance Plan
- Soil/Materials Management Plan
- Stormwater Pollution Prevention Plan
- Contractors Site Operations Plan
- Community Participation Plan

Each of these documents are discussed in detail throughout this RAWP.

4.1.1 Standards, Criteria and Guidance (SCGs)

The following standards, criteria, and guidance are typically applicable to Remedial Action projects in New York State, and will be consulted and adhered to as applicable:

- 6 NYCRR Part 364 - NYS Waste Transporter Permits
- 6 NYCRR Part 360 - NYS Solid Waste Management Requirements
- 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes
- 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities
- 6 NYCRR Subpart 374-2 - Standards for the Management of Used Oil
- 6 NYCRR Part 375 - Environmental Remediation Programs

- 6 NYCRR Part 376 - Land Disposal Restrictions
- 6 NYCRR Part 613 - Petroleum Bulk Storage
- 6 NYCRR Part 661 - Tidal Wetlands - Land Use Regulations
- 6 NYCRR Part 663 - Freshwater Wetlands - Permit Requirements
- 6 NYCRR Parts 700-706 – Classes and Standards of Quality and Purity
- 6 NYCRR Part 750 - State Pollutant Discharge Elimination System (SPDES) Permits
- 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
- 40 CFR Part 144 - Underground Injection Control Program
- CP-43 - Commissioner Policy on Groundwater Monitoring Well Decommissioning (December 2009)
- CP-49 – Climate Change and DEC Action (2022)
- CP-51- Soil Cleanup Guidance (2010)
- CP-60 – Screening and Assessment of Contaminated Sediment (2014)
- DER-2 - Making Changes to Selected Remedies (April 2008)
- DER-4 – Management of Coal Tar Waste & Coal Tar Contaminated Soils from Manufactured Gas Plants (2001)
- DER-10 – Technical Guidance for Site Investigation and Remediation (2010)
- DER-13 – Strategy for Evaluating Soil Vapor Intrusion at Remedial Sites in New York (2006)
- DER-23 – Citizen Participation Handbook for Remedial Programs (2010)
- DER-31 – Green Remediation (2010)
- DER-32 – Brownfield Cleanup Program Applications and Agreements (2017)

- DER-33 – Guide to Drafting and Recording Institutional Controls (2010)
- TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
- TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations (1998, Addenda 2000, 2004 and 2023)
- TOGS 1.3.8 - New Discharges to Publicly Owned Treatment Works (1994)
- TOGS 2.1.2 - Underground Injection/Recirculation (UIR) at Groundwater Remediation Sites (1990)
- New York State Standards and Specifications for Erosion and Sediment Control (2016)
- DAR-1 (formerly Air Guide 1) - Guidelines for the Control of Toxic Ambient Air Contaminants (1997)
- U.S. EPA OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (December 1997)
- New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan
- NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (2006)
- New York State Climate Act (2019)
- NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (2023)

4.1.1.1 Green and Sustainable Remediation and Climate Resiliency

The remedy will incorporate several Best Management Practices (BMPs) consistent with green remediation principles established in DER-31: Green Remediation. These BMPs are intended to minimize energy and water use, reduce waste generation and air emissions, and limited impacts to the ecosystem and local community during the remediation. The practices will address five primary areas:

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

1. To protect the local ecosystem and ecosystem services, minimally invasive technologies will be used wherever practicable. Real-time data collecting technologies are minimally invasive, protecting the local ecosystem and ecosystem services. The BMPs implemented under this principle include:
    i. Implementation of a Community Air Monitoring Plan (CAMP) using portable Photoionization Detectors (PIDs) and real-time dust monitors to protect both on-site workers and the surrounding community while maintaining a minimal physical footprint.
    ii. Use of temporary erosion and sediment controls to prevent off-site migration of soil or stormwater.
2. Minimizing transportation distances and idling times for equipment will reduce fuel usage and air emissions associated with remedial construction. The BMPs implemented under this principle include:
    i. Ensuring all diesel-powered heavy trucks and equipment to have a Clean Idle Certification Label;
    ii. Scheduling material deliveries and exports to minimize queuing and eliminate unnecessary idling.

iii. Requiring all operators to shut down engines when not in active use.

iv. Reusing clean, recyclable materials (e.g., crushed stone, certified clean fill) whenever possible to reduce the demand for virgin resources and to minimize transportation-related emissions.

v. Conducting coordination meetings virtually via videoconference or teleconference whenever feasible to reduce personal vehicle use, traffic congestion, and fuel consumption.

3. Reducing the use of unnecessary materials both on- and off-site will lower waste generation and associated emissions from material extraction, production, and disposal. The BMPs implemented under this principle include:

   i. Reducing paper usage by using electronic copies of plans and drawings;

   ii. When applicable, the reuse of clean, recyclable materials reduces consumption of non-renewable virgin resources;

   iii. Segregating waste streams for proper recycling and disposal to minimize landfill burden.

4. Requesting the Contractor tracks material use, material disposal, equipment use and associated emissions, water use, and transportation emissions of both material and personnel. The tracking data will be used in collaboration with the EPA's Spreadsheets for Environmental Footprint Analysis ("SEFA") to determine the footprint of activities on Site. Summaries of the activities are included in Appendix I.

Of the two Alternatives, Alternative 2, which achieves Track 2 use, generates a smaller footprint than Alternative 1, which achieves Track 1 use. Alternative 1 uses approximately 14.6% more energy and emits 13.7% more GHG emissions, 13.7% more NOx, 20.6% more SOx, 24.5% more particulate matter (PM), and 13.6% more hazardous air pollutants (HAPs) than Alternative 2. The two alternatives have a similar on-site footprint from energy usage and emissions; Alternative 1 is approximately 15% higher in both energy usage and GHG emissions. However, due to the amount of waste removed from the site to reach Track 1 use in Alternative 1, the off-site energy usage and GHG emissions are higher due to higher volumes of material occupying landfills.

Progress of green and sustainable remediation metrics will be tracked during the implementation of the remedial action under the Green Remediation Implementation Plan.

4.1.2 Site Specific Health & Safety Plan (HASP)

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

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

The Health and Safety Plan (HASP) and requirements defined in this Remedial Action Work Plan pertain to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion. A Site-specific HASP has been prepared for the Site and is included as Appendix B. All remedial work performed under this RAWP will be in compliance with governmental requirements, including Site and worker safety requirements mandated by the federal Occupational Health and Safety Administration (OSHA) Regulations, primarily 29 CFR Parts 1910 and 1926.

Contractors and subcontractors will have the option of adopting this HASP or developing their own Site-specific document. If a contractor or subcontractor chooses to prepare their own HASP, the Remedial Engineer will ensure that it meets the minimum requirements as detailed in the Site-specific HASP prepared for the Site. Modifications to the HASP may be made with the approval of the Remedial Engineer (RE), Site Safety Manager (SSM) and/or Project Manager (PM).

The Site Safety Coordinator will be Ms. Alex Keenan. Her resume is provided in Attachment F. If required, confined space entry will comply with all OSHA requirements to address the potential risk posed by combustible and toxic gasses.

4.1.3 Quality Assurance Project Plan (QAPP)

Sampling associated with the Site will be conducted in accordance with the QAPP included as Appendix D, which details field screening and sampling methodologies, sample submittal to the

laboratory, and reporting requirements. The QAPP includes the project team responsible for implementing the remediation requirements and provisions set forth in this RAWP. All samples will be reported with Category B deliverables and Environmental Quality Information System (EQuIS)™ electronic data deliverables (EDDs), with the exception of disposal (waste characterization) sampling.

4.1.4 Construction Quality Assurance Plan (CQAP)

All construction work related to the remedy (i.e., soil excavation) will be monitored by Vektor / AMC field personnel under the direct supervision of the Remedial Engineer. Monitoring during soil excavation will be performed to protect the health of site workers and the surrounding community. A Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) have been specifically developed for this project. These plans specify the monitoring procedures, action levels, and contingency measures that are required to protect public health.

All intrusive and soil disturbance activities will be monitored by an environmental professional (EP) under the direct supervision of the Remedial Engineer who will record observations in the site field book and complete a photographic log of the daily activities. The EP will provide daily updates to the Project Manager and Remedial Engineer who will both make periodic visits to the site as needed to assure construction quality.

4.1.5 Soil/Materials Management Plan (SMMP)

A Soil/Materials Management Plan (SMMP) is included in Section 5.4 of this document. The SMMP includes detailed plans for managing all soils/materials that are disturbed at the Site, including excavation, handling, storage, transport, and disposal. It also includes all of the procedures that will be applied to assure effective, nuisance-free performance in compliance with all applicable federal, state, and local laws and regulations.

4.1.6 Erosion and Sediment Control Plan (ESCP)

The erosion and sediment controls will be in conformance with requirements presented in the New York State Standards and Specifications for Erosion and Sediment Control.

4.1.7 Community Air Monitoring Plan (CAMP)

The site-specific Community Air Monitoring Program (CAMP) is provided in Appendix C. Community air monitoring will be performed via at least two fixed stations at the perimeter of the Site during all intrusive work. In addition to community air monitoring on the perimeter of the work zone, air monitoring will be performed periodically (at a minimum once per hour) on a roving basis with hand-held equipment based upon wind direction and the location of the intrusive work

4.1.8 Contractors Site Operations Plan (SOP);

The Remedial Engineer has reviewed all plans and submittals for this remedial project (including those listed above and contractor and sub-contractor document submittals) and confirms that they comply with this RAWP. The Remedial Engineer is responsible to ensure that all later document submittals for this remedial project, including contractor and sub-contractor document submittals, comply with this RAWP. All remedial documents will be submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

4.1.9 Citizen Participation Plan

A certification of mailing will be sent by the Volunteer to the NYSDEC project manager following the distribution of all Fact Sheets and notices that includes: (1) certification that the Fact Sheets were mailed, (2) the date they were mailed; (3) a copy of the Fact Sheet, (4) a list of recipients (contact list); and (5) a statement that the repository was inspected and that it contained all of applicable project documents.

No changes will be made to approved Fact Sheets authorized for release by NYSDEC without written consent of the NYSDEC. No other information, such as brochures and flyers, will be included with the Fact Sheet mailing.

The approved Citizen Participation Plan for this project is attached in Appendix E.

Document repositories have been established at the following locations and contain all applicable project documents:

1. Brooklyn Community Board 6
   250 Baltic Street
   Brooklyn, New York
   Phone: (718) 643-3027

2. Brooklyn Public Library – Central Branch
   10 Grand Army Plaza
   Brooklyn, New York
   Phone: (718) 230-2100

In addition, an electronic repository can be accessed via DECInfo Locator at the following link: https://extapps.dec.ny.gov/data/DecDocs/C224392/

4.2 General Remedial construction information

4.2.1 Project Organization

Resumes of key personnel involved in the Remedial Action are included in Appendix F. Personnel responsible for implementation of this RAWP are included on the Organization Chart provided in the QAPP.

4.2.2 Remedial Engineer

The Remedial Engineer for this project will be Ariel Czemerinski. The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the 601-607 Union Street Site (NYSDEC BCA Index No. C224392-11-23 Site No. C224392). The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under his supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import

of back fill material, and management of waste transport and disposal. The Remedial Engineer will be responsible for all appropriate communication with NYSDEC and NYSDOH.

The Remedial Engineer will review all pre-remedial plans submitted by contractors for compliance with this RAWP and will certify compliance in the Final Engineering Report.

The Remedial Engineer will provide the certifications listed in Section 10.1 in the FER.

4.2.3 Remedial Action Construction Schedule

The remedial action will begin with mobilization of equipment and material to the Site, which will begin approximately 1-2 weeks following RAWP approval and Decision Document, and 10 days after the distribution of the remedial construction Fact Sheet. A pre-construction meeting will be held among NYSDEC, the Remedial Engineer, and the selected remedial contractor prior to site mobilization. The remedy is expected to take 9 months as part of the construction excavation and foundation. Table 7 provides the preliminary remedial action schedule.

4.2.4 Work Hours

The hours for operation of remedial construction will conform to the New York City Department of Buildings (DOB) construction code requirements or according to specific variances issued by that agency. NYSDEC will be notified by the Volunteer of any variances issued by DOB. NYSDEC reserves the right to deny alternate remedial construction hours.

4.2.5 Site Security

The Site will be completely closed from public access by using secured construction fence. No unauthorized personnel will be able to access the Site. During off hours, the Site will be locked.

4.2.6 Traffic Control

It is not anticipated that traffic will be disrupted beyond normal contractor vehicle traffic going to and from the Site during construction. Any sidewalk closures that are required during the course of construction/remediation activities will be conducted in accordance with New York City Department of Transportation (NYCDOT) permits.

The Volunteer's construction management personnel will direct the arrival or departure of construction vehicles and provide flag services as needed to maintain safe travel exiting and entering the Site from Franklin Avenue or Montgomery Street. Traffic related to on-going remedial activity will require the staging of trucks on Montgomery Street on a daily basis during soil excavation activity. Potential truck routes are shown on Figure 12.

4.2.7 Contingency Plan

A contingency plan has been developed to describe the procedures to be followed upon discovery of an unknown source of contamination or AOC that may require remediation (USTs, stained soil, drums, etc.). The identification of a previously unknown source structure or unexpected contaminated media discovered by screening during invasive Site work will be promptly communicated by phone to the NYSDEC project manager. The findings will also be included in daily and monthly progress reports. If USTs or other previously unidentified contaminant sources are found during on-site remedial excavation or development-related construction, sampling will be performed on product, sediment, and/or surrounding soil/fill, etc., as applicable. Chemical analytical work will be for full scan parameters (TCL VOCs, SVOCs, PCBs, and pesticides; and TAL metals and PFAS). The analyses will not be limited to CP-51 parameters where tanks are identified without prior approval by the NYSDEC project manager.

4.2.8 Worker Training and Monitoring

All those who enter the work area while intrusive activities are being performed must recognize and understand the potential hazards to health and safety. All construction personnel upon entering the Site must attend a brief training meeting, its purpose being to:

- Make workers aware of the potential hazards they may encounter;
- Instruct workers on how to identify potential hazards;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- Make workers aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

The excavation contractor's on-site personnel engaged in this work will all have a minimum of 24-hour Hazardous Waste Operations and Emergency Response Operations training (40-hour preferred).

All field personnel involved in remedial activities will participate in training, if required under 29 CFR 1910.120, including 24 and 40-hour hazardous waste operator training and annual 8-hour refresher training. The Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign a HASP acknowledgment.

4.2.9 Agency Approvals

The Volunteer has addressed all SEQRA requirements for this Site. All permits or government approvals required for remedial construction have been, or will be, obtained prior to the start of remedial construction.

The planned end use for the Site is in conformance with the current zoning for the property as determined by the New York City Department of City Planning]. A Certificate of Completion will not be issued for the project unless conformance with zoning designation is demonstrated.

A complete list of all federal, state and local governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work will be provided in the Final Engineering Report.

4.2.10 NYSDEC BCP Signage

A project sign will be erected at the main entrance to the Site prior to the start of any remedial activities. The sign will indicate that the project is being performed under the New York State Brownfield Cleanup Program. The sign will meet the detailed specifications provided by the NYSDEC Project Manager.

4.2.11 Pre-Construction Meeting with NYSDEC

A pre-construction meeting or teleconference call with the Project Manager, Remedial Engineer, Construction Manager, Owner's Representative, the NYSDEC, and the NYSDOH will take place prior to the start of major construction activities.

4.2.12 Emergency Contact Information

An emergency contact sheet with names and phone numbers is included in the Site-specific HASP provided in Appendix B. That document will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.

4.2.13 Remedial Action Costs

The total estimated cost of the Remedial Action is $11,281,536. An itemized and detailed summary of estimated costs for all remedial activity is attached as Table 6. This will be revised based on actual costs and submitted as an Appendix to the Final Engineering Report.

4.3 Site Preparation

Prior to conducting any intrusive activities, the work zone(s), designated entry points, soil/fill staging areas, decontamination zones, and truck routes will be established, as applicable. The Site plan will be updated as necessary to reflect any changes in operations during the course of the intrusive work. Airborne particulate and VOC control measures, if necessary, will be implemented. Additional details of Site preparation activities are provided in the following sections.

4.3.1 Mobilization

Site mobilization involving security setup, equipment mobilization, utility mark outs, and marking and staking excavation areas will be performed prior to undertaking any Site remediation activities.

4.3.2 Monitoring Well / Vapor Probe Decommissioning

Existing groundwater monitoring wells will be properly decommissioned in accordance with NYSDEC Commissioners Policy CP-43. The only exception to this is if the full length of the well is to be excavated during remediation.

Similarly, existing soil vapor probes will be properly decommissioned.

4.3.3 Erosion and Sedimentation Controls

Erosion and sediment control measures will be installed at the Site prior to conducting any ground-intrusive work. These measures will be installed according to all applicable federal, state, and/or local laws. The measures will provide for abatement and control of environmental pollution arising from proposed remediation and construction activities. The control measures will include procedures for perimeter Site controls, stabilized construction pads at each construction entrance/exit, equipment decontamination, drainage inlet protection, and particulate suppression. The RE, or representative, will conduct routine inspections; any repairs and/or maintenance of control measures will be completed in a timely fashion to maintain the controls in proper working order. All vehicles leaving the Site will be inspected to ensure that no soil/fill adheres to the wheels or undercarriage prior to leaving the Site. Any situations involving material spilled in transit, mud, and dust tracked off-site will be remedied. The access routes will be inspected for road conditions, overhead clearance, and weight restrictions.

4.3.4 Stabilized Construction Entrance(s)

A crushed stone path will be constructed at all truck entrances and exits. The stabilized entrances will be constructed of a 4 to 6-inch bed of crushed stone or crushed concrete, which will be sloped back toward the interior of the Site. The stabilized entrances will be inspected on a daily basis during soil loading activities and reinforced as needed with additional stone/concrete material to prevent the accumulation of ruts, mud or soil. A laborer will check the trucks as they leave, and will use a hose, shovel, and/or broom to clean the truck tires and body as it leaves the Site, as necessary.

4.3.5 Utility Marker and Easements Layout

The Volunteer and its contractors are solely responsible for the identification of utilities that might be affected by work under the RAWP and implementation of all required, appropriate, or necessary health and safety measures during performance of work under this RAWP. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain any local, State or Federal permits or approvals pertinent to such work that may be required to perform work under this RAWP. Approval of this RAWP by NYSDEC does not constitute satisfaction of these requirements.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

4.3.6 Sheeting and Shoring

Appropriate management of structural stability of on-Site or off-Site structures during on-Site activities include excavation is the sole responsibility of the Volunteer and its contractors. The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this RAWP. The Volunteer and its contractors must obtain any local, State or Federal permits or approvals that may be required to perform work under this RAWP. Further, the Volunteer and its contractors are solely responsible for the implementation of all required, appropriate, or necessary health and safety measures during performance of work under the approved RAWP.

4.3.7 Equipment and Material Staging

Staging and storage of equipment and materials will be contained within the secured Site or within a secured area on the street/sidewalk in accordance with a NYCDOT permit. By the nature of the work involved in this project, equipment and materials will be moved to different areas within the secured Site as work progresses.

4.3.8 Decontamination Area

A temporary truck decontamination pad will be constructed to decontaminate trucks and other vehicles/equipment leaving the Site. The pad will be constructed by placing a 4 to 6-inch bed of stone aggregate such as crushed rock or RCA. The pad will be bermed at the sides and sloped back to the interior of the Site. The truck pad will be sized to accommodate the largest construction vehicle used and located in line with the stabilized construction entrance. The pad will be inspected on a daily basis during soil loading activities and reinforced as needed with additional stone/concrete material to prevent the accumulation of ruts, mud or soil.

4.3.9 Site Fencing

The Site will be secured with a NYDOB-approved 8-foot-high fence that is present around the entire perimeter. During all remedial activities, access to the Site will be limited, and all persons entering the Site will be required to sign a logbook and meet all applicable health and safety requirements. The Site will be secured during non-working hours.

4.3.10 Demobilization

Demobilization will consist of the restoration of material staging areas and the disposal of materials and/or general refuse in accordance with acceptable rules and regulations**.** Materials used in remedial activities will be removed and disposed of properly. All equipment will be decontaminated prior to leaving the Site.

4.4 Reporting

All daily and monthly reports will be included in the Final Engineering Report.

4.4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by noon of each day following the reporting period and will include:

- An update of progress made during the reporting day;

- Locations of work and quantities of material imported and exported from the Site (shown on a figure);
- CAMP Monitoring Station locations on a figure;
- References to alpha-numeric map for Site activities;
- A summary of any and all complaints with relevant details (names, phone numbers);
- A summary of CAMP findings, including appended data and notes of exceedances;
- A summary of mercury air monitoring, when required, including appended logs;
- Photographs of site activities;
- An explanation of notable Site conditions.

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the RAWP or other sensitive or time critical information. However, such conditions must also be included in the daily reports. Emergency conditions and changes to the RAWP will be addressed directly to NYSDEC Project Manager via personal communication.

Daily Reports will include a description of daily activities keyed to an alpha-numeric map for the Site that identifies work areas. These reports will include a summary of CAMP results, odor and dust excursions and corrective actions, and all complaints received from the public.

Any CAMP action level exceedances and corrective actions will need to be reported to the NYSDEC and the NYSDOH project managers within one business day.

A Site map that shows a predefined alpha-numeric grid for use in identifying locations described in reports submitted to NYSDEC is attached in Figure 9.

The NYSDEC assigned project number will appear on all reports.

4.4.2 Monthly Reports

Monthly reports will be submitted to NYSDEC and NYSDOH Project Managers by the 10th day of each month following the reporting period and will include:

- Activities relative to the Site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (e.g., tons/cubic yards of material exported and imported, etc.);
- Description of approved activity modifications, including changes of work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.
- Tracking of GSR metrics determined during the design process should be included in monthly reports.

4.4.3 Other Reporting

Photographs will be taken of all remedial activities and submitted to NYSDEC in digital (JPEG) format. Photos will illustrate all remedial program elements and will be of acceptable quality. Representative photos of the Site prior to any Remedial Actions will be provided. Representative photos will be provided of each contaminant source, source area and Site structures before, during and after remediation. Photos will be included in the daily reports as needed, and a comprehensive collection of photos will be included in the FER.

Progress with respect to green and sustainable remediation metrics will be tracked during implementation of the remedial action and reported in the FER, including a comparison to the goals established during the remedial program. Regular updates to the metrics used (SEFA, SiteWise™ or otherwise approved method) should be included.

The Climate Screening process and results will be documented in the form of a completed checklist and brief letter report. If the Climate Screening results indicate that a CVA is necessary, a complete CVA Report will be developed. The CVA Report will be included as an Appendix or Attachment in relevant documents and/or submitted as a standalone report.

Job-site record keeping for all remedial work will be appropriately documented. These records will be maintained on-Site at all times during the project and be available for inspection by NYSDEC and NYSDOH staff.

4.4.4 Complaint Management Plan

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

4.4.5 Deviations from the Remedial Action Work Plan

All deviations from this RAWP will require prior approval from NYSDEC. These deviations will be recorded in both the daily reports and the FER. At a minimum, the report of the deviation will include the following:

- Reasons for deviating from this RAWP;
- Approval process to be followed for changes/additions to this RAWP; and
- Effect of the deviations on overall remedy.

Major changes to the scope of work must be discussed with the NYSDEC and the NYSDOH prior to implementation. If the changes are considered to be significant enough, an addendum to the RAWP Work Plan will be prepared and submitted to NYSDEC / NYSDOH for review.

5.0 REMEDIAL ACTION: MATERIAL REMOVAL FROM SITE

Excavation work includes removal and off-Site disposal of approximately15 feet of soil/fill material across the Site with additional excavation as needed to meet Restricted Residential SCOs and applicable Protection of Groundwater SCOs. Soil excavation will be performed using conventional equipment such as track-mounted excavators, backhoes, and loaders.

All excavation work will be performed in accordance with the Site-specific HASP and CAMP. If an underground storage tank (UST) is discovered during excavation the NYSDEC Project Manager will be immediately notified and the UST removed and closed in accordance with DER-10, NYSDEC PBS regulations and NYC Fire Department regulations. It is anticipated that the excavation of non-hazardous and hazardous fill/soil will be performed by an excavation contractor using appropriately trained personnel (24 or 40 hr HAZWOPER).

Over excavated areas will be backfilled using clean native soil excavated from other areas of the Site or imported material meeting the UUSCOs, RRSCOs, or PGWSCOs. An excavation plan showing the excavation depths to achieve the Track 2 remedy is provided in Figure 10. Dewatering will be required for excavation of contaminated areas**.** A preliminary dewatering plan is provided in Appendix H.

5.1 Soil Cleanup Objectives

The applicable SCOs for this Site are the Track 2 RRSCOs and PGWSCOs, as applicable. In the event the Track 2 RRSCOs cannot be achieved, contingency plans are in place for Track 4 Site Specific SCOs. Soil and materials management on-Site and off-Site will be conducted in accordance with the Soil/Materials Management Plan as described below. UST closures will, at a minimum, conform to criteria defined in DER-10.

5.2 Groundwater Treatment

The remedy includes dewatering and excavation below the impacted soil zone. Extracted groundwater will be treated and discharged under permit to the NYC combined sewer system. To meet NYCDEP permit requirements, groundwater samples will be collected quarterly from the

discharge end of the treatment system to ensure that discharge limitations are being met and a logbook of the groundwater discharge flow meter will be maintained for each day of discharge. The logbook will include at a minimum: the date, time, flow meter reading, difference from previous day's reading, and employee's signature or initials. The logbook will be available to NYCDEP personnel for review upon request.

The dewatering system design will generally consist of the following elements:

- One (1) 5,000-gallon settling tank with transfer pump and duplex 2-bag filter skids which will then discharge to a DEP permitted discharge location;
- Two (2) elevator pit excavation locations will be supported with SOE sheet piles to provide horizontal transmissivity cut off;
- Approximately 21 sump well locations are proposed, two will be located within the two elevator pit excavations (4 sump well points total) and 17 sump well points will be installed in an even distribution across the remainder of the Site.

5.3 Remedial Performance Evaluation (Post Excavation End-Point Sampling)

Post-excavation endpoint samples will be collected at the proposed locations shown in Figure 9 to verify that remedial goals have been achieved. Additional post-excavation soil samples will be collected around any USTs and/or other hotspots encountered on the Site.

5.3.1 End-Point Sampling Frequency

Based on the sampling frequency outlined in Section 5.4 of DER-10, endpoint sampling for the general remedial excavation will include one bottom soil sample for every 900 square feet across the Site and endpoint sampling to be completed at development depths with one bottom soil sample for every 900 square feet across the Site with one sidewall sample for every 30 linear feet of exposed excavation perimeter. As the total area of the Site footprint is approximately 37,553-square feet, 43 endpoint samples at 15 feet below grade are proposed to assess the performance with respect to attainment of Track 2 Restricted Residential Use SCOs . All Site boundaries will utilize wooden lagging as a means of support of excavation therefore no sidewall samples are

anticipated to be collected. The total number of bottom endpoint samples in this RAWP is estimated and the total samples collected in the field will rely on field conditions. However, if necessary, sidewall samples would be obtained around any petroleum storage tank encountered and for every 15 linear feet of trench for any associated piping. General excavation endpoint samples will be analyzed and compared to Track 2 Restricted Residential Use SCOs.

Figure 9 shows the proposed endpoint sample locations for remedial excavation to achieve Track 2 RRSCOs. Table 8 provides a summary of endpoint sampling rationale.

5.3.2 Methodology

The endpoint samples will be collected using disposable dedicated spoons to prevent cross contamination and placed directly into presterilized laboratory-issued containers. The sample containers will be properly labeled and immediately placed on ice within a cooler. Sample time, date, and location will be recorded on a chain of custody.

The samples will be submitted to an ELAP-certified laboratory for analysis of VOCs by EPA Method 8260, SVOCs by EPA Method 8270, PCBs by EPA Method 8082, pesticides by EPA Method 8081, TAL metals by EPA Method 6000/7000 series, 1,4-dioxane by EPA Method 8270, and the 40 compound PFAS list by EPA Method 1633. In accordance with NYSDEC requirements, QA/QC sampling will be performed; the laboratory will follow the NYSDEC Analytical Services Protocol (ASP) dated 1995; and Category B deliverables and EQuIS™ EDDs will be issued. Further details regarding the specific sampling methodology and analytical procedures are presented in the QAPP, included as Appendix D.

5.3.3 Reporting of Results

The analytical results of the endpoint samples will be tabulated and compared to the UUSCOs. The tabulated data, as well as the laboratory reports, will be included in the FER. All analytical data will be submitted to the NYSDEC database in EDD format via EquIS™.

5.3.4 QA/QC

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision, and completeness requirements will be addressed by the laboratory for all data. Collected samples will be appropriately packaged, placed in coolers, and either shipped or delivered directly to the analytical laboratory via a courier. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved to maintain a temperature of 4°C. Decontamination of non-dedicated sampling equipment will consist of the following: gently tap or scrape to remove adhered soil/fill; rinse with tap water; scrub/wash with tap water/Alconox® detergent solution and bristle brush; and rinse with tap water.

One trip blank, one field blank, one blind duplicate sample, and one matrix spike/matrix spike duplicate (MS/MSD) will be collected per every 20 samples and submitted for laboratory analysis with the accompanying field samples. The field blank(s), blind duplicate(s), and MS/MSD(s) will be analyzed for the same parameters as the field sample(s); the trip blank(s) will be analyzed for VOCs only. Additional QA/QC information is provided in the QAPP, included as Appendix D.

5.3.5 DUSR and EDDs

Sampling associated with the Site will be conducted in accordance with the QAPP included as Appendix D which details field screening and sampling methodologies, sample submittal to the laboratory, and reporting requirements. The QAPP includes the project team responsible for implementing the remediation requirements and provisions set forth in this RAWP. All samples will be reported with Category B deliverables and Environmental Quality Information System (EQuIS)™ electronic data deliverables (EDDs), with the exception of disposal (waste characterization) sampling.

Verification and/or performance monitoring samples collected under this RAWP will be reviewed and evaluated in accordance with the Guidance for the Development of Data Usability Summary Reports as presented in Appendix 2B of DER-10. A third-party data validator will review the laboratory reports and prepare DUSRs. The validated data will be submitted to the

NYSDEC database in EDD format via EquIS™. DUSRs and validated data will be included in the FER.

5.3.6 Reporting of End-Point Data in FER

Chemical labs used for all end-point sample results and contingency sampling will be NYSDOH ELAP certified.

End point sampling, including bottom and side-wall sampling, will be performed in accordance with DER-10 sample frequency requirements. All Site boundaries will utilize wooden lagging as a means of support of excavation therefore no sidewall samples are anticipated to be collected. Bottom samples will be collected at a rate of one for every 900 square feet from the base of the remedial excavation. The FER will provide a tabular and map summary of all end-point sample results and exceedances of SCOs.

5.4 Estimated Material Removal Quantities

The estimated quantity of soil/fill to be removed from the Site is 20,865 cubic yards.

- 3,000 cubic yards of haz lead disposal is anticipated;
- 17,865 cubic yards of non-hazardous contaminated soil/fill is anticipated;

The estimated quantity of soil to be imported into the Site for backfill and truck pad is 1,000-1,500 cubic yards. No soil/fill is anticipated to be reused/relocated at the Site.

5.5 Soil/Materials Management Plan

The estimated quantity of soil/fill to be removed from the Site during the RA is approximately 20,865 cubic yards for remedial excavation of the entire Site to a depth of approximately 15 feet below grade. The estimated quantity of construction and demolition (C&D) debris to be removed from the Site is unknown at this time. Final quantities of materials removed will be reported in the FER.

The estimated quantity of stone to be imported to the Site is approximately 1,500 cubic yards for use below the foundation slab. The reuse and relocation of soils on Site is not anticipated.

5.5.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional or experienced field geologist under the direction of the Remedial Engineer during all remedial and development excavations into known or potentially contaminated material. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. This information will be provided on maps in the FER.

Screening will be performed by qualified environmental professionals. Resumes will be provided for all personnel responsible for field screening (e.g., those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work.

5.5.2 Stockpile Methods

In order to implement BMP, stockpiling during remedial activities will be minimized and live-loading will be conducted as much as possible.

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 NYSDEC. At a minimum, a storm event should be considered a rainfall of three inches or greater in 12 hours. Judgement should be used to evaluate water infiltration, nearby waterbodies where runoff is likely, and engineering controls that may be affected.

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. The tarps will be reused until the QEP/RE determines they need to be replaced.

Soil stockpiles will be continuously encircled with silt fences. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Water will be available on-site at suitable supply and pressure for use in dust control, when necessary. To reduce the suspension of dust, vehicle speeds within the Site will be limited with the spraying of water in vulnerable areas prior to performance of work in which suspension of dust is likely to occur.

5.5.3 Materials Excavation and Load Out

The Remedial Engineer or a qualified environmental professional under his supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The Volunteer and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no risk or impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on 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).

Vehicles leaving the Site will not be overloaded. The Remedial Engineer's representative will make reasonable efforts to ensure that vehicles are not loaded beyond their NYSDOT weight rating and that all material is secured beneath the truck bed cover.

A truck wash will be operated on-Site. The Remedial Engineer will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the remedial construction is complete.

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

The Remedial Engineer will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site -derived materials.

The Volunteer and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that may be affected by excavations (such as building foundations and bridge footings).

The Remedial Engineer will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in this Remedial Action Work Plan.

Each hotspot and structure to be remediated (i.e.: USTs, vaults and associated piping, transformers, etc.) will be removed and end-point remedial performance sampling completed before excavations related to Site development commence proximal to the hotspot or structure.

Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan.

Mechanical processing of historical fill and contaminated soil on-Site is prohibited.

All primary contaminant sources, including but not limited to hotspots, identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. The survey information will be shown on maps to be reported in the FER.

5.5.4 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.

Truck transport routes are as follows:

- The trucks will exit the site from 601-607 Union Street, turning left onto Third Avenue;
- The trucks turn right onto Gowanus Expressway/Route 278;
- The trucks continue straight onto the Verrazzano Bridge towards New Jersey

All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes.

Proposed in-bound and out-bound truck routes to the Site are shown in Figure 12. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off- Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

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

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

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

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

All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-Site in an appropriate manner.

5.5.5 Materials Disposal Off-Site

Following completion of the waste characterization sampling, properly permitted waste disposal facilities will be selected for off-site disposal. The proposed disposal facilities' information, including their location, will be reported to the NYSDEC project manager prior to commencing the disposal activities.

All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC's Project Manager. Unregulated off-Site management of materials from this Site is prohibited without formal NYSDEC approval.

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Volunteer to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the FER.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360.2. The Remedial Engineer is responsible for assuring material is properly characterized and determining the appropriate disposal methods based on the characterization results.

Historical fill and contaminated soils from the Site are prohibited from being disposed at Part 360.15 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the NYSDEC Division of Materials Management (DMM) to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC DMM. This material is prohibited from being sent or redirected to a Part 360-15 Registration Facility. In this case, as dictated by

DMM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.

The FER will include an accounting of the destination of all material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. This information will also be presented in a tabular form in the FER.

Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the FER.

Hazardous wastes derived from on-Site will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations.

Appropriately licensed haulers will be used for material removed from this Site and will be in full compliance with all applicable local, State and Federal regulations.

Waste characterization sampling will be performed exclusively for the purposes of off-Site soil disposal in a manner suitable to receiving facilities and in conformance with applicable federal, state and local laws rules and regulations and facility-specific permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC associated with waste characterization activities will be reported in the FER. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt. Waste characterization data will be used solely for complying with requirements for off-site disposal. Waste Characterization sampling cannot be utilized for:

- Delineating the extent of contamination required for remediation at a Site.
- Replacing or substituting data collected as part of Site Characterization and/or Remedial Investigation.

- Replacing or substituting confirmation or documentation sampling as described in NYSDEC DER-10, Section 5.4.
- To modify remedial decisions as formalized in a NYSDEC approved Decision Document or Record of Decision.

5.5.6 Materials Reuse On-Site

Although the reuse of material on-site is not anticipated, chemical criteria for on-Site reuse of material must be approved by NYSDEC. These criteria are listed in Table 1. The Remedial Engineer will ensure that procedures defined for materials reuse in this RAWP are followed and that unacceptable material will not remain on-Site. Material proposed for reuse would be segregated for testing until determined acceptable for redistribution.

A "Request to Import/Reuse Fill Material" form will be filed with the NYSDEC project manager for review and approval prior to material reuse on the site. A copy of the form is presented in Appendix G. Acceptable demolition material proposed for reuse on-Site, if any, will be sampled for asbestos.

Concrete crushing or processing on-Site is prohibited, unless NYSDEC has specifically approved on-site processing and reuse of acceptable demolition material.

Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site is prohibited for reuse on-Site.

Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines. This will be expressed in the Site Management Plan (SMP).

5.5.7 Fluids Management

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations.

Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP.

Dewatered fluids will not be recharged back to the land surface or subsurface of the Site. Dewatering fluids will be managed off-Site.

Discharge of water generated during remedial construction to surface waters (i.e. a local pond, stream, river and/or storm sewer) is prohibited without a SPDES permit.

5.5.8 Demarcation

After the completion of soil removal and any other invasive remedial activities and prior to backfilling, a land survey will be performed by a New York State licensed surveyor. The survey will define the top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference. This demarcation layer will constitute the top of the 'Residuals Management Zone', the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the SMP. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the 'Residuals Management Zone' in the SMP. A map showing the survey results will be included in the FER and the SMP.

5.5.9 Backfill from Off-Site Sources

All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this RAWP prior to receipt at the Site.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site. Solid waste will not be imported onto the Site.

The FER will include the following certification by the Remedial Engineer: "I certify that all import of soils from off-Site, including source evaluation, approval and sampling, has been

performed in a manner that is consistent with the methodology defined in the Remedial Action Work Plan".

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. These NYSDEC approved backfill or cover soil quality objectives are the lower of the protection of groundwater or the protection of public health soil cleanup objectives for restricted residential as set forth in Table 375-6.8(b) of 6 NYCRR Part 375 and listed in Table 1. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved RAWP or its approval by NYSDEC should be construed as an approval for this purpose.

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. Nothing in this RAWP should be construed as an approval for this purpose.

A "Request to Import/Reuse Fill Material" form will be filed with the NYSDEC project manager for review and approval prior to import to the site. A copy of the form is presented in Appendix G.

5.5.10 Stormwater Pollution Prevention

The erosion and sediment controls employed at the Site will be in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. The measures will be installed prior to conducting any ground-intrusive work. These measures will be installed according to all applicable or relevant and appropriate federal, state, and local laws.

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

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. All undercutting or erosion of the silt fence toe anchor shall be repaired immediately

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

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

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

A Stormwater Pollution Prevention Plan that conforms to the requirements of NYSDEC Division of Water guidelines and NYS regulations will be submitted to the NYSDEC and NYSDOH prior to remediation/construction.

5.5.11 Contingency Plan

If underground tanks or other previously unidentified contaminant sources are found during on-Site remedial excavation or development related construction, sampling will be performed on product, sediment and surrounding soils, etc. in accordance with DER-10. Chemical analytical work will be for full scan parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides, PCBs and PFAS). Analyses will not be otherwise limited without NYSDEC approval.

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC's Project Manager. These findings will be also included in daily and periodic electronic media reports.

5.5.11.1 Extreme Storm Preparedness and Response Contingency Plan

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme

storm event, the Volunteer will undertake the following steps for site preparedness prior to the event and response after the event.

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from excavated areas, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified, including, as necessary: clean and reposition silt fences, hay bales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

Storm Response

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to NYSDEC at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911.

Petroleum spills will be reported to NYSDEC within 2 hours of identification and consistent with State regulations. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed.

Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately

managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Stormwater control systems and structures will be inspected and maintained as necessary.

If soil or fill materials are discharged off site to adjacent properties, property owners and NYSDEC will be notified, and corrective measure plan designed to remove and clean dislocated material will be submitted to NYSDEC and implemented following approval by NYSDEC and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of NYSDEC.

If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYSDEC's spill hotline at (800) 457-7362 within statutory defined timelines. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYSDEC.

Storm Response Reporting

A site inspection report will be submitted to NYSDEC at the completion of site inspection. An inspection report will be used for this purpose. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. The site inspection report will be sent to the NYSDEC project manager and will include the site name, address, tax block and lot, site primary and alternate contact name and phone number.

Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and notice of plan for repair; report of whether soil from the site was dislocated and whether any of the soil left the site; estimates of the volume of soil that left the site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of onsite or offsite exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYSDEC; description of corrective actions; schedule for corrective actions.

This report should be completed and submitted to NYSDEC project manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

5.5.12 Community Air Monitoring Plan

A Site-specific CAMP has been prepared for the Site and is included in Appendix C. Community and roving air monitoring at the perimeter of the exclusion zone will be conducted during all intrusive Site activities in accordance with the NYSDOH Generic and Site-specific CAMPs.

All readings will be recorded and available for NYSDEC and NYSDOH project manager review. Any exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH project managers and will be included in the daily and monthly progress reports, and in the FER. Response actions for any exceedances will also be included in each report.

A map showing the location of fixed and mobile sampling stations will be shown on daily reports, and exceedances observed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers and included in the Daily Report.

5.5.13 Odor, Dust and Nuisance Control Plan

The FER will include the following certification by the Remedial Engineer: "I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the Remedial Action Work Plan."

5.5.13.1 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 the use of a PID to screen for VOCs and olfactory observations by a field technician. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of

work, will be the responsibility of the Volunteer's Remedial Engineer, who is responsible for certifying the FER.

All necessary means will be employed to prevent on- and off-Site nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils; [add other elements as appropriate]. 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.

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

5.5.13.2 Dust Control Plan

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

- Water will be available on-site at suitable supply and pressure for use in dust control. Dust suppression will be achieved through spraying water directly onto off-road areas including excavation 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 spraying.

5.5.13.3 Other Nuisances

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work. A plan will be developed and utilized by the contractor for all remedial work and will conform, at a minimum, to NYCDEP noise control standards.

6.0 RESIDUAL CONTAMINATION TO REMAIN ON-SITE

The intent of this project is to achieve a Track 2 Restricted Residential Use Cleanup. All soil/fill above RRSCOs will be removed to a depth of 15 feet below grade across the Site. Although some contamination may remain in groundwater and soil vapor, the majority of the contaminant mass will be removed as part of the remedy. As a result, concentrations of contaminants in groundwater and soil vapor are expected to decrease over time.

Since residual contaminated soil will exist beneath the Site after the remedy is complete, Institutional Controls (ICs) are required to protect human health and the environment. These ICs are described hereafter. Long-term management ICs and of residual contamination will be executed under a Site-specific Site Management Plan (SMP) that will be developed and included in the FER.

If the Site cannot achieve a Track 2 cleanup, the Site will achieve a Track 4 Restricted Residential cleanup and the composite cover system (i.e., concrete building slab) will act as long term EC. Figure 13 provides the layout and detail composite cover system to be installed if required.

The FER will report residual contamination on the Site in tabular and map form. This will include presentation of exceedances of both Track 1 and Track 2 SCOs.

7.0 INSTITUTIONAL CONTROLS

After the remedy is complete, the Site will have residual contamination remaining in place. Because contamination exceeding UUSCOs will remain in place, Institutional Controls (ICs) will be required as part of the remedial action. A Site Management Plan (SMP) will be implemented for long term management of ICs. Two elements have been designed to ensure continual and proper management of residual contamination in perpetuity: an Environmental Easement and a Site Management Plan (SMP).

All as-built drawings, diagrams, calculation and manufacturer documentation for treatment systems will be presented in the FER. A Site -specific Environmental Easement will be recorded with the NYC Office of the City Register to provide an enforceable means of ensuring the continual and proper management of residual contamination and protection of public health and the environment in perpetuity or until released in writing by NYSDEC. It requires that the grantor of the Environmental Easement and the grantor's successors and assigns adhere to all Engineering and Institutional Controls (ECs/ICs) placed on this Site by this NYSDEC-approved remedy. ICs provide restrictions on Site usage and mandate operation, maintenance, monitoring and reporting measures for all ECs and ICs. The SMP describes appropriate methods and procedures to ensure compliance with all ECs and ICs that are required by the Environmental Easement. Once the SMP has been approved by the NYSDEC, compliance with the SMP is required by the grantor of the Environmental Easement and grantor's successors and assigns.

7.1 Environmental Easement

An Environmental Easement, as defined in Article 71 Title 36 of the Environmental Conservation Law, is required when residual contamination is left on-Site after the Remedial Action is complete. As part of this remedy, an Environmental Easement approved by NYSDEC will be filed and recorded with the NYC Office of the City Register. The Environmental Easement will be submitted as part of the Final Engineering Report.

The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with NYC Office of the City Register before the Certificate of

Completion can be issued by NYSDEC. A series of Institutional Controls are required under this remedy to implement, maintain and monitor these Engineering Control systems, prevent future exposure to residual contamination by controlling disturbances of the subsurface soil and restricting the use of the Site to Restricted Residential use(s) only. These Institutional Controls are requirements or restrictions placed on the Site that are listed in, and required by, the Environmental Easement. Institutional Controls can, generally, be subdivided between controls that support Engineering Controls, and those that place general restrictions on Site usage or other requirements. Institutional Controls in both of these groups are closely integrated with the SMP, which provides all of the methods and procedures to be followed to comply with this remedy.

The Institutional Controls that support Engineering Controls, if a Track 4 remedy is achieved, are:

- Compliance with the Environmental Easement by the Grantee and the Grantee's successors and adherence of all elements of the SMP is required;
- All Engineering Controls must be operated and maintained as specified in this SMP;
- A site cover system consisting of concrete building slabs must be inspected, certified and maintained as required in the SMP;
- All Engineering Controls on the Controlled Property must be inspected and certified at a frequency and in a manner defined in the SMP;
- Data and information pertinent to Site Management for the Controlled Property must be reported at the frequency and in a manner defined in the SMP;
- Engineering Controls may not be discontinued without an amendment or extinguishment of the Environmental Easement;
- The Site may be used for restricted residential, commercial, and industrial uses only, subject to local zoning;
- The cannot be used for a higher level of use without an amendment or termination of EE by the NYSDEC.

7.2 Site Management Plan

Site Management is the last phase of remediation and begins with the approval of the FER and issuance of the Certificate of Completion (COC) for the Remedial Action. The SMP is submitted as part of the FER but will be written in a manner that allows its removal and use as a complete and independent document. Site Management continues in perpetuity or until released in writing by NYSDEC. The property owner is responsible to ensure that all Site Management responsibilities defined in the Environmental Easement and the SMP are performed.

The SMP should include methods to incorporate and track GSR. Measures should be taken to maintain a cost-effective, protective remedy that remains conscientious of the Site's environmental footprint. At a minimum, the following should be assessed: waste generation, energy usage, emissions, and water usage.

The SMP is intended to provide a detailed description of the procedures required to manage residual contamination left in place at the Site following completion of the Remedial Action in accordance with the BCA with the NYSDEC. This includes: (1) development, implementation, and management of all Engineering and Institutional Controls; (2) development and implementation of monitoring systems and a Monitoring Plan; (3) development of a plan to operate and maintain any treatment, collection, containment, or recovery systems (including, where appropriate, preparation of an Operation and Maintenance Manual); (4) submittal of Site Management Reports, performance of inspections and certification of results, and demonstration of proper communication of Site information to NYSDEC; and (5) defining criteria for termination of treatment system operation.

To address these needs, this SMP will include four plans: (1) an Engineering and Institutional Control Plan for implementation and management of EC/ICs; (2) a Monitoring Plan for implementation of Site Monitoring; (3) Excavation Work Plan; and (4) a Site Management Reporting Plan for submittal of data, information, recommendations, and certifications to NYSDEC. The SMP will be prepared in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation and the guidelines provided by NYSDEC.

Site management activities, reporting, and EC/IC certification will be scheduled on a certification period basis. The certification period will be annually. The SMP will be based on the certifying period relative to the date of issuance of the COC. The first submission will be due16 months after the issuance of the COC, and annually (or at another frequency as approved by NYSDEC) thereafter.

The SMP in the FER will include a monitoring plan for groundwater at the down-gradient Site perimeter to evaluate Site-wide performance of the remedy. Appropriately placed groundwater monitor wells will also be installed immediately down-gradient of all source remediation areas for the purpose of evaluation of the effectiveness of the remedy that is implemented.

No exclusions for handling of residual contaminated soils will be provided in the SMP. All handling of residual contaminated material will be subject to provisions contained in the SMP.

8.0 FINAL ENGINEERING REPORT

A Final Engineering Report (FER) will be submitted to NYSDEC following implementation of the Remedial Action defined in this RAWP. The FER provides the documentation that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The FER will provide a comprehensive account of the locations and characteristics of all material removed from the Site including the surveyed map(s) of all sources. The Final Engineering Report will include as-built drawings for all constructed elements, calculation and manufacturer documentation for treatment systems, certifications, manifests, bills of lading as well as the complete SMP. The FER will provide a description of the changes in the Remedial Action from the elements provided in the RAWP and associated design documents. The FER will provide a tabular summary of all performance evaluation sampling results and all material characterization results and other sampling, and chemical analysis performed as part of the Remedial Action. The FER will provide test results demonstrating that all mitigation and remedial systems are functioning properly. The FER will be prepared in conformance with DER-10.

Where determined to be necessary by NYSDEC, a Financial Assurance Plan will be required to ensure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the Site Management Plan and Environmental Easement. This determination will be made by NYSDEC in the context of the FER review.

The FER will include written and photographic documentation of all remedial work performed under this remedy.

The FER will include an itemized tabular description of actual costs incurred during all aspects of the Remedial Action.

The FER will provide a thorough summary of all residual contamination left on the Site after the remedy is complete. Residual contamination includes all contamination that exceeds the Track 1 Unrestricted Use SCO in 6NYCRR Part 375-6. A table that shows exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action and a map that

shows the location and summarizes exceedances from Track 1 Unrestricted SCOs for all soil/fill remaining at the Site after the Remedial Action will be included in the FER.

The FER will provide a thorough summary of all residual contamination that exceeds the SCOs defined for the Site in the RAWP and must provide an explanation for why the material was not removed as part of the Remedial Action. A table that shows residual contamination in excess of Site SCOs and a map that shows residual contamination in excess of Site SCOs will be included in the FER.

The FER will include an accounting of the destination of all material removed from the Site, including excavated contaminated soil, historic fill, solid waste, hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. It will provide an accounting of the origin and chemical quality of all material imported onto the Site.

The FER must include a discussion of the green remediation practices/technologies employed throughout the remedial program. A final footprint analysis using a DER accepted model, and any tracking methods used through the construction including restoration activities. Before approval of a FER and issuance of a COC, all project reports must be submitted in digital form on electronic media (PDF).

8.1 Certifications

The following certification will appear in front of the Executive Summary of the Final Engineering Report. The FER will be prepared, stamped and the following certification signed by an individual licensed or otherwise authorized in accordance with article 145 of the education law to practice the profession of engineering. The certification will include the following statements:

I, _____, am currently a registered professional engineer licensed by the State of New York, I had primary direct responsibility for implementation of the remedial program activities, and I certify that the Remedial Action Work Plan was implemented and that all construction activities were completed in substantial conformance with the Department-approved Remedial Action Work Plan.

I certify that all use restrictions, Institutional Controls, Engineering Controls, and/or any operation and maintenance requirements applicable to the Site are contained in an environmental easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

I certify that a Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by Department.

I certify that any financial assurance mechanisms required by the Department pursuant to Environmental Conservation Law have been executed.

I certify that all data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department.

I certify that all information and statements in this certification are true. I understand that a false statement made herein is punishable as Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as Owner's Designated Site Representative for the site.

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

9.0 SCHEDULE

The remedial action will begin with mobilization of equipment and material to the Site which will begin immediately after the RAWP approval. The remedy, which will be implemented in accordance with this RAWP, is anticipated to take approximately 9 months to complete. It is expected that the COC will be achieved in 2027. The estimated schedule for remedial activities is provided in Table 9.

TABLES

Table 1
Soil Cleanup Objectives
601-607 Union Street (C224392)

COMPOUNDS	UUSCOs	RRSCOs
VOCs	ppm	ppm
1,1,1-Trichloroethane	0.68	100
1,1,2,2-Tetrachloroethane	~	~
1,1,2-Trichloroethane	~	~
1,1-Dichloroethane	0.27	26
1,1-Dichloroethene	0.33	100
1,2,3-Trichlorobenzene	~	~
1,2,4-Trichlorobenzene	~	~
1,2-Dibromo-3-chloropropane	~	~
1,2-Dibromoethane	~	~
1,2-Dichlorobenzene	1.1	100
1,2-Dichloroethane	0.02	3.1
1,2-Dichloropropane	~	~
1,3-Dichlorobenzene	2.4	49
1,4-Dichlorobenzene	1.8	13
1,4-Dioxane	0.1	13
2-Butanone	0.12	100
2-Hexanone	~	~
4-Methyl-2-pentanone	~	~
Acetone	0.05	100
Benzene	0.06	4.8
Bromochloromethane	~	~
Bromodichloromethane	~	~
Bromoform	~	~
Bromomethane	~	~
Carbon disulfide	~	~
Carbon tetrachloride	0.76	2.4
Chlorobenzene	1.1	100
Chloroethane	~	~
Chloroform	0.37	49
Chloromethane	~	~
cis-1,2-Dichloroethene	0.25	100
cis-1,3-Dichloropropene	~	~
Cyclohexane	~	~
Dibromochloromethane	~	~
Dichlorodifluoromethane	~	~
Ethylbenzene	1	41
Freon-113	~	~
Isopropylbenzene	~	~
Methyl Acetate	~	~
Methyl cyclohexane	~	~
Methyl tert butyl ether	0.93	100
Methylene chloride	0.05	100
o-Xylene	~	~
p/m-Xylene	~	~
Styrene	~	~
Tetrachloroethene	1.3	19
Toluene	0.7	100
trans-1,2-Dichloroethene	0.19	100
trans-1,3-Dichloropropene	~	~
Trichloroethene	0.47	21
Trichlorofluoromethane	~	~
Vinyl chloride	0.02	0.9

COMPOUNDS	UUSCOs	RRSCOs	PGWSCOs
SVOCs	ppm	ppm	ppm
1,2,4,5-Tetrachlorobenzene	~	~	N/A
1,4-Dioxane	0.1	13	N/A
2,3,4,6-Tetrachlorophenol	~	~	N/A
2,4,5-Trichlorophenol	~	~	N/A
2,4,6-Trichlorophenol	~	~	N/A
2,4-Dichlorophenol	~	~	N/A
2,4-Dimethylphenol	~	~	N/A
2,4-Dinitrophenol	~	~	N/A
2,4-Dinitrotoluene	~	~	N/A
2,6-Dinitrotoluene	~	~	N/A
2-Chloronaphthalene	~	~	N/A
2-Chlorophenol	~	~	N/A
2-Methylnaphthalene	~	~	N/A
2-Methylphenol	0.33	100	N/A
2-Nitroaniline	~	~	N/A
2-Nitrophenol	~	~	N/A
3,3'-Dichlorobenzidine	~	~	N/A
3-Methylphenol/4-Methylphenol	0.33	100	N/A
3-Nitroaniline	~	~	N/A
4,6-Dinitro-o-cresol	~	~	N/A
4-Bromophenyl phenyl ether	~	~	N/A
4-Chloroaniline	~	~	N/A
4-Chlorophenyl phenyl ether	~	~	N/A
4-Nitroaniline	~	~	N/A
4-Nitrophenol	~	~	N/A
Acenaphthene	20	100	N/A
Acenaphthylene	100	100	N/A
Acetophenone	~	~	N/A
Anthracene	100	100	N/A
Atrazine	~	~	N/A
Benzaldehyde	~	~	N/A
Benzo(a)anthracene	1	1	1
Benzo(a)pyrene	1	1	22
Benzo(b)fluoranthene	1	1	1.7
Benzo(ghi)perylene	100	100	N/A
Benzo(k)fluoranthene	0.8	3.9	1.7
Biphenyl	~	~	N/A
Bis(2-chloroethoxy)methane	~	~	N/A
Bis(2-chloroethyl)ether	~	~	N/A
Bis(2-chloroisopropyl)ether	~	~	N/A
Bis(2-ethylhexyl)phthalate	~	~	N/A
Butyl benzyl phthalate	~	~	N/A
Caprolactam	~	~	N/A
Carbazole	~	~	N/A
Chrysene	1	3.9	1
Di-n-butylphthalate	~	~	N/A
Di-n-octylphthalate	~	~	N/A
Dibenzo(a,h)anthracene	0.33	0.33	N/A
Dibenzofuran	7	59	N/A
Diethyl phthalate	~	~	N/A
Dimethyl phthalate	~	~	N/A
Fluoranthene	100	100	N/A
Fluorene	30	100	N/A
Hexachlorobenzene	0.33	1.2	N/A
Hexachlorobutadiene	~	~	N/A
Hexachlorocyclopentadiene	~	~	N/A
Hexachloroethane	~	~	N/A
Indeno(1,2,3-cd)pyrene	0.5	0.5	N/A
Isophorone	~	~	N/A
n-Nitrosodi-n-propylamine	~	~	N/A
Naphthalene	12	100	N/A
NDPA/DPA	~	~	N/A
Nitrobenzene	~	~	N/A
p-Chloro-m-cresol	~	~	N/A
Pentachlorophenol	0.8	6.7	N/A
Phenanthrene	100	100	N/A
Phenol	0.33	100	N/A
Pyrene	100	100	N/A

COMPOUNDS	UUSCOs	RRSCOs
Herbicides	ppm	ppm
2,4,5-T	~	~
2,4,5-TP (Silvex)	3.8	100
2,4-D	~	~
Pesticides	ppm	ppm
4,4'-DDD	0.0033	13
4,4'-DDE	0.0033	8.9
4,4'-DDT	0.0033	7.9
Aldrin	0.005	0.097
Alpha-BHC	0.02	0.48
Beta-BHC	0.036	0.36
Chlordane	~	~
cis-Chlordane	0.094	4.2
Delta-BHC	0.04	100
Dieldrin	0.005	0.2
Endosulfan I	2.4	24
Endosulfan II	2.4	24
Endosulfan sulfate	2.4	24
Endrin	0.014	11
Endrin aldehyde	~	~
Endrin ketone	~	~
Heptachlor	0.042	2.1
Heptachlor epoxide	~	~
Lindane	0.1	1.3
Methoxychlor	~	~
Toxaphene	~	~
trans-Chlordane	~	~
Total Metals	ppm	ppm
Aluminum	~	~
Antimony	~	~
Arsenic	13	16
Barium	350	400
Beryllium	7.2	72
Cadmium	2.5	4.3
Calcium	~	~
Chromium	~	~
Cobalt	~	~
Copper	50	270
Iron	~	~
Lead	63	400
Magnesium	~	~
Manganese	1600	2000
Mercury	0.18	0.81
Nickel	30	310
Potassium	~	~
Selenium	3.9	180
Silver	2	180
Sodium	~	~
Thallium	~	~
Vanadium	~	~
Zinc	109	10000
TCLP Metals	-	-
Lead	~	~
Mercury	~	~
PFAS	ppm	ppm
PFOS	0.00088	0.044
PFOA	0.00066	0.033

Notes:

1. The Site intends to achieve Track 2 Restricted Residential Cleanup.

2. Any backfill at a minimum will need to meet the lower of applicable PGWSCOs or Restrictred Residential SCOs

Table 2
Exceedances of Track 1 and Track 2 SCOs in Soil/Fill
601-607 Union Street (C224392)

LOCATION	NY-UNRES	NY-RESRR	25SB-1 (0-2)		25SB-1 (9-11)		25SB-1 (12-13)		25SB-2 (0-2)		25SB-2 (12-13)		25SB-3 (0-2)		25SB-3 (12-13)		25SB-4 (0-2)		25SB-4 (7-9)		25SB-4 (12-13)	
SAMPLING DATE			7/2/2025		7/2/2025		7/2/2025		7/2/2025		7/2/2025		7/2/2025		7/2/2025		7/2/2025		7/2/2025		7/2/2025	
LAB SAMPLE ID			L2541710-01		L2541710-02		L2541710-03		L2541710-04		L2541710-05		L2541710-06		L2541710-07		L2541710-08		L2541710-09		L2541710-10	
SAMPLE TYPE			SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
COMPOUNDS			Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
VOCs	ppm	ppm	ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
2-Butanone	0.12	100	0.014	U	0.013	J	0.016	U	0.012		0.013	U	0.01	J	0.03		0.014	U	0.012	U	0.0042	J
Acetone	0.05	100	0.014	U	0.068		0.016	U	0.043		0.025		0.064		0.13		0.014	U	0.012	U	0.024	
SVOCs			ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
2-Methylphenol	0.33	100	0.18	U	0.19	U	0.21	U	1.7	U	0.2	U	0.24	U	0.19	U	1.9	U	0.19	U	0.21	U
3-Methylphenol/4-Methylphenol	0.33	100	0.029	J	0.085	J	0.66		2.4	U	0.1	J	0.052	J	0.13	J	2.8	U	0.28	U	0.62	
Acenaphthene	20	100	0.35		0.65		0.25		2.8		0.028	J	0.12	J	0.8		2.1		0.72		0.26	
Benzo(a)anthracene	1	1	1.6		0.36		0.52		9.8		0.15		0.92		2.2		17		1.1		2	
Benzo(a)pyrene	1	1	1.5		0.31		0.44		12		0.14	J	0.87		1.9		16		0.93		1.6	
Benzo(b)fluoranthene	1	1	1.6		0.34		0.56		14		0.18		1.1		2.4		18		1.1		1.9	
Benzo(k)fluoranthene	0.8	3.9	0.56		0.12		0.18		4.1		0.067	J	0.39		0.88		5.6		0.42		0.65	
Chrysene	1	3.9	1.6		0.36		0.51		9.5		0.14		0.94		2.2		16		1.1		2.1	
Dibenzo(a,h)anthracene	0.33	0.33	0.21		0.042	J	0.068	J	1.4		0.027	J	0.08	J	0.18		2		0.097	J	0.18	
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.87		0.17		0.29		9.2		0.19		0.4		0.9		7.9		0.44		0.65	
Naphthalene	12	100	0.32		5.7		1.1		2.5		0.053	J	0.45		1.9		2.2		2.2		0.32	
Phenol	0.33	100	0.18	U	0.19	U	0.033	J	1.7	U	0.2	U	0.24	U	0.047	J	1.9	U	0.19	U	0.08	J
Total Metals			ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
Arsenic, Total	13	16	3.47		4.65		14.3		7.92		3.15		5.22		3.56		6.75		7.24		11.8	
Barium, Total	350	400	63.9		93.5		128		114		50.4		73.3		65.6		92.3		148		647	
Cadmium, Total	2.5	4.3	0.079	J	0.063	J	0.989	U	0.222	J	0.931	U	0.394	J	0.878	U	0.95	U	0.889	U	0.991	U
Copper, Total	50	270	61.9		17.4		90.2		43.3		25.4		32.7		22.1		37.3		58.9		89.4	
Lead, Total	63	400	428		156		766		513		122		228		140		563		2570		10000	
Mercury, Total	0.18	0.81	0.324		5.12		9.05		0.905		0.126		1.37		0.69		2.56		3.29		6.82	
Nickel, Total	30	310	7.47		15.4		21.7		10.5		6.86		5.06		10.7		10.6		18.6		14.9	
Selenium, Total	3.9	180	0.568	J	0.702	J	0.505	J	0.594	J	1.86	U	0.599	J	1.76	U	0.826	J	1.03	J	1.12	J
Zinc, Total	109	10000	84.8		153		446		163		68		112		53.7		95.4		151		266	
Pesticides			ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
4,4'-DDD	0.0033	13	0.0017	U	0.00182	U	0.00202	U	0.0016	U	0.00935	U	0.00222	U	0.00183	U	0.00189	U	0.0018	U	0.00984	U

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J - Concentration is estimated
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NY-UNRES: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

Table 2
Exceedances of Track 1 and Track 2 SCOs in Soil/Fill
601-607 Union Street (C224392)

LOCATION	NY-UNRES	NY-RESRR	25SB-5 (0-2)		25SB-5 (11-12)		25SB-6 (0-2)		25SB-6 (7-9)		25SB-6 (11-12)		25SB-7 (0-2)		25SB-7 (12-13)	
SAMPLING DATE			7/2/2025		7/2/2025		7/2/2025		7/2/2025		7/2/2025		7/8/2025		7/8/2025	
LAB SAMPLE ID			L2541710-11		L2541710-12		L2541710-13		L2541710-14		L2541710-15		L2542557-01		L2542557-02	
SAMPLE TYPE			SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
COMPOUNDS			Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
VOCs	ppm	ppm	ppm		ppm		ppm		ppm		ppm		ppm		ppm	
2-Butanone	0.12	100	0.021	U	0.0025	J	0.049		0.012		0.28	J	0.011	U	0.018	J
Acetone	0.05	100	0.021	U	0.013		0.14		0.059		0.27	J	0.011	U	0.092	
SVOCs			ppm		ppm		ppm		ppm		ppm		ppm		ppm	
2-Methylphenol	0.33	100	0.22	U	0.19	U	0.2	U	0.9	U	0.19	U	0.18	U	0.48	J
3-Methylphenol/4-Methylphenol	0.33	100	0.09	J	0.21	J	0.18	J	1.3	U	0.27	U	0.27	U	1.3	J
Acenaphthene	20	100	0.18		1		0.31		1.5		16	J	0.27		7.4	
Benzo(a)anthracene	1	1	1		0.69		1.7		3		6.3		1.2		20	
Benzo(a)pyrene	1	1	1		0.61		1.5		2.6		5.5		1		17	
Benzo(b)fluoranthene	1	1	1.2		0.8		1.4		3.1		7		1.3		22	
Benzo(k)fluoranthene	0.8	3.9	0.37		0.21		0.4		0.97		2		0.33		5.1	
Chrysene	1	3.9	1.1		0.72		1.7		3		6.1		1.1		20	
Dibenzo(a,h)anthracene	0.33	0.33	0.13		0.092	J	0.28		0.39	J	0.93		0.14		2.4	
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.62		0.36		1		1.4		3.2		0.6		9.2	
Naphthalene	12	100	0.22		1.9		2.3		2.2		3.2		0.29		8.2	
Phenol	0.33	100	0.22	U	0.043	J	0.2	U	0.9	U	0.19	U	0.18	U	0.53	J
Total Metals			ppm		ppm		ppm		ppm		ppm		ppm		ppm	
Arsenic, Total	13	16	4.78		1.88		7.6		5.46		18.4		5.38		27.8	
Barium, Total	350	400	42.3		44.2		128		70		219		107		418	
Cadmium, Total	2.5	4.3	0.122	J	0.934	U	0.413	J	0.089	J	1.3		0.081	J	0.429	J
Copper, Total	50	270	33.7		5.06		64.8		16		181		33.6		60.1	
Lead, Total	63	400	134		273		1360		244		1350		5100		941	
Mercury, Total	0.18	0.81	0.354		3.68		1.68		0.853		6.34		0.634		2.21	
Nickel, Total	30	310	8.57		5.64		10.4		8.5		21.4		7.69		14.6	
Selenium, Total	3.9	180	1.42	J	1.87	U	0.697	J	1.71	U	0.831	J	0.841	J	17.3	
Zinc, Total	109	10000	59.9		145		91.5		87.9		278		48.8		288	
Pesticides			ppm		ppm		ppm		ppm		ppm		ppm		ppm	
4,4'-DDD	0.0033	13	0.00384		0.0018	U	0.00184	U	0.0169	U	0.00183	U	0.00176	U	0.00276	U

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Table 2
Exceedances of Track 1 and Track 2 SCOs in Soil/Fill
601-607 Union Street (C224392)

LOCATION	NY-UNRES	NY-RESRR	25SB-8 (1-3)		25SB-8 (11-12)		25SB-9 (0-2)		25SB-9 (11-12)		25SB-10 (0-2)		25SB-10 (11-12)		25SB-11 (0-2)		25SB-11 (11-12)	
SAMPLING DATE			7/8/2025		7/8/2025		7/1/2025		7/1/2025		7/1/2025		7/1/2025		7/1/2025		7/1/2025	
LAB SAMPLE ID			L2542557-03		L2542557-04		L2541375-10		L2541375-11		L2541375-12		L2541375-13		L2541375-01		L2541375-02	
SAMPLE TYPE			SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
COMPOUNDS			Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
VOCs	ppm	ppm	ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
2-Butanone	0.12	100	0.012	U	0.012	U	0.018	U	0.0058	J	0.011	U	0.019		0.0092	U	0.018	U
Acetone	0.05	100	0.012	U	0.012	U	0.018	U	0.029		0.011	U	0.067		0.0092	U	0.01	J
SVOCs			ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
2-Methylphenol	0.33	100	0.92	U	0.2	U	0.21	U	0.2	U	0.21	U	0.22	U	0.9	U	0.2	U
3-Methylphenol/4-Methylphenol	0.33	100	0.22	J	0.69		2.5		0.29	U	0.3	U	0.15	J	1.3	U	0.29	U
Acenaphthene	20	100	1.7		0.1	J	0.5		0.077	J	0.26		7		0.13	J	0.064	J
Benzo(a)anthracene	1	1	12		0.48		0.95		0.28		2.2		4.6		13		0.44	
Benzo(a)pyrene	1	1	9		0.42		0.72		0.17		2.1		6.6		20		0.55	
Benzo(b)fluoranthene	1	1	11		0.52		0.94		0.18		2.6		5.7		18		0.65	
Benzo(k)fluoranthene	0.8	3.9	4.3		0.16		0.26		0.054	J	0.68		1.2		3.8		0.22	
Chrysene	1	3.9	10		0.43		0.97		0.22		2.2		4.4		12		0.53	
Dibenzo(a,h)anthracene	0.33	0.33	1.4		0.065	J	0.1	J	0.12	U	0.32		0.49		1.8		0.083	J
Indeno(1,2,3-cd)pyrene	0.5	0.5	5.1		0.24		0.36		0.098	J	1.3		3.3		12		0.34	
Naphthalene	12	100	0.81	J	0.21		4		0.2		0.22		31		0.21	J	0.19	J
Phenol	0.33	100	0.92	U	0.057	J	0.14	J	0.2	U	0.21	U	0.22	U	0.9	U	0.2	U
Total Metals			ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
Arsenic, Total	13	16	5.22		30		15.5		2.72		11.6		13.9		7.7		6.25	
Barium, Total	350	400	58.8		252		222		63.4		257		88.4		434		142	
Cadmium, Total	2.5	4.3	0.32	J	0.258	J	0.241	J	0.947	U	3.62		0.332	J	0.428	J	0.092	J
Copper, Total	50	270	31.5		75.8		162		34		93.8		93.9		41		33.9	
Lead, Total	63	400	254		2940		498		97.2		745		3700		1100		498	
Mercury, Total	0.18	0.81	1.49		2.42		0.576		0.919		0.915		7.47		0.968		8.83	
Nickel, Total	30	310	13		28		16.8		35.2		40.3		18		18.3		7.92	
Selenium, Total	3.9	180	0.386	J	1.2	J	5.97		1.89	U	0.979	J	2.78		1.72	U	1.67	J
Zinc, Total	109	10000	109		192		151		80.6		898		242		651		137	
Pesticides			ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
4,4'-DDD	0.0033	13	0.00171	U	0.00186	U	0.00202	U	0.00192	U	0.00195	U	0.00206	U	0.00176	U	0.00187	U

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NY-UNRES: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

Table 2
Exceedances of Track 1 and Track 2 SCOs in Soil/Fill
601-607 Union Street (C224392)

LOCATION	NY-UNRES	NY-RESRR	25SB-12 (0-2)		25SB-12 (11-12)		25SB-13 (0-2)		25SB-13 (11-12)		25SB-14 (0-2)		25SB-14 (7-9)		25SB-14 (11-12)	
SAMPLING DATE			7/1/2025		7/1/2025		7/1/2025		7/1/2025		7/1/2025		7/1/2025		7/1/2025	
LAB SAMPLE ID			L2541375-08		L2541375-09		L2541375-06		L2541375-07		L2541375-03		L2541375-04		L2541375-05	
SAMPLE TYPE			SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
COMPOUNDS			Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
VOCs	ppm	ppm	ppm		ppm		ppm		ppm		ppm		ppm		ppm	
2-Butanone	0.12	100	0.011	U	0.0054	J	0.012	U	0.0099	U	0.01	U	0.0092	U	0.01	U
Acetone	0.05	100	0.011	U	0.024		0.012	U	0.0082	J	0.01	U	0.0092	U	0.01	U
SVOCs			ppm		ppm		ppm		ppm		ppm		ppm		ppm	
2-Methylphenol	0.33	100	0.18	U	0.2	U	0.18	U	0.2	U	0.18	U	0.19	U	0.19	U
3-Methylphenol/4-Methylphenol	0.33	100	0.082	J	0.069	J	0.078	J	0.28	U	0.27	U	0.27	U	0.059	J
Acenaphthene	20	100	0.25		34		0.68		0.37		0.27		0.15	U	0.064	J
Benzo(a)anthracene	1	1	1.3		0.36		4.4		2		1.4		0.055	J	0.46	
Benzo(a)pyrene	1	1	1.1		0.3		3.7		1.7		1.3		0.08	J	0.38	
Benzo(b)fluoranthene	1	1	1.3		0.39		5.1		2.2		1.5		0.081	J	0.49	
Benzo(k)fluoranthene	0.8	3.9	0.45		0.11	J	1.1		0.57		0.55		0.03	J	0.12	
Chrysene	1	3.9	1.2		0.37		4		2		1.4		0.052	J	0.44	
Dibenzo(a,h)anthracene	0.33	0.33	0.17		0.045	J	0.62		0.26		0.18		0.11	U	0.057	J
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.59		0.16		2.3		1		0.77		0.056	J	0.21	
Naphthalene	12	100	0.26		44		0.4		0.49		0.21		0.096	J	0.18	J
Phenol	0.33	100	0.18	U	0.2	U	0.047	J	0.2	U	0.18	U	0.19	U	0.19	U
Total Metals			ppm		ppm		ppm		ppm		ppm		ppm		ppm	
Arsenic, Total	13	16	14.1		5.3		35.2		5.42		6.43		6.23		9.82	
Barium, Total	350	400	152		97.3		136		93.6		1270		46.7		127	
Cadmium, Total	2.5	4.3	0.352	J	0.2	J	0.302	J	0.909	U	0.224	J	0.872	U	0.1	J
Copper, Total	50	270	81.3		49.4		57.4		92.2		10.6		14.3		40.9	
Lead, Total	63	400	636		336		1710		237		375		371		692	
Mercury, Total	0.18	0.81	1.27		0.604		0.562		0.858		0.166		0.535		1.89	
Nickel, Total	30	310	16.8		13.9		19.5		9.26		14.5		15.8		8.25	
Selenium, Total	3.9	180	1	J	0.906	J	0.458	J	0.472	J	1.7	U	0.975	J	8.82	
Zinc, Total	109	10000	226		113		114		50.4		789		161		233	
Pesticides			ppm		ppm		ppm		ppm		ppm		ppm		ppm	
4,4'-DDD	0.0033	13	0.00169	U	0.00186	U	0.00173	U	0.00189	U	0.00173	U	0.00175	U	0.0013	J

U - Not detected at the reported detection limit for the sample.
J - Concentration is estimated
NY-RESRR: New York NYCRR Part 375 Restricted-Residential Criteria, New York Restricted use Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.
NY-UNRES: New York NYCRR Part 375 New York Unrestricted use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.

Table 2
Exceedances of Track 1 and Track 2 SCOs in Soil/Fill
601-607 Union Street (C224392)

Sample ID	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	EPA Toxicity Characteristic (TCLP) Regulatory Levels	25SB-4 (0-2)		25SB-4X (6-7)		25SB-4 (7-9)		25SB-4X (9-10)		25SB-4 (12-13)		25SB-4X (13-15)		25SB-4X (15-17)		25SB-4X (19-21)		25SB-4X (21-23)		25SB-4X (23-25)		25SB-4X (25-27)	
Sampling Date				7/2/2025		8/21/25		7/2/2025		8/21/25		7/2/2025		8/21/25		8/21/25		8/21/25		8/21/25		8/21/25		8/21/25	
Laboratory ID				L2541710-08/L2544818-08		L2552999-30		L2541710-09/L2544818-09		L2552999-32		L2541710-10/L2544818-10		L2552999-33/L2554429-04		L2554429-10		L2555016-01		L2555017-01		L2555018-01		L2555020-01	
Sample Matrix				SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
Compound				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Total Metals	ppm	ppm	~	ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
Lead, Total	63	400	~	563		1140		2570		435		10000		410		666		751		342		193	J	326	
Mercury, Total	0.18	0.81	~	2.56		-	-	3.29		-	-	6.82		1.09		-	-	-	-	-	-	ND		-	-
TCLP Metals	~	~	mg/l	mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l	
Lead, TCLP	~	~	5	2.63		38.6		7.04		12		2.1		1.4		2.81		3.22		0.187	J	0.499	J	3.36	
Mercury, TCLP	~	~	0.2	-	-	-	-	-	-	-	-	ND		-	-	-	-	-	-	-	-	ND		-	-

Sample ID	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	EPA Toxicity Characteristic (TCLP) Regulatory Levels	25SB-5 (0-2)		25SB-5 (11-12)		25SB-5X (12-14)		25SB-5X (14-16)		25SB-5X (16-18)		25SB-5X (18-20)	
Sampling Date				7/2/2025		7/2/2025		8/21/25		8/21/25		8/21/25		8/21/25	
Laboratory ID				L2541710-11/L2544818-11		L2541710-12/L2544818-12		L2552999-42/L2554429-05		L2554429-11		L2555022-01		L2555023-01	
Sample Matrix				SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
Compound				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Total Metals	ppm	ppm	~	ppm		ppm		ppm		ppm		ppm		ppm	
Lead, Total	63	400	~	134		273		179		389		78.1		398	
Mercury, Total	0.18	0.81	~	0.354		3.68		1.1		-	-	-	-	-	-
TCLP Metals	~	~	mg/l	mg/l		mg/l		mg/l		mg/l		mg/l		mg/l	
Lead, TCLP	~	~	5	2.04		3.9		0.622		2.85		2.42		0.392	J
Mercury, TCLP	~	~	0.2	-	-	-	-	-	-	-	-	-	-	-	-

Sample ID	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	EPA Toxicity Characteristic (TCLP) Regulatory Levels	25SB-6 (0-2)		25SB-6X (6-7)		25SB-6 (7-9)		25SB-6X (9-10)		25SB-6 (11-12)		25SB-6X (12-14)		25SB-6X (14-16)		25SB-6X (16-18)		25SB-6X (18-20)		25SB-6X (22-24)	
Sampling Date				7/2/2025		8/21/25		7/2/2025		8/21/25		7/2/2025		8/21/25		8/21/25		8/21/25		8/21/25		8/21/25	
Laboratory ID				L2541710-13/L2544818-13		L2552999-17		L2541710-14/L2544818-14		L2552999-19		L2541710-15/L2544818-15		L2552999-21/L2554429-03		L2554429-09		L2554986-01		L2554992-01		L2555003-01	
Sample Matrix				SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
Compound				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Total Metals	ppm	ppm	~	ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
Lead, Total	63	400	~	1360		128		244		1330		1350		745		404		424		411		815	
Mercury, Total	0.18	0.81	~	1.68		-	-	0.853		-	-	6.34		0.32		-	-	-	-	-	-	-	-
TCLP Metals	~	~	mg/l	mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l	
Lead, TCLP	~	~	5	1.8		2.05		5.47		3.24		0.165	J	14.2		2.06		2.9		2.95		2.4	
Mercury, TCLP	~	~	0.2	-	-	-	-	-	-	-	-	ND		-	-	-	-	-	-	-	-	-	-

Sample ID	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	EPA Toxicity Characteristic (TCLP) Regulatory Levels	25SB-9 (0-2)		25SB-9X (2-4)		25SB-9X (4-6)		25SB-9X (6-8)		25SB-9 (11-12)		25SB-9X (12-14)		25SB-9X (18-20)		25SB-9X (24-26)	
Sampling Date				7/1/2025		8/21/25		8/21/25		8/21/25		7/1/25		8/21/25		8/21/25		8/21/25	
Laboratory ID				L2541375-10/L2544872-10		L2552999-51		L2554429-12		L2555032-01		L2541375-11		L2552999-56/L2554429-06		L2554429-13		L2555935-01	
Sample Matrix				SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
Compound				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Total Metals	ppm	ppm	~	ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
Lead, Total	63	400	~	498		211		892		318		97.2		425		346		1050	
Mercury, Total	0.18	0.81	~	0.576		-	-	-	-	-	-	0.919		0.665		-	-	-	-
TCLP Metals	~	~	mg/l	mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l	
Lead, TCLP	~	~	5	11.7		16		0.143	J	0.124	J	-	-	0.822		1.36		0.279	
Mercury, TCLP	~	~	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sample ID	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	EPA Toxicity Characteristic (TCLP) Regulatory Levels	25SB-10 (0-2)		25SB-10X (7-8)		25SB-10 (11-12)		25SB-10X (12-14)		25SB-10X (14-16)		25SB-10X (16-18)		25SB-10X (18-20)		25SB-10X (24-26)		25SB-10X (26-28)	
Sampling Date				7/1/2025		8/21/25		7/1/2025		8/21/25		8/21/25		8/21/25		8/21/25		8/21/25		8/21/25	
Laboratory ID				L2541375-12/L2544872-11		L2552999-07		L2541375-13/L2544872-12		L2552999-08/L2554429-02		L2554429-08		L2554952-01		L2554961-01		L2554983-01		L2555834-01	
Sample Matrix				SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
Compound				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Total Metals	ppm	ppm	~	ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm		ppm	
Lead, Total	63	400	~	745		516		3700		982		761		481		143		157		102	
Mercury, Total	0.18	0.81	~	0.915		-	-	7.47		-	-	-	-	-	-	-	-	-	-	-	-
TCLP Metals	~	~	mg/l	mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l	
Lead, TCLP	~	~	5	0.336	J	41.2		0.0698	J	26.3		2.63		3.19		2.66		0.746		1.8	
Mercury, TCLP	~	~	0.2	-	-	-	-	ND		-	-	-	-	-	-	-	-	-	-	-	-

Sample ID	NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives	NYSDEC Part 375 Restricted Use Soil Cleanup Objectives-Residential	EPA Toxicity Characteristic (TCLP) Regulatory Levels	25SB-11 (0-2)		25SB-11X (7-8)		25SB-11 (11-12)		25SB-11X (12-14)		25SB-11X (14-16)		25SB-11X (16-18)		25SB-11X (18-20)	
Sampling Date				7/1/2025		8/21/25		7/1/2025		8/21/25		8/21/25		8/21/25		8/21/25	
Laboratory ID				L2541375-01/L2544872-01		L2552999-01		L2541375-02/L2544872-02		L2552999-02/L2554429-01		L2554429-07		L2554920-01		L2554938-01	
Sample Matrix				SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
Compound				Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
Total Metals	ppm	ppm	~	ppm		ppm		ppm		ppm		ppm		ppm		ppm	
Lead, Total	63	400	~	1100		549		498		508		952		498		76.8	
Mercury, Total	0.18	0.81	~	0.968				8.83		-	-	-	-	-	-	-	-
TCLP Metals	~	~	mg/l	mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l	
Lead, TCLP	~	~	5	1.68		11		99.1		2.1		2.9		0.609		0.303	J
Mercury, TCLP	~	~	0.2	-	-	-	-	ND		-	-	-	-	-	-	-	-

Table 3
Exceedances of Groundwater GA Standards
601-607 Union Street (C224392)

LOCATION	NY-AWQS	Units	25MW-1		25MW-2		25MW-3		25MW-4		25MW-5		25MW-6		25MW-7		25MW-8		25B8DW		25B10D		25FB-1	
SAMPLING DATE			7/14/2025		7/14/2025		7/15/2025		7/16/2025		7/14/2025		7/15/2025		7/15/2025		7/16/2025		7/16/2025		7/16/2025		7/14/2025	
LAB SAMPLE ID			L2543949-01		L2543949-02		L2544316-03		L2544658-01		L2543949-03		L2544316-01		L2544316-02		L2544658-02		L2544658-03		L2544658-04		L2543949-04	
SAMPLE TYPE			WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER		WATER	
			Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
1,4 Dioxane by 8270E-SIM																								
1,4-Dioxane	0.35	ug/l	0.144	U	0.381		0.144	U	-	-	0.139	U	0.144	U	0.15	U	0.37		0.139	U	0.134	U	0.139	U
Perfluorinated Alkyl Acids by EPA 1633																								
Perfluorooctanesulfonic Acid (PFOS)	0.0027	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00967		0.0036		0.00254		-	-
Perfluorooctanoic Acid (PFOA)	0.0067	ug/l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0361		0.0386		0.0573		-	-
Perfluorinated Alkyl Acids by Isotope Dilution																								
Perfluorooctanesulfonic Acid (PFOS)	0.0027	ug/l	0.005	U	0.005	U	0.005	U	-	-	0.0292		0.0013	JF	0.00474		-	-	-	-	-	-	0.00173	U
Perfluorooctanoic Acid (PFOA)	0.0067	ug/l	0.032		0.107		0.0364		-	-	0.0236		0.0484		0.0114		-	-	-	-	-	-	0.00173	U
Semivolatile Organics by GC/MS																								
Phenol	1	ug/l	5	U	5	U	5	U	1.5	J	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Semivolatile Organics by GC/MS-SIM																								
Benzo(a)anthracene	0.002	ug/l	0.04	J	0.05	J	0.1	U	0.9		0.23		0.1	U	0.03	J	0.55		0.1	U	0.1	U	0.04	J
Benzo(a)pyrene	0	ug/l	0.1	U	0.1	U	0.1	U	0.93		0.25		0.1	U	0.1	U	0.43	J	0.1	U	0.1	U	0.1	U
Benzo(b)fluoranthene	0.002	ug/l	0.1	U	0.1	U	0.1	U	1.2		0.32		0.1	U	0.1	U	0.45	J	0.1	U	0.1	U	0.1	U
Benzo(k)fluoranthene	0.002	ug/l	0.1	U	0.1	U	0.1	U	0.32		0.1	J	0.1	U	0.1	U	0.5	U	0.1	U	0.1	U	0.1	U
Chrysene	0.002	ug/l	0.1	U	0.1	U	0.1	U	0.92		0.19		0.1	U	0.1	U	0.22	J	0.1	U	0.1	U	0.1	U
Hexachlorobenzene	0.04	ug/l	0.8	U	0.8	U	0.8	U	0.05	J	0.8	U	0.8	U	0.8	U	4	U	0.8	U	0.8	U	0.8	U
Indeno(1,2,3-cd)pyrene	0.002	ug/l	0.1	U	0.1	U	0.1	U	0.7		0.18		0.1	U	0.1	U	0.31	J	0.05	J	0.1	U	0.1	U
Total Metals																								
Arsenic, Total	25	ug/l	3.1		3.12		2.54		18.54		48.64		1.64		16.86		23.26		9.26		1.3		0.5	U
Barium, Total	1000	ug/l	313.8		711.9		217.8		553.6		1073		316		101.8		351.4		125.7		156.5		0.18	J
Chromium, Total	50	ug/l	0.39	J	0.58	J	0.72	J	17.31		64.72		0.27	J	0.46	J	7.35		10.38		6.86		1	U
Copper, Total	200	ug/l	0.52	J	4.08		2.76		40.01		64.72		0.61	J	1.67		19.61		3.56		6.7		1	U
Iron, Total	300	ug/l	35100		55300		21400		25200		59800		32100		3730		16200		5160		3050		50	U
Lead, Total	25	ug/l	4.46		15.36		26.84		579.9		2707		4.58		9.24		312.6		6.32		4.23		0.37	J
Magnesium, Total	35000	ug/l	49000		29400		16600		46400		37000		40100		10500		14300		62800		69100		70	U
Manganese, Total	300	ug/l	920.5		2667		1253		1488		3698		1148		379.5		678.1		1175		239.5		0.57	J
Mercury, Total	0.7	ug/l	0.2	U	0.2	U	0.13	J	3		9.92		0.2	U	0.2	U	1.1		0.2	U	0.2	U	0.2	U
Nickel, Total	100	ug/l	1.11	J	2.08		0.66	J	22.84		104		0.94	J	2.48		7.11		4.86		6.22		2	U
Selenium, Total	10	ug/l	5	U	5	U	5	U	4.07	J	19.8		5	U	5	U	2.28	J	5	U	5	U	5	U
Sodium, Total	20000	ug/l	188000		543000		117000		540000		392000		324000		22200		369000		198000		234000		200	J
Thallium, Total	0.5	ug/l	1	U	1	U	1	U	0.22	J	0.81	J	1	U	1	U	0.16	J	2	U	2	U	1	U
Volatile Organics by GC/MS																								
Benzene	1	ug/l	0.5	U	0.5	U	0.5	U	0.5	U	0.2	J	0.5	U	0.5	U	1.7		0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	5	ug/l	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	3.7		29		2.5	U
Tetrachloroethene	5	ug/l	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	6.2		22		0.5	U
Trichloroethene	5	ug/l	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	3.8		10		0.5	U

NY-AWQS: New York TOGS 111 Ambient Water Quality Standards & Guidance Values Criteria per Standards & Guidance Values including all addenda through February 2023.
U - Not detected at the reported detection limit for the sample.
J - Concentraiton is estimated

Table 4
VOCs in Soil Vapor and Outdoor Air (2025 RI)
601-607 Union Street (C224392)

SAMPLE ID	25SV-1 (10')		25SV-2 (10')		25DUP-1		25SV-3 (10')		25SV-4 (10')		25SS-1		25AI-1	
SAMPLING DATE	7/8/2025		7/8/2025		7/8/2025		7/8/2025		7/8/2025		7/8/2025		7/8/2025	
LAB SAMPLE ID	L2542672-01		L2542672-02		L2542672-07		L2542672-03		L2542672-04		L2542672-05		L2542672-06	
SAMPLE TYPE	SOIL VAPOR		SOIL VAPOR		SOIL VAPOR		SOIL VAPOR		SOIL VAPOR		SUB-SLAB VAPOR		INDOOR AIR	
REPORTING UNIT	ug/m^3		ug/m^3		ug/m^3		ug/m^3		ug/m^3		ug/m^3		ug/m^3	
VOCs	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
1,1,1-Trichloroethane	23.7	U	**23.4**		**27.7**		1.09	U	**1.26**		**31.1**		0.109	U
1,1,2,2-Tetrachloroethane	29.9	U	2.75	U	1.37	U	1.37	U	1.37	U	1.37	U	1.37	U
1,1,2-Trichloroethane	23.7	U	2.18	U	1.09	U	1.09	U	1.09	U	1.09	U	1.09	U
1,1-Dichloroethane	17.6	U	1.62	U	0.809	U	0.809	U	0.809	U	0.809	U	0.809	U
1,1-Dichloroethene	17.2	U	1.59	U	0.793	U	0.793	U	0.793	U	0.793	U	0.079	U
1,2,4-Trichlorobenzene	32.3	U	2.97	U	1.48	U	1.48	U	1.48	U	1.48	U	1.48	U
1,2,4-Trimethylbenzene	21.4	U	**14.8**		**14.5**		**3.3**		**2.89**		**12.4**		**1.79**	
1,2-Dibromoethane	33.4	U	3.07	U	1.54	U	1.54	U	1.54	U	1.54	U	1.54	U
1,2-Dichlorobenzene	26.2	U	2.4	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
1,2-Dichloroethane	17.6	U	1.62	U	0.809	U	0.809	U	0.809	U	0.809	U	0.809	U
1,2-Dichloropropane	20.1	U	1.85	U	0.924	U	0.924	U	0.924	U	0.924	U	0.924	U
1,3,5-Trimethylbenzene	21.4	U	**4.44**		**4.31**		**1.76**		**1.3**		**3.15**		0.983	U
1,3-Butadiene	9.62	U	**5.49**	J	**7.88**	J	0.442	U	0.442	U	**0.6**		**0.546**	
1,3-Dichlorobenzene	26.2	U	2.4	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
1,4-Dichlorobenzene	26.2	U	2.4	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
1,4-Dioxane	15.7	U	1.44	U	0.721	U	0.721	U	0.721	U	0.721	U	0.721	U
2,2,4-Trimethylpentane	**4500**		1.87	U	**5.51**		0.934	U	0.934	U	0.934	U	**4.1**	
2-Butanone	32.1	U	**15**	J	**24.2**	J	**44.8**		**34.8**		**31.6**		**5.78**	
2-Hexanone	17.8	U	**3.34**	J	**5.33**	J	**9.34**		**9.92**		**6.43**		0.82	U
3-Chloropropene	13.6	U	1.25	U	0.626	U	0.626	U	0.626	U	0.626	U	0.626	U
4-Ethyltoluene	21.4	U	**2.48**		**2.41**		2.64		0.983	U	**2.16**		0.983	U
4-Methyl-2-pentanone	**98.4**		4.1	U	**2.48**		2.05	U	2.05	U	**3.18**		2.05	U
Acetone	51.8	U	**107**	J	**184**	J	**568**		**632**		**161**		**30.2**	
Benzene	13.9	U	**20.3**	J	**7.67**	J	**56.2**		0.639	U	**2.44**		**4.54**	
Benzyl chloride	22.5	U	2.07	U	1.04	U	1.04	U	1.04	U	1.04	U	1.04	U
Bromodichloromethane	29.1	U	2.68	U	1.34	U	1.34	U	1.34	U	1.34	U	1.34	U
Bromoform	45	U	4.14	U	2.07	U	2.07	U	2.07	U	2.07	U	2.07	U
Bromomethane	16.9	U	1.55	U	0.777	U	0.777	U	0.777	U	0.777	U	0.777	U
Carbon disulfide	**23.9**		**386**	J	**9.03**	J	**21**		**0.713**		**2.05**		0.623	U
Carbon tetrachloride	27.4	U	2.52	U	1.26	U	1.26	U	1.26	U	1.26	U	**0.447**	
Chlorobenzene	20	U	1.84	U	0.921	U	0.921	U	0.921	U	0.921	U	0.921	U
Chloroethane	11.5	U	1.06	U	0.528	U	0.528	U	0.528	U	0.528	U	0.528	U
Chloroform	21.2	U	1.95	U	**2.12**		0.977	U	**2.65**		**1.15**		0.977	U
Chloromethane	8.98	U	0.826	U	**0.832**		**0.458**		0.413	U	0.413	U	**1.43**	
cis-1,2-Dichloroethene	17.2	U	1.59	U	0.793	U	0.793	U	0.793	U	0.793	U	0.079	U
cis-1,3-Dichloropropene	19.7	U	1.82	U	0.908	U	0.908	U	0.908	U	0.908	U	0.908	U
Cyclohexane	**164**		**3.2**	J	**5.89**	J	**8.85**		0.688	U	**1.41**		**1.13**	
Dibromochloromethane	37.1	U	3.41	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
Dichlorodifluoromethane	21.5	U	**2.22**		**2.11**		**1.05**		**2.39**		**2.17**		**2.32**	
Ethanol	205	U	18.8	U	**13.5**		**21.1**		**23.7**		**10.4**		**37.3**	
Ethyl Acetate	39.3	U	3.6	U	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U
Ethylbenzene	18.9	U	**6.17**		**5.95**		**21.6**		**1.91**		**4.43**		**1.68**	
Freon-113	33.3	U	3.07	U	1.53	U	1.53	U	1.53	U	1.53	U	1.53	U
Freon-114	30.4	U	2.8	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
Heptane	**23.4**		**9.67**		**10.5**		**14.1**		**3.11**		**16.3**		**1.72**	
Hexachlorobutadiene	46.4	U	4.27	U	2.13	U	2.13	U	2.13	U	2.13	U	2.13	U
Isopropanol	53.6	U	**5.48**	J	**25.8**	J	**7.2**		**7.4**		**17**		**5.8**	
Methyl tert butyl ether	15.7	U	1.44	U	0.721	U	0.721	U	0.721	U	0.721	U	0.721	U
Methylene chloride	37.9	U	3.47	U	1.74	U	1.74	U	1.74	U	1.74	U	1.74	U
n-Hexane	**161**		**11.5**		**12.5**		**25.5**		**1.39**		**32.3**		**3.91**	
Naphthalene	21.7	U	**3.68**		**4.01**		0.996	U	0.996	U	**4.21**		**1.64**	
o-Xylene	**22.5**		**9.56**		**8.9**		**13.9**		**5.21**		**8.38**		**2.23**	
p/m-Xylene	**50.8**		**19.6**		**20.8**		**26.1**		**9.21**		**17.5**		**5.39**	
Styrene	18.5	U	1.7	U	**1.36**		0.852	U	0.852	U	**1.03**		0.852	U
Tertiary butyl Alcohol	**40.3**		**78.5**	J	**147**	J	**272**		**330**	J	**47.9**		1.52	U
Tetrachloroethene	29.5	U	**46.8**	J	**14.2**	J	1.36	U	**7.8**		**27.7**		**0.746**	
Tetrahydrofuran	32.1	U	2.95	U	1.47	U	1.47	U	1.47	U	**1.7**		1.47	U
Toluene	**24.3**		**23.4**		**20.2**		**37**		**1.68**		**10.9**		**19.7**	
trans-1,2-Dichloroethene	17.2	U	1.59	U	0.793	U	0.793	U	0.793	U	0.793	U	0.793	U
trans-1,3-Dichloropropene	19.7	U	1.82	U	0.908	U	0.908	U	0.908	U	0.908	U	0.908	U
Trichloroethene	23.4	U	2.15	U	1.07	U	1.07	U	1.07	U	1.07	U	**0.193**	
Trichlorofluoromethane	24.4	U	2.25	U	**1.48**		1.12	U	**1.88**		**1.48**		**1.2**	
Vinyl bromide	19	U	1.75	U	0.874	U	0.874	U	0.874	U	0.874	U	0.874	U
Vinyl chloride	11.1	U	1.02	U	0.511	U	0.511	U	0.511	U	0.511	U	0.051	U
VOCs by SIM	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual	Results	Qual
1,1,1-Trichloroethane	-	-	-	-	-	-	-	-	-	-	-	-	0.109	U
1,1-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-	-	0.079	U
Carbon tetrachloride	-	-	-	-	-	-	-	-	-	-	-	-	0.447	
cis-1,2-Dichloroethene	-	-	-	-	-	-	-	-	-	-	-	-	0.079	U
Tetrachloroethene	-	-	-	-	-	-	-	-	-	-	-	-	0.746	
Trichloroethene	-	-	-	-	-	-	-	-	-	-	-	-	0.193	
Vinyl chloride	-	-	-	-	-	-	-	-	-	-	-	-	0.051	U

Notes:
1. 25DUP-1 was collected from 25SV-2

Table 5
601-607 Union Street (C224392)
Remedial Cost Estimate for Alternative 1
Track 1 Unrestricted Use Cleanup

Task No.	Description	Estimated Quantity	Unit	Unit Cost	Estimated Cost
Site Preparation/Contractor Fees					
1	Mobilization/Demobilization, Fence, Security, Site Maintenance	LS			$500,000
2	Demolition and Abatement	LS			$750,000
3	Decontamination Area	LS			$10,000
4	Permitting	LS			$35,000
5	In-situ Waste Characterization	LS			$150,000
6	Soil Excavation	41,725	CY	$30	$1,251,750
7	Off-site Soil Disposal (Non-Hazardous)	58,088	Ton	$85	$4,937,480
8	Off-site Soil Disposal (Hazardous)	4,500	Ton	$350	$1,575,000
9	Well Abandonment	LS			$10,000
10	Storage Tank Removal	LS			$15,000
11	Support of Excavation (SOE)	LS			$3,500,000
12	Dewatering/Treatment System Installation	LS			$250,000
13	Operation and Maintenance of Dewatering/Treatment System	12	Month	$20,000	$240,000
14	DEP Discharge Fees	LS (Est. 12 months)			$950,000
15	Dust, Odor, Vapor Control	12	Month	$10,000	$120,000
16	Import of Clean Fill	20,000	CY	$35	$700,000
17	Surveying	LS			$15,000
Engineering and Consulting Fees					
18	Project Management, Reporting (Daily Reports, Monthly Reports)	12	Month	$10,000	$120,000
19	Endpoint Sampling	90	Sample	$1,500	$135,000
20	Excavation Oversight and CAMP	12	Month	$30,000	$360,000
21	SOE Design and Special SOE Inspections	LS			$150,000
22	Final Engineering Report	LS			$25,000
				Subtotal	$15,799,230
				20% Contingency	$3,159,846
				Estimated Total	**$18,959,076**

Table 6
601-607 Union Street (C224392)
Remedial Cost Estimate for Alternative 2
Track 2 Restricted Residential Cleanup

Task No.	Description	Estimated Quantity	Unit	Unit Cost	Estimated Cost
Site Preparation/Contractor Fees					
1	Mobilization/Demobilization, Fence, Security, Site Maintenance	LS			$500,000
2	Demolition and Abatement	LS			$750,000
3	Decontamination Area	LS			$10,000
4	Permitting	LS			$35,000
5	In-situ Waste Characterization	LS			$80,000
6	Soil Excavation	20,865	CY	$30	$625,950
7	Off-site Soil Disposal (Non-Hazardous)	26,798	Ton	$85	$2,277,830
8	Off-site Soil Disposal (Hazardous)	4,500	Ton	$350	$1,575,000
9	Well Abandonment	LS			$10,000
10	Storage Tank Removal	LS			$15,000
11	Support of Excavation (SOE)	LS			$2,000,000
12	Dewatering/Treatment System Installation	LS			$100,000
13	Operation and Maintenance of Dewatering/Treatment System	5	Month	$20,000	$100,000
14	DEP Discharge Fees	LS (Est. 5 months)			$600,000
15	Dust, Odor, Vapor Control	9	Month	$10,000	$90,000
16	Import of Clean Fill	1,000	CY	$35	$35,000
17	Surveying	LS			$15,000
Engineering and Consulting Fees					
18	Project Management, Reporting (Daily Reports, Monthly Reports)	9	Month	$10,000	$90,000
19	Endpoint Sampling	45	Sample	$1,500	$67,500
20	Excavation Oversight and CAMP	9	Month	$30,000	$270,000
21	SOE Design and Special SOE Inspections	LS			$100,000
22	Final Engineering Report, Environmental Easement, Site Management Plan	LS			$55,000
				Subtotal	$9,401,280
				20% Contingency	$1,880,256
				Estimated Total	**$11,281,536**

Table 7
Remedial Schedule
601-607 Union Street (C224392)

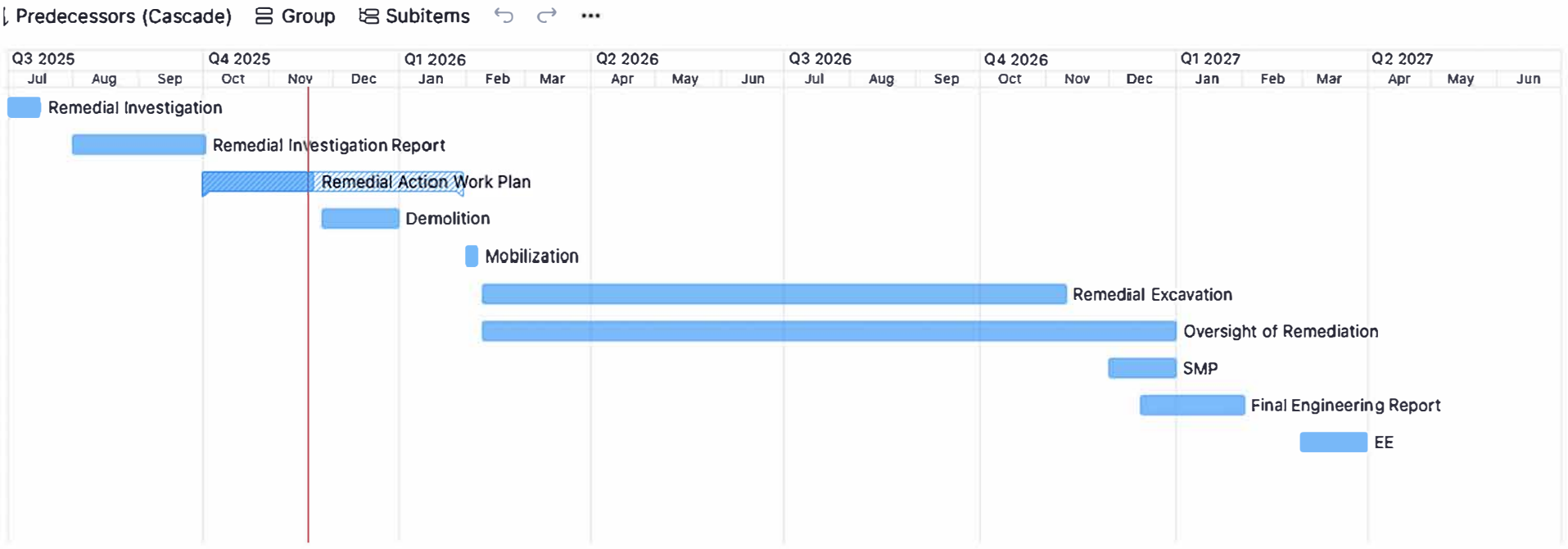


Table 8
Endpoint Sampling Rationale and Summary
601-607 Union Street (C224392)

Sample Matrix	Sample ID	Sample Interval (feet below surface grade)	Rationale	Estimated Number of Samples	Analysis
SOIL	EP-1	Collect at 15 feet below grade and el. 4.5	To assess if Track 2 SCOs are achieved at the bottom of excavation or Track 4, contingency at 15 feet	1	Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Pesticides, Total Analyte List (TAL) Metals, Cyanide total, per- and poly-fluoroalkyl substances (PFAS), and 1,4-dioxane
	EP-2	Collect at 15 feet below grade and el. 4.5		1	
	EP-3	Collect at 15 feet below grade and el. 4.5		1	
	EP-4	Collect at 15 feet below grade and el. 4.5		1	
	EP-5	Collect at 15 feet below grade and el. 4.5		1	
	EP-6	Collect at 15 feet below grade and el. 4.5		1	
	EP-7	Collect at 15 feet below grade and el. 4.5		1	
	EP-8	Collect at 15 feet below grade and el. 4.5		1	
	EP-9	Collect at 15 feet below grade and el. 4.5		1	
	EP-10	Collect at 15 feet below grade and el. 4.5		1	
	EP-11	Collect at 15 feet below grade and el. 4.5		1	
	EP-12	Collect at 15 feet below grade and el. 4.5		1	
	EP-13	Collect at 15 feet below grade and el. 4.5		1	
	EP-14	Collect at 15 feet below grade and el. 4.5		1	
	EP-15	Collect at 15 feet below grade and el. 4.5		1	
	EP-16	Collect at 15 feet below grade and el. 81.5		1	
	EP-17	Collect at 15 feet below grade and el. 81.5		1	
	EP-18	Collect at 15 feet below grade and el. 81.5		1	
	EP-19	Collect at 15 feet below grade and el. 81.5		1	
	EP-20	Collect at 15 feet below grade and el. 81.5		1	
	EP-21	Collect at 15 feet below grade and el. 81.5		1	
	EP-22	Collect at 15 feet below grade and el. 81.5		1	
	EP-23	Collect at 15 feet below grade and el. 81.5		1	
	EP-24	Collect at 15 feet below grade and el. 81.5		1	

* Additional soil samples may be collected based on field conditions (i.e: post excavation lab results, elevated PID readings, odor, sheen, etc.)

Table 8
Endpoint Sampling Rationale and Summary
601-607 Union Street (C224392)

Sample Matrix	Sample ID	Sample Interval (feet below surface grade)	Rationale	Estimated Number of Samples	Analysis	Sample Matrix
SOIL	EP-25	Collect at 15 feet below grade and el. 4.5	To assess if Track 2 SCOs are achieved at the bottom of excavation or Track 4, contingency at 15 feet	1	Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Pesticides, Total Analyte List (TAL) Metals, Cyanide total, per- and poly-fluoroalkyl substances (PFAS), and 1,4-dioxane	SOIL
	EP-26	Collect at 15 feet below grade and el. 4.5		1		
	EP-27	Collect at 15 feet below grade and el. 4.5		1		
	EP-28	Collect at 15 feet below grade and el. 4.5		1		
	EP-29	Collect at 15 feet below grade and el. 4.5		1		
	EP-30	Collect at 15 feet below grade and el. 4.5		1		
	EP-31	Collect at 15 feet below grade and el. 4.5		1		
	EP-32	Collect at 15 feet below grade and el. 4.5		1		
	EP-33	Collect at 15 feet below grade and el. 4.5		1		
	EP-34	Collect at 15 feet below grade and el. 4.5		1		
	EP-35	Collect at 15 feet below grade and el. 4.5		1		
	EP-36	Collect at 15 feet below grade and el. 4.5		1		
	EP-37	Collect at 15 feet below grade and el. 4.5		1		
	EP-38	Collect at 15 feet below grade and el. 4.5		1		
	EP-39	Collect at 15 feet below grade and el. 4.5		1		
	EP-40	Collect at 15 feet below grade and el. 4.5		1		
	EP-41	Collect at 15 feet below grade and el. 4.5		1		
	EP-42	Collect at 15 feet below grade and el. 4.5		1		
	EP-43	Collect at 15 feet below grade and el. 4.5		1		
	SB-DUP-1(Depth)	Blind Duplicate: One per 20 soil samples	QA/QC	1		
	SB-DUP-2(Depth)	Blind Duplicate: One per 20 soil samples	QA/QC	1		
	SB-DUP-3Depth)	Blind Duplicate: One per 20 soil samples	QA/QC	1		
	SB-MS/MSD-1 (Depth)	One per 20 soil samples	QA/QC	1		
	SB-MS/MSD-2 (Depth)	One per 20 soil samples	QA/QC	1		

* Additional soil samples may be collected based on field conditions (i.e: post excavation lab results, elevated PID readings, odor, sheen, etc.)

Table 8
Endpoint Sampling Rationale and Summary
601-607 Union Street (C224392)

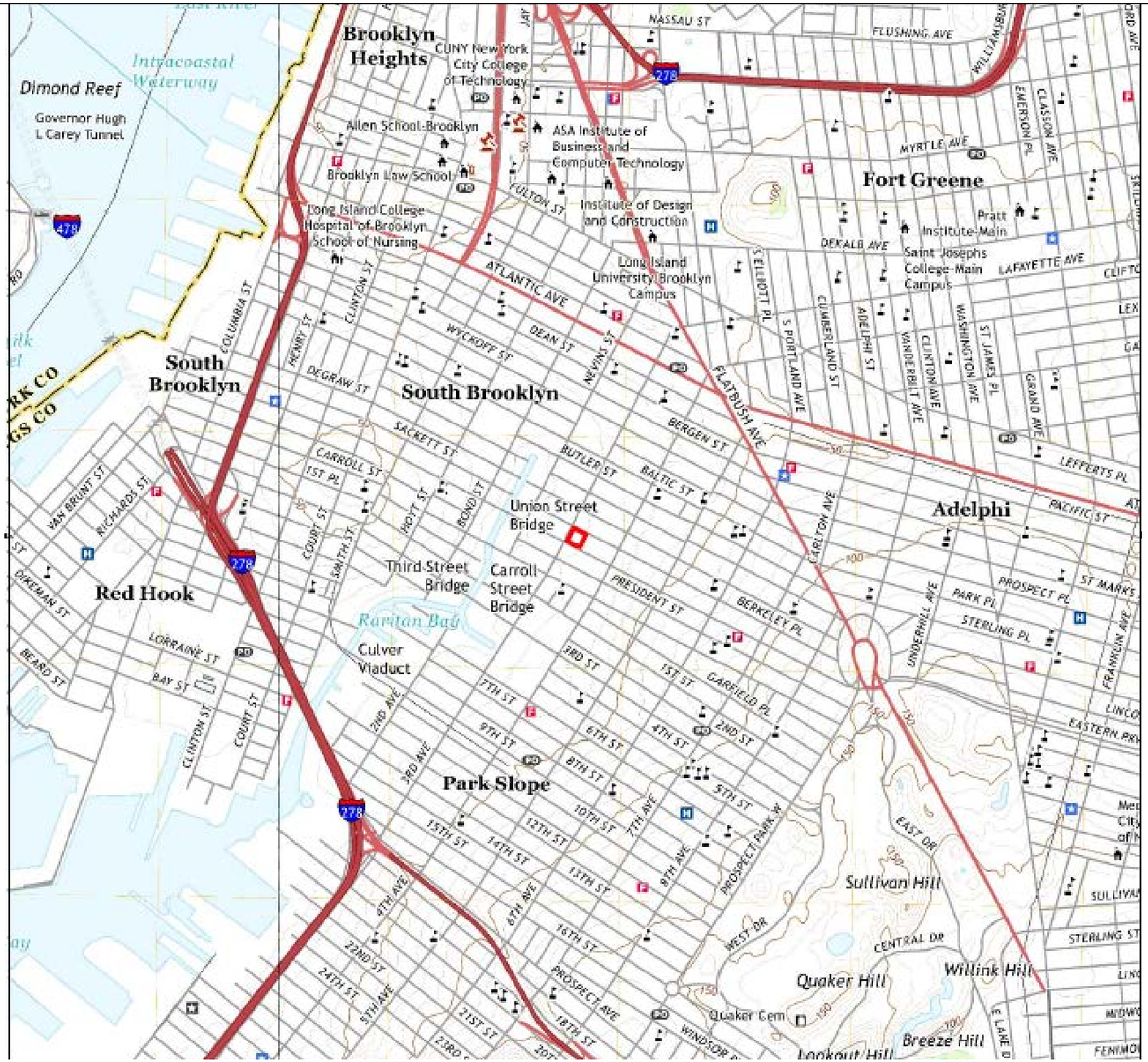
Sample Matrix	Sample ID	Sample Interval (feet below surface grade)	Rationale	Estimated Number of Samples	Analysis
SOIL	SB-MS/MSD-3 (Depth)	One per 20 soil samples	QA/QC	1	Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Pesticides, Total Analyte List (TAL) Metals, Cyanide total, per- and poly-fluoroalkyl substances (PFAS), and 1,4-dioxane
	FB-1	Field Blank per 20 samples	QA/QC	1	
	FB-2	Field Blank per 20 samples	QA/QC	1	
	FB-3	Field Blank per 20 samples	QA/QC	1	
Water	TB-1	Trip Blank: 1 per cooler per day (Lab-prepared)	QA/QC	15	TCL VOCs

Totals

Sample #s	Rationale	Total
EP-1 through EP-43	Assess Track 2 at Remedial Depth	43
Field Duplicate	QA/QC	3
MS/MSD		6
Field Blank		3
Trip Blank		15
Total Samples		70

* Additional soil samples may be collected based on field conditions (i.e: post excavation lab results, elevated PID readings, odor, sheen, etc.)

FIGURES



vEKtor consultants

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www.vektorconsultants.com

Legend:

BCP SITE LOCATION

Notes:

1. BASE MAP PROVIDED BY GOOGLE MAPS

Scale:

0 miles 0.5

Figure No.	1
Figure Name:	SITE LOCATION MAP
Report:	RAWP
Date:	8/14/2025
Drawn By:	KB
Site Address:	601-607 UNION STREET BROOKLYN, NY (C224392)



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Legend:

- ONE AND TWO FAMILY BUILDINGS
- MULTI-FAMILY WALK-UP BUILDINGS
- MULTI-FAMILY ELEVATOR BUILDINGS
- MIXED RESIDENTIAL AND COMMERCIAL BUILDINGS
- COMMERCIAL AND OFFICE BUILDINGS
- INDUSTRIAL AND MANUFACTURING
- TRANSPORTATION AND UTILITY
- PUBLIC FACILITIES AND INSTITUTIONS
- OPEN SPACE AND OUTDOOR RECREATION
- PARKING FACILITIES
- VACANT LAND
- OTHER
- MANDATORY INCLUSIONARY HOUSING AREAS
- SITE BOUNDARY

BASE MAP PROVIDED BY NYC PLANNING

Scale:

N W E S

0 50' 100'

Figure No.	2
Figure Name:	SITE BOUNDARY AND SURROUNDING USE
Report:	RAWP
Date:	8/14/2025
Drawn By:	KB
Site Address:	601-607 UNION STREET BROOKLYN, NY (C224392)

Sample ID and Depth	25SB-1 (0-2)		25SB-1 (9-11)		25SB-1 (12-13)	
Sampling Date	7/2/2025		7/2/2025		7/2/2025	
VOCs	Results	Q	Results	Q	Results	Q
Acetone	0.014	U	0.068	J+	0.016	U
SVOCs	Results	Q	Results	Q	Results	Q
3-/4-Methylphenol	0.029	J	0.085	J	0.66	
Benzo(a)anthracene	1.6		0.36		0.52	
Benzo(a)pyrene	1.5		0.31		0.44	
Benzo(b)fluoranthene	1.6		0.34		0.56	
Chrysene	1.6		0.36		0.51	
Indeno(1,2,3-cd)pyrene	0.87		0.17		0.29	
Herbicides	ND		ND		ND	
Pesticides	ND		NE		ND	
PCBs	ND		ND		ND	
Total Metals	Results	Q	Results	Q	Results	Q
Arsenic	3.47		4.65		14.3	
Copper	61.9		17.4		90.2	
Lead	428	J+	156	J+	766	J+
Mercury	0.324		5.12		9.05	
PFAS	ND		ND		ND	

Sample ID and	SP-11 (10-12)	
Sample Date	9/7/2022	
VOCs	Results	Q
1,4-Dichlorobenzene	3.4	D
n-Butylbenzene	25	D
n-Propylbenzene	29	D
sec-Butylbenzene	22	D
Xylenes, Total	1.1	JD
SVOCs	NE	
PCBs	ND	
Total Metals	Results	Q
Copper	111	
Lead	446	
Zinc	101	
Mercury	0.99	
Pesticides	ND	
PFAS	ND	

Sample ID and Depth	SP-2 (8-10)	
Sample Date	9/7/2022	
VOCs	Results	Q
Methylene chloride	111	B
SVOCs	Results	Q
Benzo(a)anthracene	2.98	D
Benzo(a)pyrene	2.69	D
Benzo(b)fluoranthene	2.49	D
Benzo(k)fluoranthene	2.21	D
Chrysene	3.16	D
Dibenzo(a,h)anthracen	0.49	D
Indeno[1,2,3-	1.41	D
PCBs	ND	
Total Metals	Results	Q
Nickel	48.5	
Mercury	0.66	
Pesticides	ND	
PFAS	ND	

Sample ID and Depth	25SB-9 (0-2)		25SB-9 (11-12)	
Sampling Date	7/1/2025		7/1/2025	
	Results	Q	Results	Q
VOCs	NE		NE	
SVOCs	Results	Q	Results	Q
3-/4-Methylphenol	2.5		0.29	U
Herbicides	ND		ND	
Pesticides	ND		ND	
PCBs	ND		ND	
Total Metals	Results	Q	Results	Q
Arsenic	15.5	J-	2.72	J-
Mercury	0.576		0.919	
Nickel	16.8		35.2	
Lead	5.97		1.89	U
Zinc	151	J	80.6	J
PFAS	ND		ND	

Sample ID and Depth	SP-1 (8-10)	
Sample Date	9/7/2022	
VOCs	Results	Q
Methylene chloride	5.1	D
SVOCs	Results	Q
Benzo(a)anthracene	3.79	D
Benzo(a)pyrene	2.85	D
Benzo(b)fluoranthene	2.25	D
Benzo(k)fluoranthene	2.34	D
Chrysene	3.72	D
Dibenzo(a,h)anthracene	0.45	D
Indeno(1,2,3-cd)pyrene	1.13	D
PCBs	ND	
Total Metals	Results	Q
Lead	196	
Mercury	3.29	
Pesticides	ND	
PFAS	ND	

Sample ID and Depth	25SB-12 (0-2)		25SB-12 (11-12)	
Sampling Date	7/1/2025		7/1/2025	
Compound	Results	Q	Results	Q
VOCs	ND		NE	
SVOCs	Results	Q	Results	Q
Acenaphthene	0.25		34	
Benzo(a)anthracene	1.3		0.36	
Benzo(a)pyrene	1.1		0.3	
Benzo(b)fluoranthene	1.3		0.39	
Chrysene	1.2		0.37	
Indeno(1,2,3-cd)pyrene	0.59		0.16	
Naphthalene	0.26		44	
Herbicides	ND		ND	
Pesticides	ND		ND	
PCBs	ND		ND	
Total Metals	Results	Q	Results	Q
Arsenic	14.1		5.3	
Copper	81.3	J-	49.4	J-
Lead	636		336	
Mercury	1.27		0.604	
Zinc	226	J	113	J
PFAS	ND		ND	

Sample ID and Depth	SP-7 (0-2)	
Sample Date	9/7/2022	
Compound	Results	Q
VOCs	NE	
SVOCs	NE	
PCBs	ND	
Total Metals	Results	Q
Arsenic	106	
Barium	1090	
Copper	102	
Lead	1690	
Zinc	470	
Mercury	1.58	
Chromium, Trivalent	49.6	
Pesticides	ND	
PFAS	ND	

Sample ID and	SP-8 (1-3)	
Sample Date	9/7/2022	
Compound	Results	Q
VOCs	NE	
SVOCs	NE	
PCBs	ND	
Total Metals	Results	Q
Lead	78.6	
Nickel	70.7	
Zinc	118	
Pesticides	ND	
PFAS	NE	

Sample ID and Depth	SP-9 (1-3)	
Sample Date	9/7/2022	
Compound	Results	Q
VOCs	NE	
SVOCs	Results	Q
Benzo(a)pyrene	1.53	D
Benzo(b)fluoranthene	1.32	D
Benzo(k)fluoranthene	1.33	D
Dibenzo(a,h)anthracene	0.34	D
Indeno(1,2,3-cd)pyrene	1.01	D
PCBs	ND	
Total Metals	Results	Q
Arsenic	43.2	
Barium	550	
Copper	181	
Lead	688	
Nickel	451	
Zinc	425	
Mercury	47.1	
Chromium, Trivalent	109	
Pesticides	ND	
PFAS	ND	

Sample ID and Depth	SP-12 (10-12)	
Sample Date	9/8/2022	
Compound	Results	Q
VOCs	NE	
SVOCs	Results	Q
Benzo(a)anthracene	4.31	D
Benzo(a)pyrene	4.41	D
Benzo(b)fluoranthene	2.62	D
Benzo(k)fluoranthene	2.55	D
Chrysene	4.12	D
Dibenzo(a,h)anthracene	0.52	D
Indeno(1,2,3-cd)pyrene	1.49	D
PCBs	ND	
Total Metals	Results	Q
Arsenic	20.7	
Barium	677	
Copper	57.7	
Lead	740	
Zinc	236	
Mercury	10.8	
Pesticides	ND	
PFAS	NE	

Sample ID and Depth	25SB-2 (0-2)		25SB-2 (12-13)	
Sampling Date	7/2/2025		7/2/2025	
Compound	Results	Q	Results	Q
VOCs	NE		NE	
SVOCs	Results	Q	Results	Q
Benzo(a)anthracene	9.8		0.15	
Benzo(a)pyrene	12		0.14	J
Benzo(b)fluoranthene	14		0.18	
Benzo(k)fluoranthene	4.1		0.067	J
Chrysene	9.5		0.14	
Dibenzo(a,h)anthracene	1.4		0.027	J
Indeno(1,2,3-cd)pyrene	9.2		0.19	
Herbicides	ND		ND	
Pesticides	ND		ND	
PCBs	ND		ND	
Total Metals	Results	Q	Results	Q
Lead	513	J+	122	J+
Mercury	0.905		0.126	
Zinc	163		68	
PFAS	ND		ND	

Sample ID and Depth	25SB-7 (0-2)		25SB-7 (12-13)	
Sampling Date	7/8/2025		7/8/2025	
VOCs	Results	Q	Results	Q
Acetone	0.011	U	0.092	
SVOCs	Results	Q	Results	Q
2-Methylphenol	0.18	U	0.48	J
Benzo(a)anthracene	1.2		20	
Benzo(a)pyrene	1		17	
Benzo(b)fluoranthene	1.3		22	
Benzo(k)fluoranthene	0.33		5.1	
Chrysene	1.1		20	
Dibenzo(a,h)anthracene	0.14		2.4	
Indeno(1,2,3-cd)pyrene	0.6		9.2	
Phenol	0.18	U	0.53	J
Herbicides	ND		ND	
Pesticides	ND		ND	
PCBs	ND		ND	
Total Metals	Results	Q	Results	Q
Arsenic	5.38		27.8	J+
Barium	107		418	
Copper	33.6		60.1	
Lead	5100		941	
Mercury	0.634		2.21	
Selenium	0.841	J	17.3	
Zinc	48.8		288	
PFAS	ND		ND	

Sample ID and	SP-16 (8-10)	
Sample Date	9/8/2022	
Compound	Results	Q
VOCs	NE	
SVOCs	Results	Q
Benzo(a)anthracene	30.3	D
Benzo(a)pyrene	25.2	D
Benzo(b)fluoranthen	17	D
Benzo(k)fluoranthen	20.4	D
Chrysene	26.8	D
Dibenzo(a,h)anthrac	3.77	D
Indeno(1,2,3-	12.8	D
PCBs	ND	
Total Metals	Results	Q
Lead	296	
Mercury	12	
Pesticides	ND	
PFAS	ND	

Sample ID and Depth	SP-10 (8-10)	
Sample Date	9/7/2022	
VOCs	Results	Q
1,2,4-	3.70	D
n-Propylbenzene	5.40	D
SVOCs	NE	
PCBs	NE	
Total Metals	Results	Q
Lead	1870	
Zinc	977	
Mercury	6.22	
Pesticides	ND	
PFAS	ND	

Sample ID and	SP-3 (10-12)	
Sample Date	9/7/2022	
Compound	Results	Q
VOCs	NE	
SVOCs	NE	
PCBs	ND	
Total Metals	Results	Q
Arsenic	21.9	
Lead	1560	
Zinc	496	
Mercury	0.51	
Pesticides	ND	
PFAS	ND	

Sample ID and Depth	25SB-4 (0-2)		25SB-4 (7-9)		25SB-4 (12-13)	
Sampling Date	7/2/2025		7/2/2025		7/2/2025	
Compound	Results	Q	Results	Q	Results	Q
VOCs	ND		ND		NE	
SVOCs	Results	Q	Results	Q	Results	Q
3-/4-Methylphenol	1.9	U	0.28	U	0.62	
Benzo(a)anthracene	17		1.1		2	
Benzo(a)pyrene	16		0.93		1.6	
Benzo(b)fluoranthene	18		1.1		1.9	
Benzo(k)fluoranthene	5.6		0.42		0.65	
Chrysene	16		1.1		2.1	
Dibenzo(a,h)anthracene	2		0.097	J	0.18	
Indeno(1,2,3-cd)pyrene	7.9		0.44		0.65	
Herbicides	ND		ND		ND	
Pesticides	ND		ND		ND	
PCBs	ND		ND		ND	
Total Metals	Results	Q	Results	Q	Results	Q
Barium	92.3		148		647	
Copper	37.3		58.9		89.4	
Lead	563	J+	2570	J+	10000	J+
Mercury	2.56		3.29		6.82	
Zinc	95.4		151		266	
PFAS	ND		ND		ND	

Sample ID and Depth	SP-5 (6-8)	
Sample Date	9/7/2022	
Compound	Results	Q
VOCs	NE	
SVOCs	NE	
PCBs	ND	
Total Metals	Results	Q
Nickel	46.5	
Pesticides	ND	
PFAS	ND	

Sample ID and Depth	25SB-10 (0-2)		25SB-10 (11-12)	
Sampling Date	7/1/2025		7/1/2025	
VOCs	Results	Q	Results	Q
Acetone	0.011	U	0.067	
SVOCs	Results	Q	Results	Q
Benzo(a)anthracene	2.2		4.6	
Benzo(a)pyrene	2.1		6.6	
Benzo(b)fluoranthene	2.6		5.7	
Benzo(k)fluoranthene	0.68		1.2	
Chrysene	2.2		4.4	
Dibenzo(a,h)anthracene	0.32		0.49	
Indeno(1,2,3-cd)pyrene	1.3		3.3	
Naphthalene	0.22		31	
Herbicides	ND		ND	
Pesticides	ND		ND	
PCBs	ND		ND	
Total Metals	Results	Q	Results	Q
Arsenic	11.6	J-	13.9	J-
Copper	93.8	J-	93.9	J-
Lead	745		3700	
Mercury	0.915		7.47	
Nickel	40.3		18	
Zinc	898	J	242	J
PFAS	NE		ND	

Sample ID and Depth	25SB-13 (0-2)		25SB-13 (11-12)	
Sampling Date	7/1/2025		7/1/2025	
Compound	Results	Q	Results	Q
VOCs	ND		ND	
SVOCs	Results	Q	Results	Q
Benzo(a)anthracene	4.4		2	
Benzo(a)pyrene	3.7		1.7	
Benzo(b)fluoranthene	5.1		2.2	
Benzo(k)fluoranthene	1.1		0.57	
Chrysene	4		2	
Dibenzo(a,h)anthracene	0.62		0.26	
Indeno(1,2,3-cd)pyrene	2.3		1	
Herbicides	ND		ND	
Pesticides	ND		ND	
PCBs	ND		ND	
Total Metals	Results	Q	Results	Q
Arsenic	35.2	J-	5.42	J-
Copper	57.4		92.2	J-
Lead	1710		237	
Mercury	0.562		0.858	
Zinc	114	J	50.4	J
PFAS	NE		ND	

Sample ID and Depth	25SB-3 (0-2)		25SB-3 (12-13)	
Sampling Date	7/2/2025		7/2/2025	
VOCs	Results	Q	Results	Q
Acetone	0.064		0.13	
SVOCs	Results	Q	Results	Q
Benzo(a)anthracene	0.92		2.2	
Benzo(a)pyrene	0.87		1.9	
Benzo(b)fluoranthene	1.1		2.4	
Benzo(k)fluoranthene	0.39		0.88	
Chrysene	0.94		2.2	
Indeno(1,2,3-cd)pyrene	0.4		0.9	
Herbicides	ND		ND	
Pesticides	ND		ND	
PCBs	ND		ND	
Total Metals	Results	Q	Results	Q
Lead	228	J+	140	J+
Mercury	1.37		0.69	
Zinc	112		53.7	
PFAS	ND		ND	

Sample ID and	SP-15 (6-8)	
Sample Date	9/8/2022	
VOCs	Results	Q
Acetone	0.057	
SVOCs	Results	Q
Acenaphthene	23.8	D
Benzo(a)anthracene	40.5	D
Benzo(a)pyrene	54.8	D
Benzo(b)fluoranthen	21.7	D
Benzo(k)fluoranthen	28.2	D
Chrysene	43	D
Dibenzo(a,h)anthrac	4.41	D
Fluoranthene	107	D
Indeno(1,2,3-	24.9	D
Pyrene	183	D
PCBs	ND	
Total Metals	Results	Q
Silver	3.66	
Mercury	0.58	
Pesticides	ND	
PFAS	ND	

Sample ID and	SP-14 (6-8)	
Sample Date	9/8/2022	
Compound	Results	Q
VOCs	NE	
SVOCs	Results	Q
Benzo(a)pyrene	1.56	D
Benzo(b)fluoranthen	1.15	D
Benzo(k)fluoranthen	1.23	D
Chrysene	1.52	D
Indeno(1,2,3-	0.68	D
PCBs	ND	
Total Metals	Results	Q
Lead	763	
Mercury	2.04	
Pesticides	ND	
PFAS	ND	

Sample ID and Depth	SP-4 (4-6)	
Sample Date	9/7/2022	
Compound	Results	Q
VOCs	NE	
SVOCs	Results	Q
Benzo(a)anthracene	1.4	D
Benzo(a)pyrene	1.01	D
Benzo(b)fluoranthene	0.95	D
Benzo(k)fluoranthene	1.38	D
Indeno[1,2,3-cd]pyrene	0.58	D
PCBs	ND	
Total Metals	Results	Q
Arsenic	14.3	
Copper	139	
Lead	743	
Nickel	76.3	
Silver	7.08	
Zinc	249	
Mercury	3.10	
Chromium, Trivalent	30.7	
Pesticides	ND	
PFAS	Results	Q
Perfluorooctanoic acid	1.62	

Sample ID and Depth	25SB-8 (1-3)		25SB-8 (11-12)	
Sampling Date	7/8/2025		7/8/2025	
Compound	Results	Q	Results	Q
VOCs	ND		NE	
SVOCs	Results	Q	Results	Q
3-/4-Methylphenol	0.22	J	0.69	
Benzo(a)anthracene	12		0.48	
Benzo(a)pyrene	9		0.42	
Benzo(b)fluoranthene	11		0.52	
Benzo(k)fluoranthene	4.3		0.16	
Chrysene	10		0.43	
Dibenzo(a,h)anthracene	1.4		0.065	J
Indeno(1,2,3-cd)pyrene	5.1		0.24	
Herbicides	ND		ND	
Pesticides	ND		ND	
PCBs	ND		ND	
Total Metals	Results	Q	Results	Q
Arsenic	19.6			
Copper	50.9			
Lead	377			
Zinc	296			
Mercury	2.31			
Pesticides	ND			
PFAS	NE			

Sample ID and	SP-17 (4-6)	
Sample Date	9/8/2022	
Compound	Results	Q
VOCs	NE	
SVOCs	NE	
PCBs	ND	
Total Metals	Results	Q
Lead	103	
Mercury	3.28	
Pesticides	ND	
PFAS	ND	

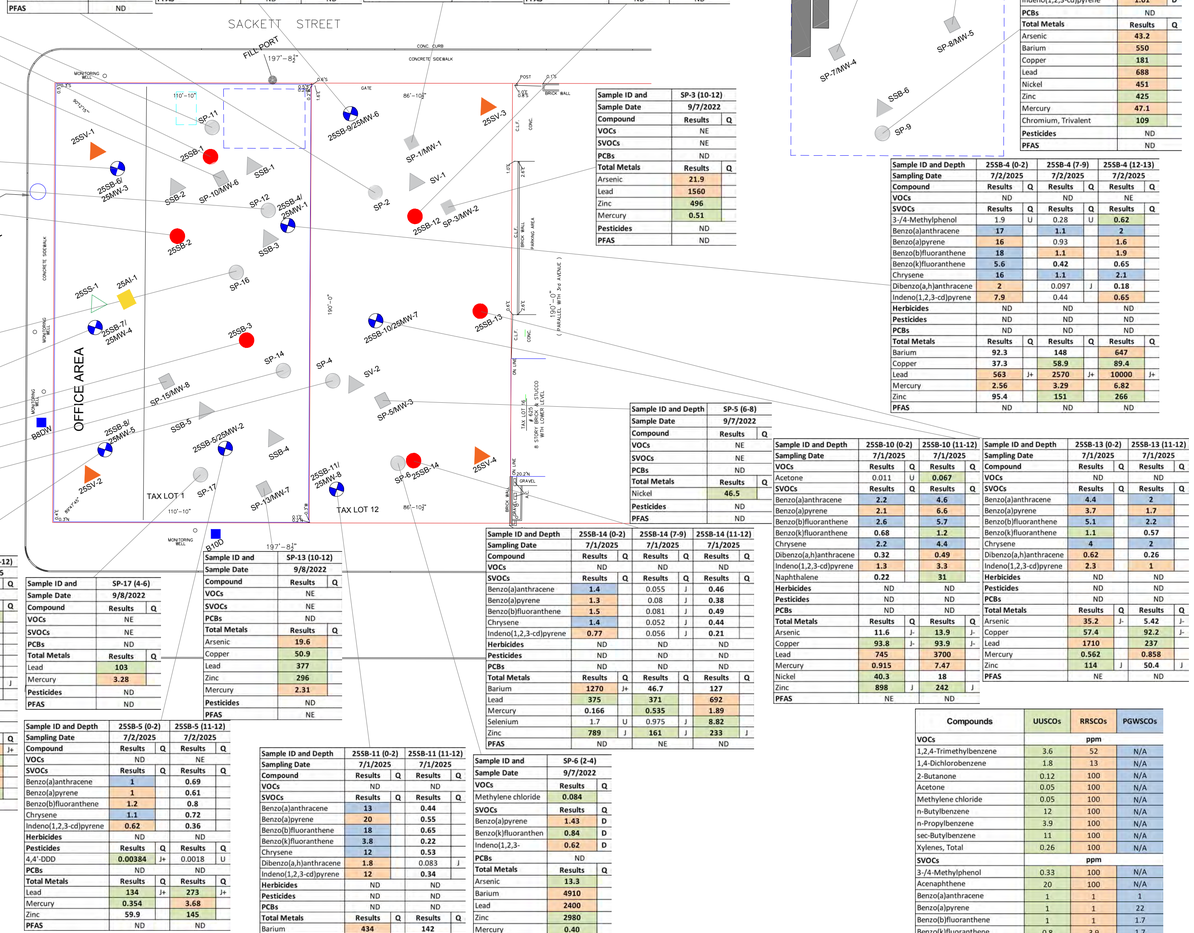
Sample ID and Depth	25SB-5 (0-2)		25SB-5 (11-12)	
Sampling Date	7/2/2025		7/2/2025	
Compound	Results	Q	Results	Q
VOCs	ND		NE	
SVOCs	Results	Q	Results	Q
Benzo(a)anthracene	1		0.69	
Benzo(a)pyrene	1		0.61	
Benzo(b)fluoranthene	1.2		0.8	
Chrysene	1.1		0.72	
Indeno(1,2,3-cd)pyrene	0.62		0.36	
Herbicides	ND		ND	
Pesticides	Results	Q	Results	Q
4,4'-DDD	0.00384	J+	0.0018	U
PCBs	ND		ND	
Total Metals	Results	Q	Results	Q
Lead	134	J+	273	J+
Mercury	0.354		3.68	
Zinc	59.9		145	
PFAS	ND		ND	

Sample ID and Depth	25SB-11 (0-2)		25SB-11 (11-12)	
Sampling Date	7/1/2025		7/1/2025	
Compound	Results	Q	Results	Q
VOCs	ND		ND	
SVOCs	Results	Q	Results	Q
Benzo(a)anthracene	13		0.44	
Benzo(a)pyrene	20		0.55	
Benzo(b)fluoranthene	18		0.65	
Benzo(k)fluoranthene	3.8		0.22	
Chrysene	12		0.53	
Dibenzo(a,h)anthracene	1.8		0.083	J
Indeno(1,2,3-cd)pyrene	12		0.34	
Herbicides	ND		ND	
Pesticides	ND		ND	
PCBs	ND		ND	
Total Metals	Results	Q	Results	Q
Barium	434		142	
Lead	1100		498	
Mercury	0.968		8.83	
Zinc	651	J	137	J
PFAS	NE		ND	

Sample ID and	SP-6 (2-4)	
Sample Date	9/7/2022	
VOCs	Results	Q
Methylene chloride	0.084	
SVOCs	Results	Q
Benzo(a)pyrene	1.43	D
Benzo(k)fluoranthen	0.84	D
Indeno(1,2,3-	0.62	D
PCBs	ND	
Total Metals	Results	Q
Arsenic	13.3	
Barium	4910	
Lead	2400	
Zinc	2980	
Mercury	0.40	
Pesticides	ND	
PFAS	NE	

Sample ID and Depth	25SB-14 (0-2)		25SB-14 (7-9)		25SB-14 (11-12)	
Sampling Date	7/1/2025		7/1/2025		7/1/2025	
Compound	Results	Q	Results	Q	Results	Q
VOCs	ND		ND		ND	
SVOCs	Results	Q	Results	Q	Results	Q
Benzo(a)anthracene	1.3		0.055	J	0.46	
Benzo(a)pyrene	1.3		0.08	J	0.38	
Benzo(b)fluoranthene	1.5		0.081	J	0.49	
Chrysene	1.4		0.052	J	0.44	
Indeno(1,2,3-cd)pyrene	0.77		0.056	J	0.21	
Herbicides	ND		ND		ND	
Pesticides	ND		ND		ND	
PCBs	ND		ND		ND	
Total Metals	Results	Q	Results	Q	Results	Q
Barium	1270	J+	46.7		127	
Lead	375		371		692	
Mercury	0.166		0.535		1.89	
Selenium	1.7	U	0.975	J	8.82	
Zinc	789	J	161	J	233	J
PFAS	ND		NE		ND	

Compounds	UUSCOs	RRSCOs	PGWSCOs
VOCs	ppm		
1,2,4-Trimethylbenzene	3.6	52	N/A
1,4-Dichlorobenzene	1.8	13	N/A
2-Butanone	0.12	100	N/A
Acetone	0.05	100	N/A
Methylene chloride	0.05	100	N/A
n-Butylbenzene	12	100	N/A
n-Propylbenzene	3.9	100	N/A
sec-Butylbenzene	11	100	N/A
Xylenes, Total	0.26	100	N/A
SVOCs	ppm		
3-/4-Methylphenol	0.33	100	N/A
Acenaphthene	20	100	N/A
Benzo(a)anthracene	1	1	3
Benzo(a)pyrene	1	1	22
Benzo(b)fluoranthene	1	1	1.7
Benzo(k)fluoranthene	0.8	3.9	1.7
Chrysene	1	3.9	1
Dibenzo(a,h)anthracene	0.33	0.33	N/A
Fluoranthene	100	100	N/A
Indeno(1,2,3-cd)pyrene	0.5	0.5	N/A
Naphthalene	12	100	N/A
Pyrene	100	100	N/A
Total Metals	ppm		
Arsenic	13	16	N/A
Barium	350	400	N/A
Copper	50	270	N/A
Lead	63	400	N/A
Nickel	30	310	N/A
Selenium	3.9	180	N/A
Silver	2	180	N/A
Zinc	109	10000	N/A
Mercury	0.18	0.81	N/A
Chromium, Trivalent	30	180	N/A
Zinc	109	10000	N/A
Pesticides	ppm		
4,4'-DDD	0.0033	13	N/A
PFAS	ppm		
PFOA	0.66	6.6	N/A



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- Property Boundary
- Current Tax Lot Line
- Soil Boring and Monitoring Well Location and ID (2025) — 25SB-X/25MW-X
- Soil Vapor Point Location and ID (2025) — 25SV-X
- Soil Boring Location and ID (2025) — 25SB-X
- Prior Soil Boring Location and ID
- Prior Soil Boring and Monitoring Well Location and ID
- Prior Soil Vapor Point Location and ID
- Existing Monitoring Well Location
- Sub-Slab Vapor Point Location and ID (2025)
- Indoor Air Sample Location and Designated ID (2025)

Notes:

1. All results are reported in parts per million (ppm)
2. SCO: Soil Cleanup Objectives
3. UUSCO: Unrestricted Use SCOs
4. RRSCO: Restricted Residential Use SCOs
5. PGWSCO: Protection of Groundwater SCOs

Scale: 0 — 50' — 100'

Figure No. 3

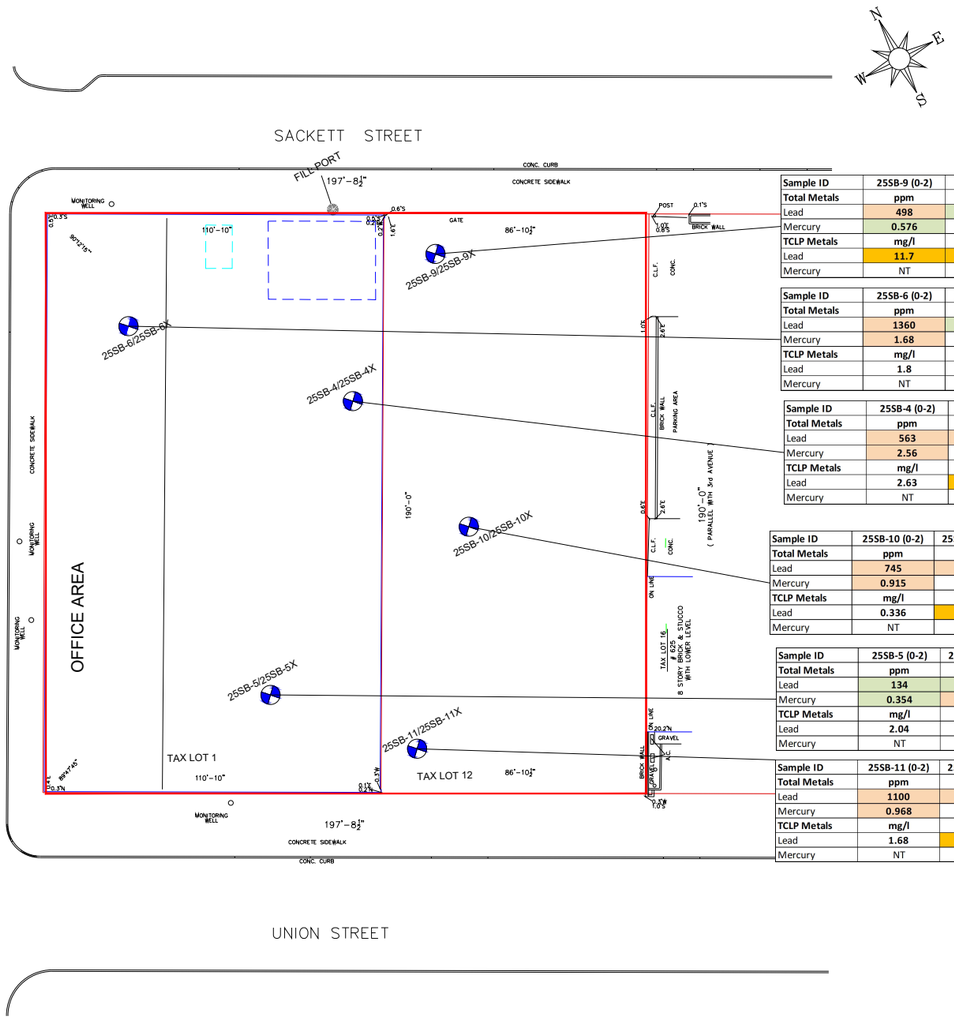
Figure Name: SOIL EXCEEDANCES

Report: RAWP

Date: 8/14/2025

Drawn By: KB

Site Address: 601-607 UNION STREET, BROOKLYN, NY (C224392)



Sample ID	25SB-9 (0-2)	25SB-9X (2-4)	25SB-9X (4-6)	25SB-9X (6-8)	25SB-9 (11-12)	25SB-9X (12-14)	25SB-9X (18-20)	25SB-9X (24-26)	25SB-9X (26-28)	25SB-9X (28-30)
Total Metals	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lead	498	211	892	318	97.2	425	346	1050	25.7	15.9
Mercury	0.576	NT	NT	NT	0.919	0.665	NT	NT	ND	ND
TCLP Metals	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Lead	11.7	16	0.143	0.124	NT	0.822	1.36	0.279	ND	ND
Mercury	NT	NT	NT	NT	NT	NT	NT	NT	ND	ND

Sample ID	25SB-6 (0-2)	25SB-6X (6-7)	25SB-6 (7-9)	25SB-6X (9-10)	25SB-6 (11-12)	25SB-6X (12-14)	25SB-6X (14-16)	25SB-6X (16-18)	25SB-6X (18-20)	25SB-6X (22-24)	25SB-6X (26-28)	25SB-6X (28-30)
Total Metals	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lead	1360	128	244	1330	1350	745	404	424	411	815	25.2	10.5
Mercury	1.68	NT	0.853	NT	6.34	0.32	NT	NT	NT	NT	ND	ND
TCLP Metals	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Lead	1.8	2.05	5.47	3.24	0.165	14.2	2.06	2.9	2.95	2.4	0.668	ND
Mercury	NT	NT	NT	NT	ND	NT	NT	NT	NT	NT	ND	ND

Sample ID	25SB-4 (0-2)	25SB-4X (6-7)	25SB-4 (7-9)	25SB-4X (9-10)	25SB-4 (12-13)	25SB-4X (13-15)	25SB-4X (15-17)	25SB-4X (19-21)	25SB-4X (21-23)	25SB-4X (23-25)	25SB-4X (25-27)	25SB-4X (29-30)
Total Metals	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lead	563	1140	2570	435	10000	410	666	751	342	193	326	5.82
Mercury	2.56	NT	3.29	NT	6.82	1.09	NT	NT	NT	ND	NT	ND
TCLP Metals	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Lead	2.63	38.6	7.04	12	2.1	1.4	2.81	3.22	0.187	0.499	3.36	0.033
Mercury	NT	NT	NT	NT	ND	NT	NT	NT	NT	ND	NT	ND

Sample ID	25SB-10 (0-2)	25SB-10X (7-8)	25SB-10 (11-12)	25SB-10X (12-14)	25SB-10X (14-16)	25SB-10X (16-18)	25SB-10X (18-20)	25SB-10X (24-26)	25SB-10X (26-28)	25SB-10X (28-30)
Total Metals	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lead	745	516	3700	982	761	481	143	157	102	10.8
Mercury	0.915	NT	7.47	NT	NT	NT	NT	NT	NT	ND
TCLP Metals	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Lead	0.336	41.2	0.0698	26.3	2.63	3.19	2.66	0.746	1.8	0.036
Mercury	NT	NT	ND	NT	NT	NT	NT	NT	NT	ND

Sample ID	25SB-5 (0-2)	25SB-5 (11-12)	25SB-5X (12-14)	25SB-5X (14-16)	25SB-5X (16-18)	25SB-5X (18-20)	25SB-5X (22-24)	25SB-5X (26-28)
Total Metals	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lead	134	273	179	389	78.1	398	12.2	18.1
Mercury	0.354	3.68	1.1	NT	NT	NT	ND	NT
TCLP Metals	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Lead	2.04	3.9	0.622	2.85	2.42	0.392	ND	0.14
Mercury	NT	NT	NT	NT	NT	NT	ND	NT

Sample ID	25SB-11 (0-2)	25SB-11X (7-8)	25SB-11 (11-12)	25SB-11X (12-14)	25SB-11X (14-16)	25SB-11X (16-18)	25SB-11X (18-20)
Total Metals	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Lead	1100	549	498	508	952	498	76.8
Mercury	0.968	NT	8.83	NT	NT	NT	NT
TCLP Metals	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Lead	1.68	11	99.1	2.1	2.9	0.609	0.303
Mercury	NT	NT	ND	NT	NT	NT	NT

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Legend:

- Property Boundary
- Soil Boring Location and Designated ID (2025) 25SB-X/25SB-XX

Notes:

1. All feature locations are approximate
2. ppm: parts per million
3. mg/L: milligram per liter
4. SCO: Soil Cleanup Objectives
5. Bold values are detected concentrations
6. Green highlighted values are above Unrestricted Use SCOs
7. Pink highlighted values are above Restricted Residential SCOs
8. Orange highlighted values are above EPA Hazardous Waste Limits

Scale:

0 50' 100'

Figure No. 4

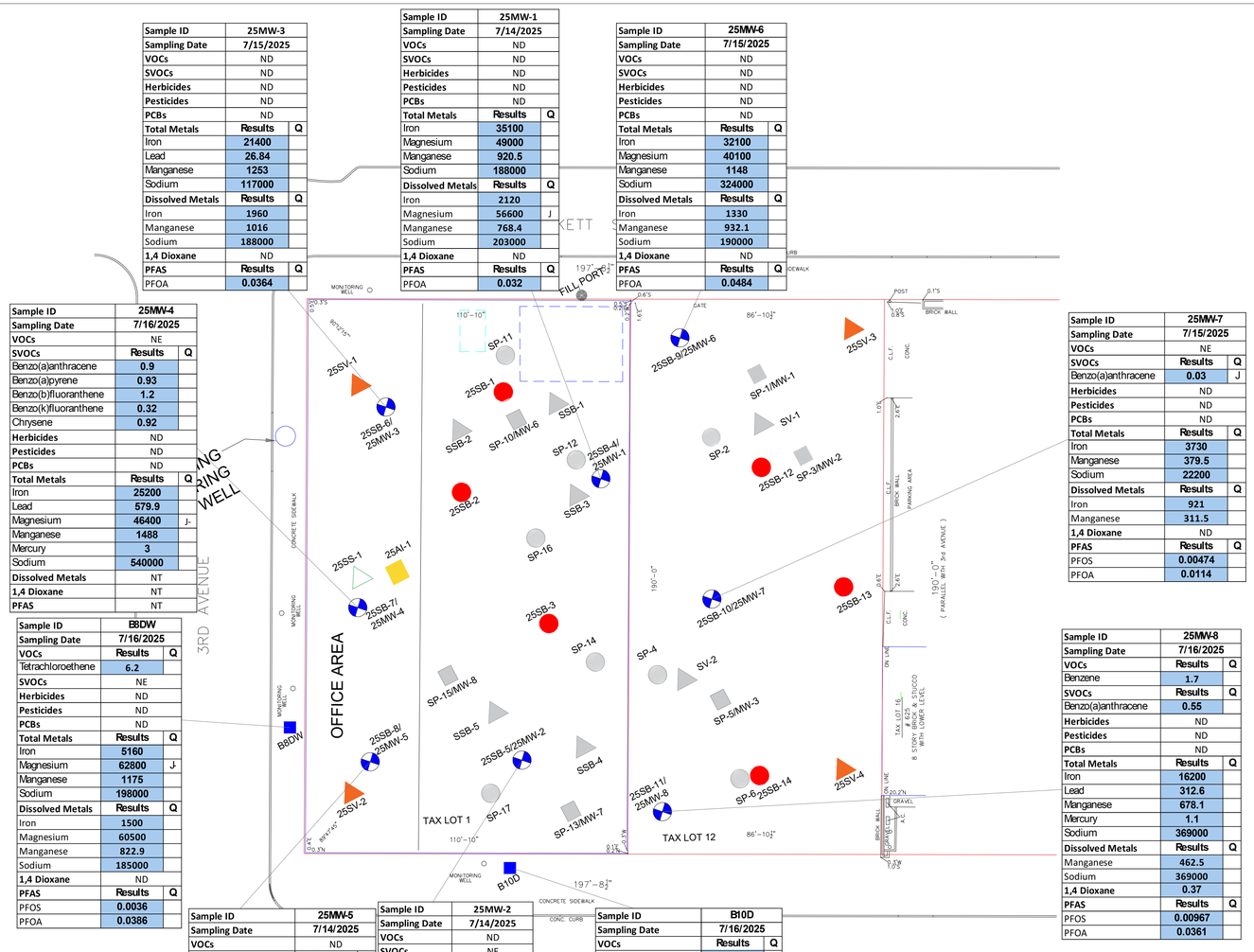
Figure Name: METALS DELINEATION PLAN

Report: RAWP

Date: 10/9/2025

Drawn By: KB

Site Address: 601-607 UNION STREET
BROOKLYN, NEW YORK (C224392)



Sample ID	25MW-3	
Sampling Date	7/15/2025	
VOCs	ND	
SVOCs	ND	
Herbicides	ND	
Pesticides	ND	
PCBs	ND	
Total Metals	**Results**	**Q**
Iron	21400	
Lead	26.84	
Manganese	1253	
Sodium	117000	
Dissolved Metals	**Results**	**Q**
Iron	1960	
Manganese	1016	
Sodium	188000	
1,4 Dioxane	ND	
PFAS	**Results**	**Q**
PFOA	0.0364	

Sample ID	25MW-1	
Sampling Date	7/14/2025	
VOCs	ND	
SVOCs	ND	
Herbicides	ND	
Pesticides	ND	
PCBs	ND	
Total Metals	**Results**	**Q**
Iron	35100	
Magnesium	49000	
Manganese	920.5	
Sodium	188000	
Dissolved Metals	**Results**	**Q**
Iron	2120	
Magnesium	56600	J
Manganese	768.4	
Sodium	203000	
PFAS	**Results**	**Q**
PFOA	0.032	

Sample ID	25MW-6	
Sampling Date	7/15/2025	
VOCs	ND	
SVOCs	ND	
Herbicides	ND	
Pesticides	ND	
PCBs	ND	
Total Metals	**Results**	**Q**
Iron	32100	
Magnesium	40100	
Manganese	1148	
Sodium	324000	
Dissolved Metals	**Results**	**Q**
Iron	1330	
Manganese	932.1	
Sodium	190000	
1,4 Dioxane	ND	
PFAS	**Results**	**Q**
PFOA	0.0484	

Sample ID	25MW-4	
Sampling Date	7/16/2025	
VOCs	NE	
SVOCs	Results	Q
Benzo(a)anthracene	0.9	
Benzo(a)pyrene	0.93	
Benzo(b)fluoranthene	1.2	
Benzo(k)fluoranthene	0.32	
Chrysene	0.92	
Herbicides	ND	
Pesticides	ND	
PCBs	ND	
Total Metals	Results	Q
Iron	25200	
Lead	579.9	
Magnesium	46400	J-
Manganese	1488	
Mercury	3	
Sodium	540000	
Dissolved Metals	NT	
1,4 Dioxane	NT	
PFAS	NT	

Sample ID	25MW-7	
Sampling Date	7/15/2025	
VOCs	NE	
SVOCs	Results	Q
Benzo(a)anthracene	0.03	J
Herbicides	ND	
Pesticides	ND	
PCBs	ND	
Total Metals	Results	Q
Iron	3730	
Manganese	379.5	
Sodium	22200	
Dissolved Metals	Results	Q
Iron	921	
Manganese	311.5	
1,4 Dioxane	ND	
PFAS	Results	Q
PFOS	0.00474	
PFOA	0.0114	

Sample ID	B8DW	
Sampling Date	7/16/2025	
VOCs	Results	Q
Tetrachloroethene	6.2	
SVOCs	NE	
Herbicides	ND	
Pesticides	ND	
PCBs	ND	
Total Metals	Results	Q
Iron	5160	
Magnesium	62800	J-
Manganese	1175	
Sodium	198000	
Dissolved Metals	Results	Q
Iron	1500	
Magnesium	60500	
Manganese	822.9	
Sodium	185000	
1,4 Dioxane	ND	
PFAS	Results	Q
PFOS	0.0036	
PFOA	0.0386	

Sample ID	25MW-8	
Sampling Date	7/16/2025	
VOCs	Results	Q
Benzene	1.7	
SVOCs	Results	Q
Benzo(a)anthracene	0.55	
Herbicides	ND	
Pesticides	ND	
PCBs	ND	
Total Metals	Results	Q
Iron	16200	
Lead	312.6	
Manganese	678.1	
Mercury	1.1	
Sodium	369000	
Dissolved Metals	Results	Q
Manganese	462.5	
Sodium	369000	
1,4 Dioxane	0.37	
PFAS	Results	Q
PFOS	0.00967	
PFOA	0.0361	

Sample ID	25MW-5	
Sampling Date	7/14/2025	
VOCs	ND	
SVOCs	Results	Q
Benzo(a)anthracene	0.23	
Benzo(a)pyrene	0.25	
Benzo(b)fluoranthene	0.32	
Chrysene	0.19	
Herbicides	ND	
Pesticides	ND	
PCBs	ND	
Total Metals	Results	Q
Arsenic	48.64	
Barium	1073	
Chromium	64.72	
Copper	384.9	
Iron	59800	
Lead	2707	
Magnesium	37000	J-
Manganese	3698	
Mercury	9.92	
Nickel	104	
Selenium	19.8	
Sodium	392000	
Dissolved Metals	Results	Q
Iron	501	
Manganese	1643	
Sodium	341000	
1,4 Dioxane	ND	
PFAS	Results	Q
PFOS	0.0292	
PFOA	0.0236	

Sample ID	25MW-2	
Sampling Date	7/14/2025	
VOCs	ND	
SVOCs	NE	
Herbicides	ND	
Pesticides	ND	
PCBs	ND	
Total Metals	Results	Q
Iron	55300	
Manganese	2667	
Sodium	543000	
Dissolved Metals	Results	Q
Iron	1560	
Manganese	1798	
Sodium	536000	
1,4 Dioxane	0.381	
PFAS	Results	Q
PFOA	0.107	

Sample ID	B10D	
Sampling Date	7/16/2025	
VOCs	Results	Q
cis-1,2-Dichloroethene	29	
Tetrachloroethene	22	
Trichloroethene	10	
SVOCs	NE	
Herbicides	ND	
Pesticides	ND	
PCBs	ND	
Total Metals	Results	Q
Iron	3050	
Magnesium	69100	J-
Sodium	234000	
Dissolved Metals	Results	Q
Iron	805	
Magnesium	68900	
Sodium	229000	
1,4 Dioxane	ND	
PFAS	Results	Q
PFOA	0.0573	

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Legend:

- Property Boundary
- Current Tax Lot Line
- 25SB-X/25MW-X — Soil Boring and Monitoring Well Location and Designated ID (2025)
- 25SV-X — Soil Vapor Point Location and Designated ID (2025)
- 25SB-X — Soil Boring Location and Designated ID (2025)
- Prior Soil Boring Location and Designated ID
- Prior Soil Boring and Monitoring Well Location and Designated ID
- Prior Soil Vapor Point Location and Designated ID
- Existing Monitoring Well Location
- Sub-Slab Vapor Point Location and Designated ID (2025)
- Indoor Air Sample Location and Designated ID (2025)

Notes:
1. All features are approximate.
2. All results are reported in parts per billion (ppb)

Scale:

0 50' 100'

Figure No.	5
Figure Name:	GROUNDWATER EXCEEDANCES
Report:	RAWP
Date:	9/25/2025
Drawn By:	KB
Site Address:	601-607 UNION STREET BROOKLYN, NY (C224392)

SAMPLE ID	25SS-1		25AI-1	
VOCs	Results	Q	Results	Q
1,1,1-Trichloroethane	**31.1**		0.109	U
1,2,4-Trimethylbenzene	**12.4**		**1.79**	
1,3,5-Trimethylbenzene	**3.15**		0.983	U
1,3-Butadiene	**0.6**		**0.546**	
2,2,4-Trimethylpentane	0.934	U	**4.1**	
2-Butanone	**31.6**		**5.78**	
2-Hexanone	**6.43**		0.82	U
4-Ethyltoluene	**2.16**		0.983	U
4-Methyl-2-pentanone	**3.18**		2.05	U
Acetone	**161**		**30.2**	
Benzene	**2.44**		**4.54**	
Carbon disulfide	**2.05**		0.623	U
Carbon tetrachloride	1.26	U	**0.447**	
Chloroform	**1.15**		0.977	U
Chloromethane	0.413	U	**1.43**	
Cyclohexane	**1.41**		**1.13**	
Dichlorodifluoromethane	**2.17**		**2.32**	
Ethanol	**10.4**		**37.3**	
Ethylbenzene	**4.43**		**1.68**	
Heptane	**16.3**		**1.72**	
Isopropanol	**17**		**5.8**	
n-Hexane	**32.3**		**3.91**	
Naphthalene	**4.21**		**1.64**	
o-Xylene	**8.38**		**2.23**	
p/m-Xylene	**17.5**		**5.39**	
Styrene	**1.03**		0.852	U
Tertiary butyl Alcohol	**47.9**		1.52	U
Tetrachloroethene	**27.7**		**0.746**	
Tetrahydrofuran	**1.7**		1.47	U
Toluene	**10.9**		**19.7**	
Trichloroethene	1.07	U	**0.193**	
Trichlorofluoromethane	**1.48**		**1.2**	

SAMPLE ID	SSB-5
VOCs	Results
1,1-Dichloroethane	**3.901**
1,2,4-Trimethylbenzene	**12**
1,3,5-Trimethylbenzene	**5.3**
1,4-Dioxane	**1.7**
2-Butanone	**19**
4-Methyl-2-pentanone	**2.2**
Acetone	**110**
Acrylonitrile	**2.9**
Benzene	**2.8**
Carbon disulfide	**28**
Chloromethane	**0.88**
Cyclohexane	**49**
Dichlorodifluoromethane	**1.9**
Ethyl acetate	**3.8**
Ethyl Benzene	**7.3**
Isopropanol	**5.1**
MTBE	**40**
Methylene chloride	**1.6**
n-Heptane	**35**
n-Hexane	**74**
o-Xylene	**9.4**
p-&m-Xylenes	**22**
p-Ethyltoluene	**13**
Propylene	**93**
Styrene	**1.2**
Tetrachloroethylene	**5.3**
Tetrahydrofuran	**13**
Toluene	**7.5**
Trichloroethylene	**2.5**

SAMPLE ID	SSB-4
VOCs	Results
1,2,4-Trimethylbenzene	**9.6**
1,3,5-Trimethylbenzene	**2.9**
1,3-Butadiene	**1.1**
2-Butanone	**1.5**
2-Hexanone	**1.4**
4-Methyl-2-pentanone	**0.68**
Acetone	**14**
Benzene	**1.4**
Carbon disulfide	**1.6**
Carbon tetrachloride	**0.31**
Chloromethane	**1.4**
Cyclohexane	**0.91**
Dichlorodifluoromethane	**2**
Ethyl Benzene	**3.5**
Isopropanol	**1.8**
Methylene chloride	**1.2**
n-Heptane	**1.9**
n-Hexane	**1.2**
o-Xylene	**5.5**
p-&m-Xylenes	**16**
p-Ethyltoluene	**9.6**
Propylene	**4.1**
Styrene	**0.71**
Tetrachloroethylene	**17**
Tetrahydrofuran	**0.98**
Toluene	**5.3**
Trichloroethylene	**0.71**
Trichlorofluoromethane	**1.2**
Vinyl Chloride	**0.21**

SAMPLE ID	25DUP-1		SAMPLE ID	25SV-2 (10')	
VOCs	Results	Q	VOCs	Results	Q
1,1,1-Trichloroethane	**27.7**		1,1,1-Trichloroethane	**23.4**	
1,2,4-Trimethylbenzene	**14.5**		1,2,4-Trimethylbenzene	**14.8**	
1,3,5-Trimethylbenzene	**4.31**		1,3,5-Trimethylbenzene	**4.44**	
1,3-Butadiene	**7.88**	J	1,3-Butadiene	**5.49**	
2,2,4-Trimethylpentane	**5.51**		2-Butanone	**15**	
2-Butanone	**24.2**	J	2-Hexanone	**3.34**	J
2-Hexanone	**5.33**	J	4-Ethyltoluene	**2.48**	
4-Ethyltoluene	**2.41**		Acetone	**107**	
4-Methyl-2-pentanone	**2.48**		Benzene	**20.3**	J
Acetone	**184**	J	Carbon disulfide	**386**	
Benzene	**7.67**	J	Cyclohexane	**3.2**	J
Carbon disulfide	**9.03**		Dichlorodifluoromethane	**2.22**	
Chloroform	**2.12**		Ethylbenzene	**6.17**	
Chloromethane	**0.832**		Heptane	**9.67**	
Cyclohexane	**5.89**	J	Isopropanol	**5.48**	
Dichlorodifluoromethane	**2.11**		n-Hexane	**11.5**	
Ethanol	**13.5**		Naphthalene	**3.68**	
Ethylbenzene	**5.95**		o-Xylene	**9.56**	
Heptane	**10.5**		p/m-Xylene	**19.6**	
Isopropanol	**25.8**	J	Tertiary butyl Alcohol	**78.5**	
n-Hexane	**12.5**		Tetrachloroethene	**46.8**	J
Naphthalene	**4.01**		Toluene	**23.4**	
o-Xylene	**8.9**				
p/m-Xylene	**20.8**				
Styrene	**1.36**				
Tertiary butyl Alcohol	**147**	J			
Tetrachloroethene	**14.2**	J			
Toluene	**20.2**				
Trichlorofluoromethane	**1.48**				

SAMPLE ID	25SV-1 (10')	
VOCs	Results	Q
2,2,4-Trimethylpentane	**4500**	
4-Methyl-2-pentanone	**98.4**	
Carbon disulfide	**23.9**	
Cyclohexane	**164**	
Heptane	**23.4**	
n-Hexane	**161**	
o-Xylene	**22.5**	
p/m-Xylene	**50.8**	
Tertiary butyl Alcohol	**40.3**	
Toluene	**24.3**	

SAMPLE ID	SSB-2
VOCs	Results
1,2,4-Trimethylbenzene	**5.8**
1,3,5-Trimethylbenzene	**1.4**
1,3-Butadiene	**1.3**
2-Butanone	**0.89**
2-Hexanone	**1.7**
Acetone	**6.2**
Benzene	**1.7**
Chloroform	**4.2**
Chloromethane	**0.46**
cis-1,2-Dichloroethylene	**0.4**
Cyclohexane	**1.7**
Dichlorodifluoromethane	**2.1**
Ethyl acetate	**1.5**
Ethyl Benzene	**1.8**
Isopropanol	**1.8**
Methyl Methacrylate	**0.83**
Methylene chloride	**1.4**
n-Heptane	**1.2**
n-Hexane	**1.1**
o-Xylene	**2.5**
p-&m-Xylenes	**7.3**
p-Ethyltoluene	**5.1**
Propylene	**2.4**
Styrene	**0.86**
Tetrachloroethylene	**550**
Toluene	**4.6**
Trichloroethylene	**240**
Trichlorofluoromethane	**1.2**

SAMPLE ID	SSB-1
VOCs	Results
1,1-Dichloroethane	**0.68**
1,2,4-Trimethylbenzene	**24**
1,3,5-Trimethylbenzene	**7.9**
1,3-Butadiene	**1.1**
1,4-Dioxane	**1.2**
2-Butanone	**3.9**
2-Hexanone	**4.5**
4-Methyl-2-pentanone	**1.4**
Acetone	**51**
Benzene	**2.2**
Carbon disulfide	**0.68**
Chloroethane	**0.44**
Chloroform	**1.8**
Chloromethane	**1.4**
cis-1,2-Dichloroethylene	**7.2**
Cyclohexane	**5.4**
Dichlorodifluoromethane	**2.1**
Ethyl acetate	**1.2**
Ethyl Benzene	**8.6**
Isopropanol	**18**
Methyl Methacrylate	**0.82**
Methylene chloride	**1.8**
n-Heptane	**8.6**
n-Hexane	**6**
o-Xylene	**14**
p-&m-Xylenes	**30**
p-Ethyltoluene	**26**
Propylene	**9.4**
Tetrachloroethylene	**92**
Tetrahydrofuran	**2.1**
Toluene	**13**
trans-1,2-Dichloroethylene	**2.2**
Trichloroethylene	**21**
Trichlorofluoromethane	**1.2**
Vinyl Chloride	**0.6**

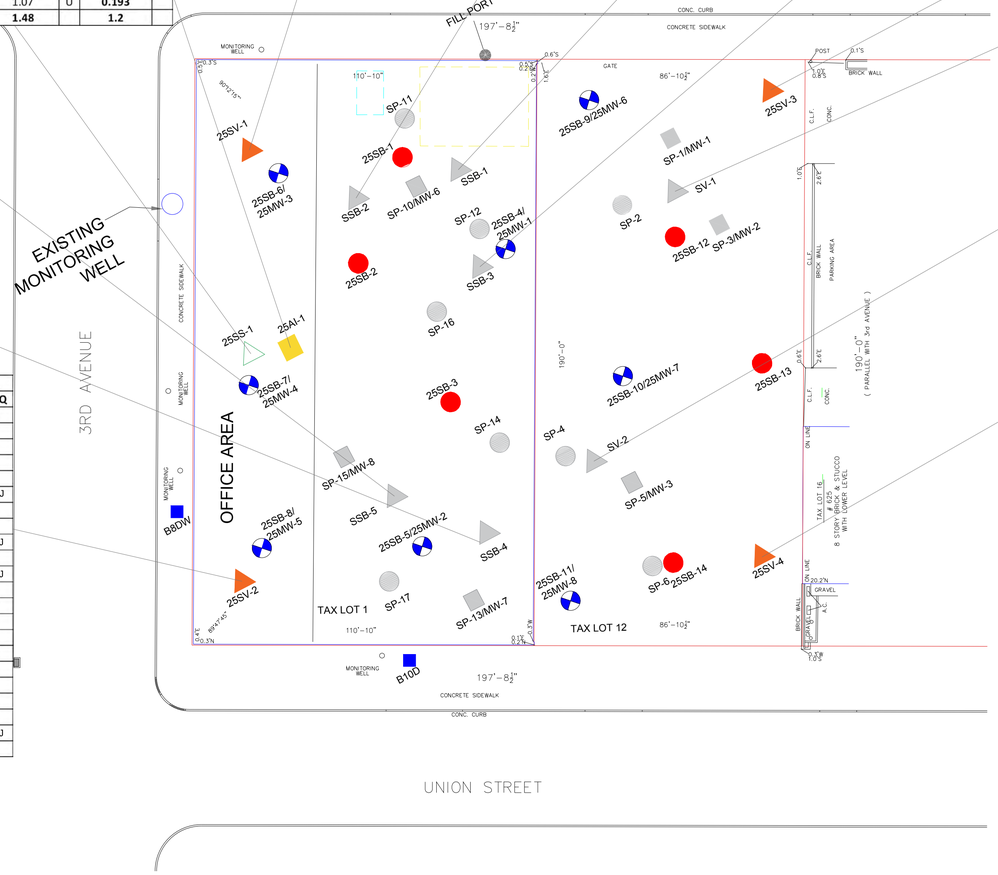
SAMPLE ID	SSB-3
VOCs	Results
1,2,4-Trimethylbenzene	**33**
1,3,5-Trimethylbenzene	**11**
1,3-Butadiene	**1.2**
1,4-Dioxane	**1.3**
2-Butanone	**7.8**
2-Hexanone	**5.7**
4-Methyl-2-pentanone	**5.7**
Acetone	**77**
Acrylonitrile	**0.38**
Benzene	**9.1**
Bromomethane	**0.68**
Carbon disulfide	**3.8**
Chloromethane	**1.3**
Cyclohexane	**28**
Dichlorodifluoromethane	**1.9**
Ethyl acetate	**2.4**
Ethyl Benzene	**20**
Isopropanol	**10**
Methyl Methacrylate	**4.3**
MTBE	**0.76**
Methylene chloride	**1.3**
n-Heptane	**38**
n-Hexane	**27**
o-Xylene	**26**
p-&m-Xylenes	**60**
p-Ethyltoluene	**40**
Propylene	**53**
Tetrachloroethylene	**150**
Tetrahydrofuran	**9.2**
Toluene	**37**
Trichloroethylene	**2.6**
Trichlorofluoromethane	**1.1**

SAMPLE ID	25SV-3 (10')	
VOCs	Results	Q
1,2,4-Trimethylbenzene	**3.3**	
1,3,5-Trimethylbenzene	**1.76**	
2-Butanone	**44.8**	
2-Hexanone	**9.34**	
Acetone	**568**	
Benzene	**56.2**	
Carbon disulfide	**21**	
Chloromethane	**0.458**	
Cyclohexane	**8.85**	
Dichlorodifluoromethane	**1.05**	
Ethanol	**21.1**	
Ethylbenzene	**21.6**	
Heptane	**14.1**	
Isopropanol	**7.2**	
n-Hexane	**25.5**	
o-Xylene	**13.9**	
p/m-Xylene	**26.1**	
Tertiary butyl Alcohol	**272**	
Toluene	**37**	

SAMPLE ID	SV-1 (10')
VOCs	Results
1,2,4-Trimethylbenzene	**1.4**
1,3-Butadiene	**1.3**
2-Butanone	**23**
2-Hexanone	**5.7**
Acetone	**99**
Acrylonitrile	**0.54**
Benzene	**1.7**
Carbon disulfide	**23**
Chloromethane	**0.87**
Cyclohexane	**8.5**
Dichlorodifluoromethane	**1.3**
Ethyl acetate	**1.4**
Ethyl Benzene	**2.1**
Isopropanol	**3.7**
Methylene chloride	**1.3**
n-Heptane	**6.6**
n-Hexane	**19**
o-Xylene	**1.9**
p-&m-Xylenes	**4.2**
p-Ethyltoluene	**0.94**
Propylene	**67**
Tetrachloroethylene	**1.3**
Toluene	**3.1**
Trichloroethylene	**0.51**

SAMPLE ID	SV-2 (10')
VOCs	Results
1,2,4-Trimethylbenzene	**2.5**
1,3,5-Trimethylbenzene	**0.85**
1,3-Butadiene	**1.1**
2-Butanone	**7**
2-Hexanone	**2.6**
4-Methyl-2-pentanone	**1.1**
Acetone	**53**
Acrylonitrile	**0.83**
Benzene	**3**
Carbon disulfide	**0.75**
Cyclohexane	**2.1**
Ethyl acetate	**1.6**
Ethyl Benzene	**1.1**
Isopropanol	**3.1**
Methylene chloride	**1.3**
n-Heptane	**28**
n-Hexane	**35**
o-Xylene	**1.6**
p-&m-Xylenes	**3.5**
p-Ethyltoluene	**1.4**
Propylene	**57**
Styrene	**0.74**
Tetrachloroethylene	**4.8**
Toluene	**5.9**
Trichloroethylene	**0.47**

SAMPLE ID	25SV-4 (10')	
VOCs	Results	Q
1,1,1-Trichloroethane	**1.26**	
1,2,4-Trimethylbenzene	**2.89**	
1,3,5-Trimethylbenzene	**1.3**	
2-Butanone	**34.8**	
2-Hexanone	**9.92**	
Acetone	**632**	
Carbon disulfide	**0.713**	
Chloroform	**2.65**	
Dichlorodifluoromethane	**2.39**	
Ethanol	**23.7**	
Ethylbenzene	**1.91**	
Heptane	**3.11**	
Isopropanol	**7.4**	
n-Hexane	**1.39**	
o-Xylene	**5.21**	
p/m-Xylene	**9.21**	
Tertiary butyl Alcohol	**330**	J
Tetrachloroethene	**7.8**	
Toluene	**1.68**	
Trichlorofluoromethane	**1.88**	



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Legend:

- Property Boundary
- Current Tax Lot Line
- 25SB-X/25MW-X — Soil Boring and Monitoring Well Location and Designated ID (2025)
- 25SV-X — Soil Vapor Point Location and Designated ID (2025)
- 25SB-X — Soil Boring Location and Designated ID (2025)
- Prior Soil Boring Location and Designated ID
- Prior Soil Boring and Monitoring Well Location and Designated ID
- Prior Soil Vapor Point Location and Designated ID
- Existing Monitoring Well Location
- Sub-Slab Vapor Point Location and Designated ID (2025)
- Off--Site Monitoring Well Location and Designated ID (2025)
- Indoor Air Sample Location and Designated ID (2025)

Scale: 0 — 50' — 100'

Figure No. 6

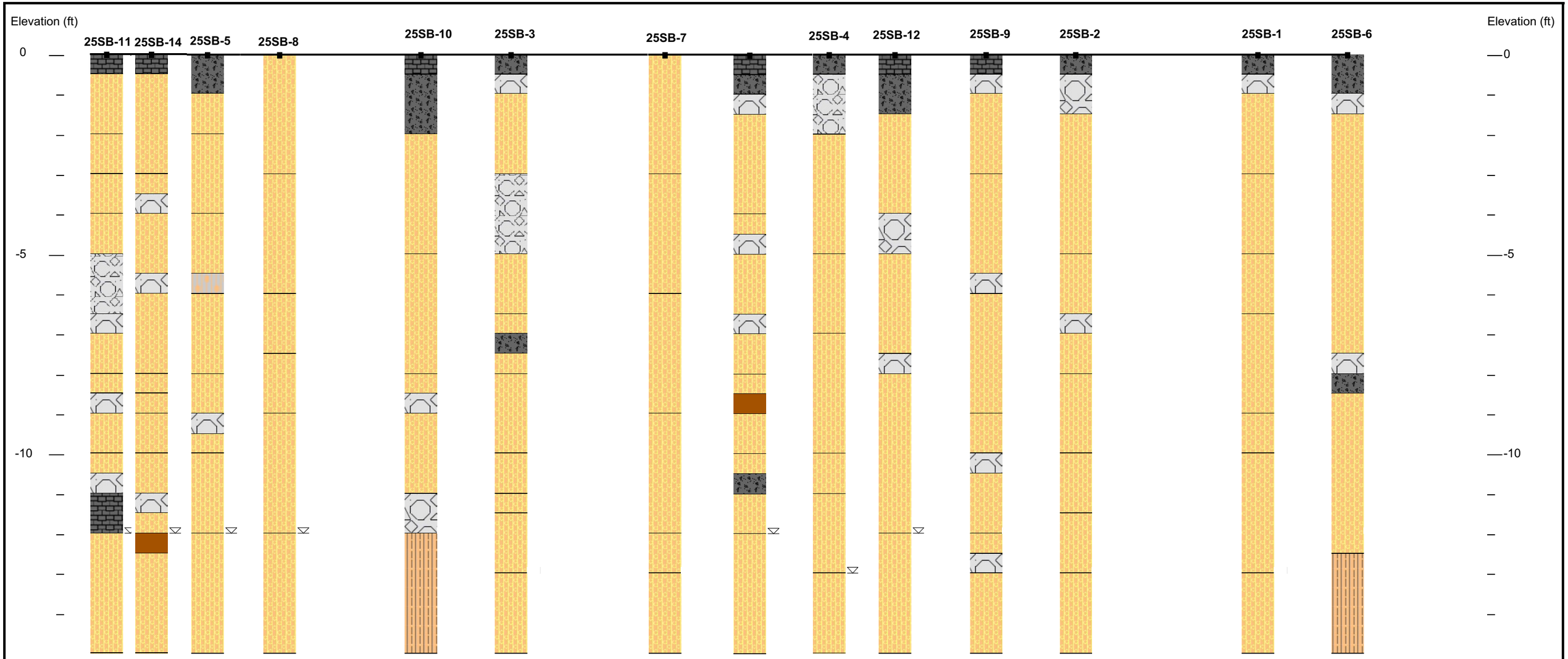
Figure Name: SOIL VAPOR DETECTIONS

Report: RAWP

Date: 8/14/2025

Drawn By: KB

Site Address: 601-607 UNION STREET
BROOKLYN, NY (C224392)



Legend

- CONCRETE
- Silty SAND (SM)
- Silty GRAVEL (GM)
- FILL
- Organic SOIL (OL)
- ASPHALT

Water Level During Drilling

Water Level at End of Drilling

Built with Google Maps



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FIGURE No.	7A
FIGURE NAME:	GEOLOGIC CROSS SECTION (N-S)
REPORT:	REMEDIAL ACTION WORK PLAN
SITE:	601-607 UNION STREET BROOKLYN, NY (C224392)

Elevation (ft)

25SB-13 | 25SB-12 | 25SB-14 | 25SB-10 | 25SB-11 | 25SB-9 | 25SB-3 | 25SB-4 | 25SB-5 | 25SB-2 | 25SB-1 | 25SB-7 | 25SB-8 | 25SB-6

0
-5
-10

190

Distance (ft)

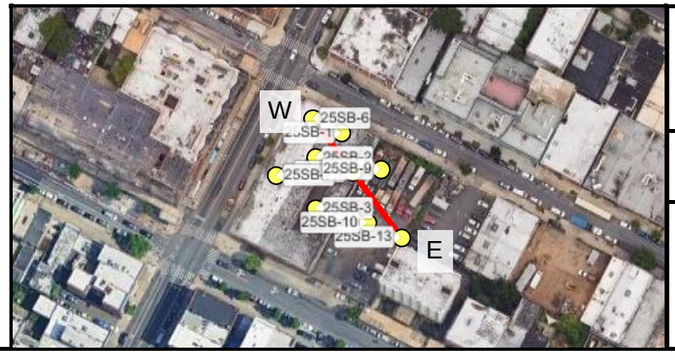
E 0 — 170 W

Legend

- ASPHALT
- CONCRETE
- FILL
- Silty SAND (SM)
- WOOD
- Organic SOIL (OL)

Water Level During Drilling
Water Level at End of Drilling

Built with Google Maps



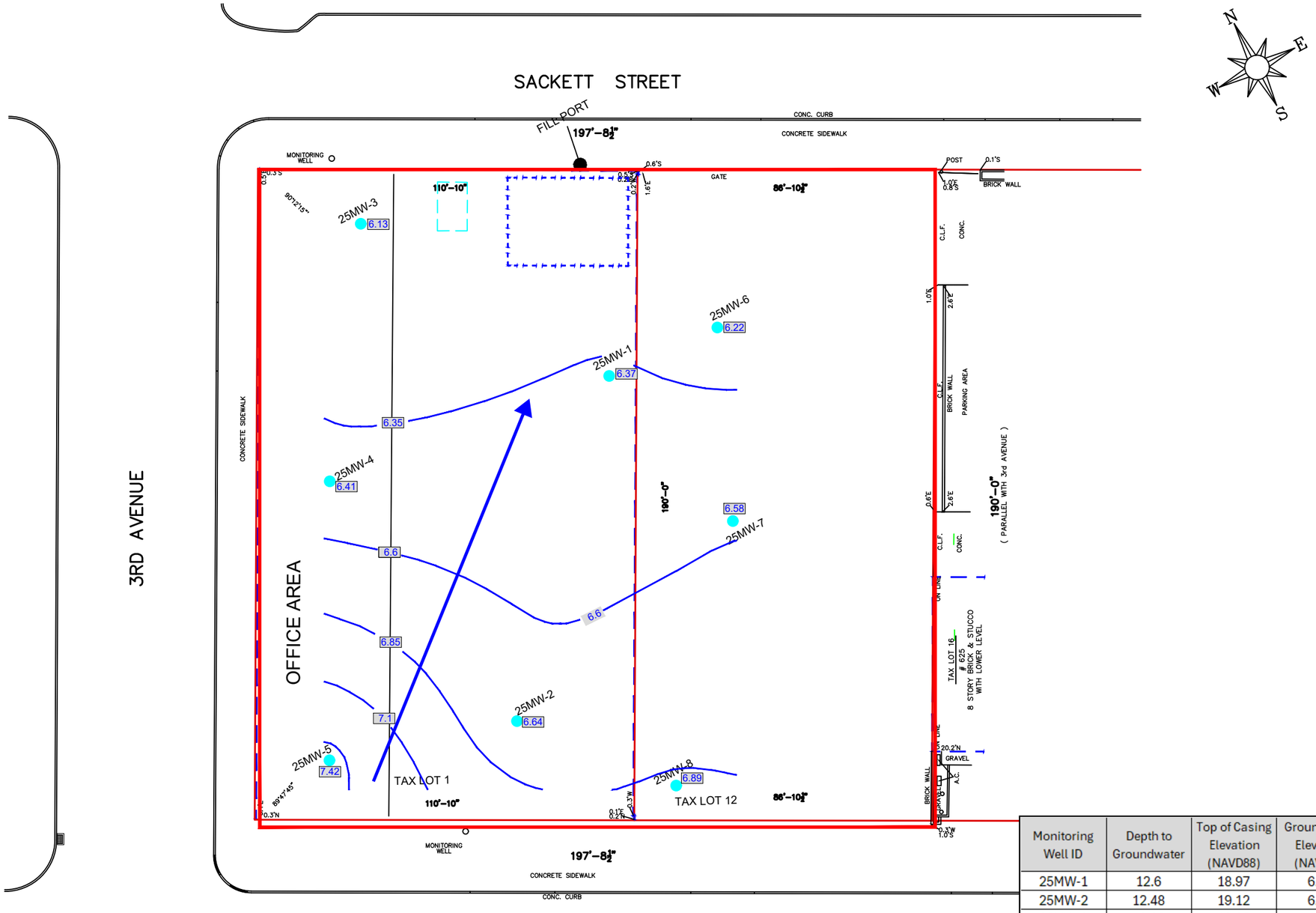
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FIGURE No. 7B

FIGURE NAME: GEOLOGIC CROSS SECTION (W-E)

REPORT: REMEDIAL ACTION WORK PLAN

SITE: 601-607 UNION STREET
BROOKLYN, NY (C224392)



Monitoring Well ID	Depth to Groundwater	Top of Casing Elevation (NAVD88)	Groundwater Elevation (NAVD88)
25MW-1	12.6	18.97	6.37
25MW-2	12.48	19.12	6.64
25MW-3	13.22	19.35	6.13
25MW-4	15.28	21.69	6.41
25MW-5	12.72	20.14	7.42
25MW-6	13.15	19.37	6.22
25MW-7	12.52	19.10	6.58
25MW-8	12.63	19.52	6.89

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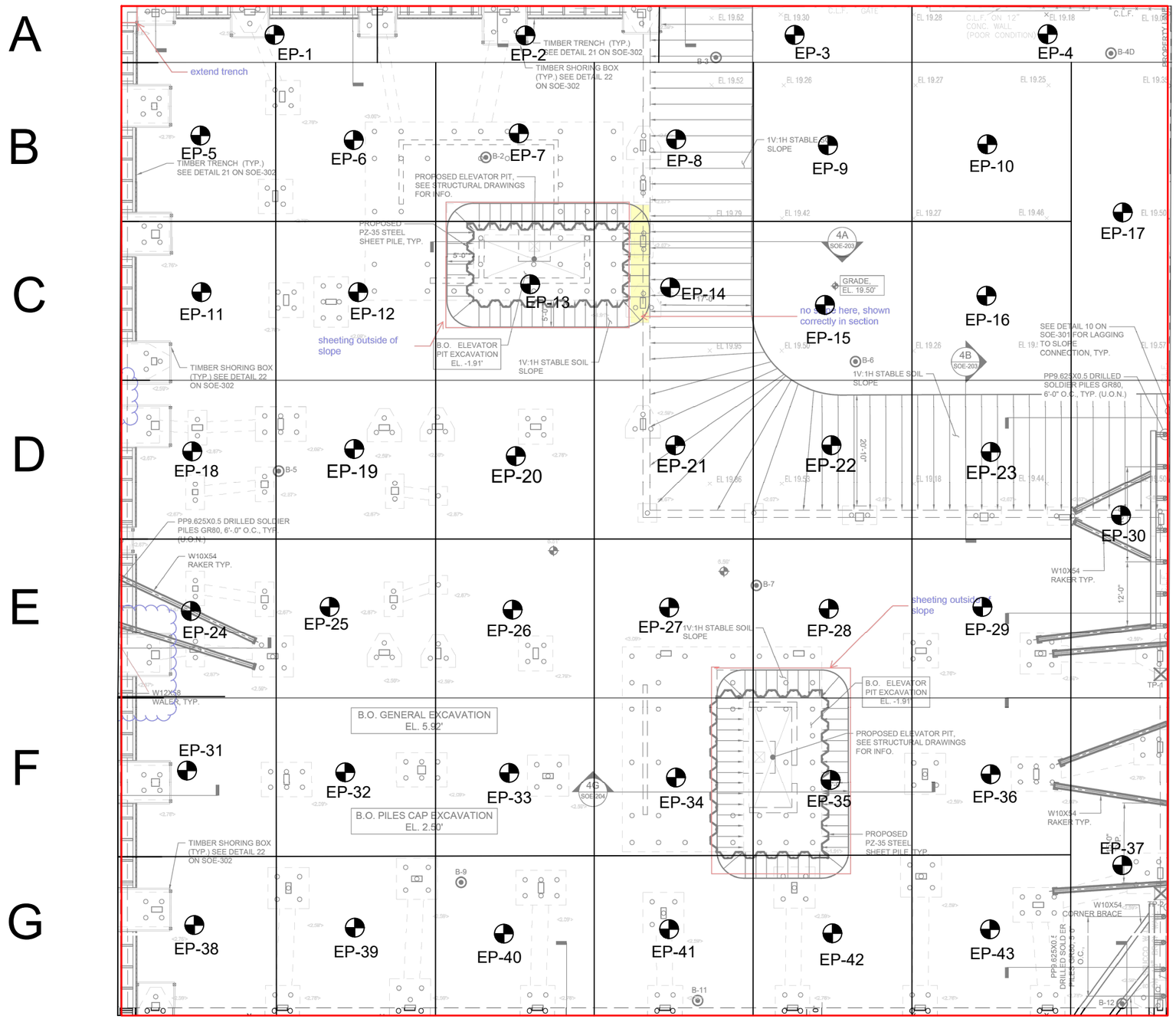
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Legend:

- Property Boundary
- Monitoring Well
- 15.08 Groundwater Elevation (feet)
- Groundwater Elevation Contour Line (feet)
  Contour Interval = 0.5 feet
- 15.08 Groundwater Elevation (feet)
- Groundwater Flow Direction

Scale: 0 50' 100'

Figure No.	8
Figure Name:	GROUNDWATER CONTOUR PLAN
Report:	RAWP
Date:	10/7/2025
Drawn By:	KB
Site Address:	601-607 UNION STREET BROOKLYN, NY (C224392)



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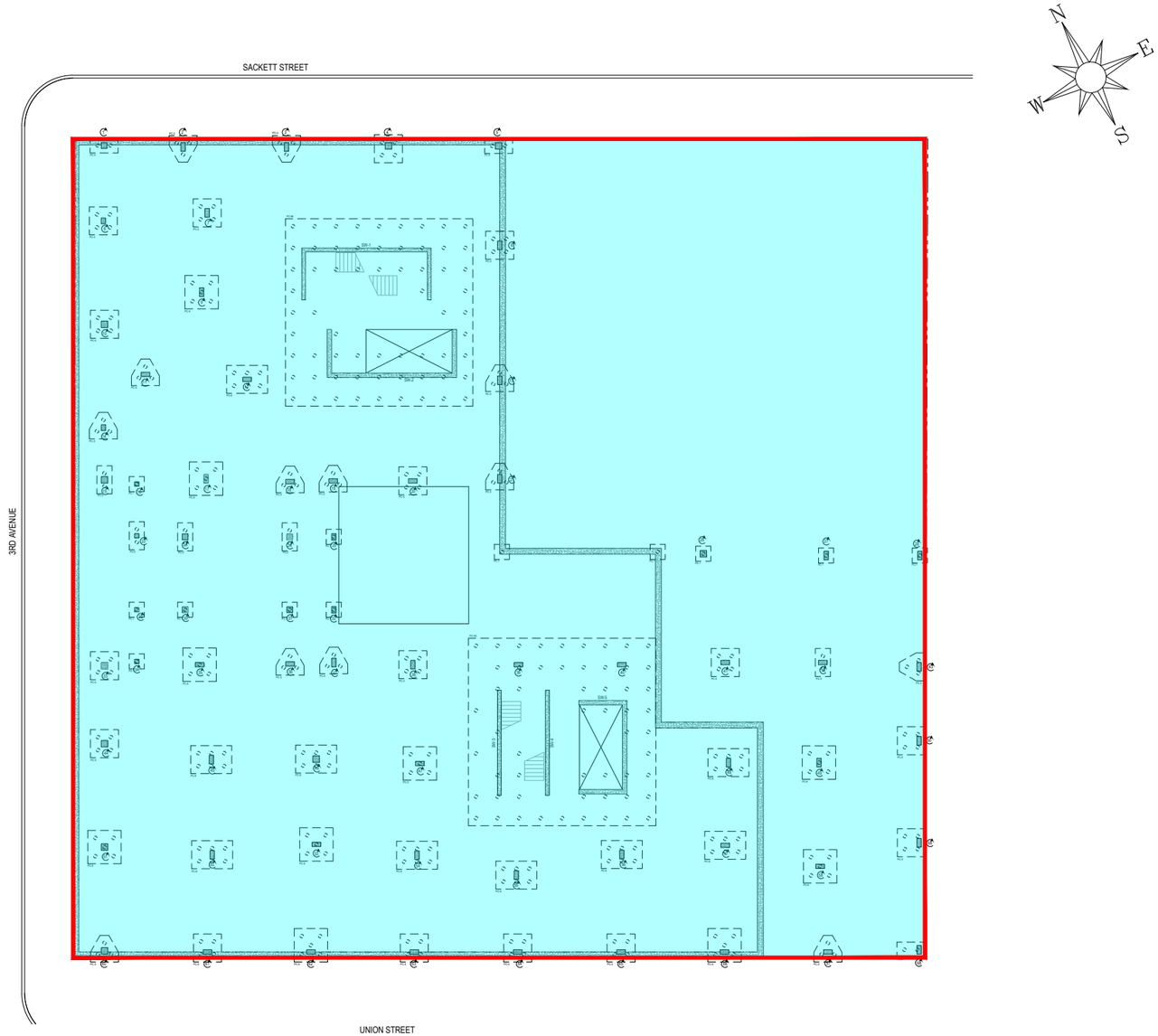
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Legend:

- Site Boundary
- EP-X — Proposed End Point Sample ID and Location
- Alpha Numeric Grid

Scale: 0 15 20

Figure No.	3
Figure Name:	ALPHA NUMERIC GRID & EP SAMPLE LOCATIONS
Report:	RAWP
Date:	10/30/2025
Drawn By:	KB
Site Address:	601-607 UNION STREET, BROOKLYN, NY (C224392)



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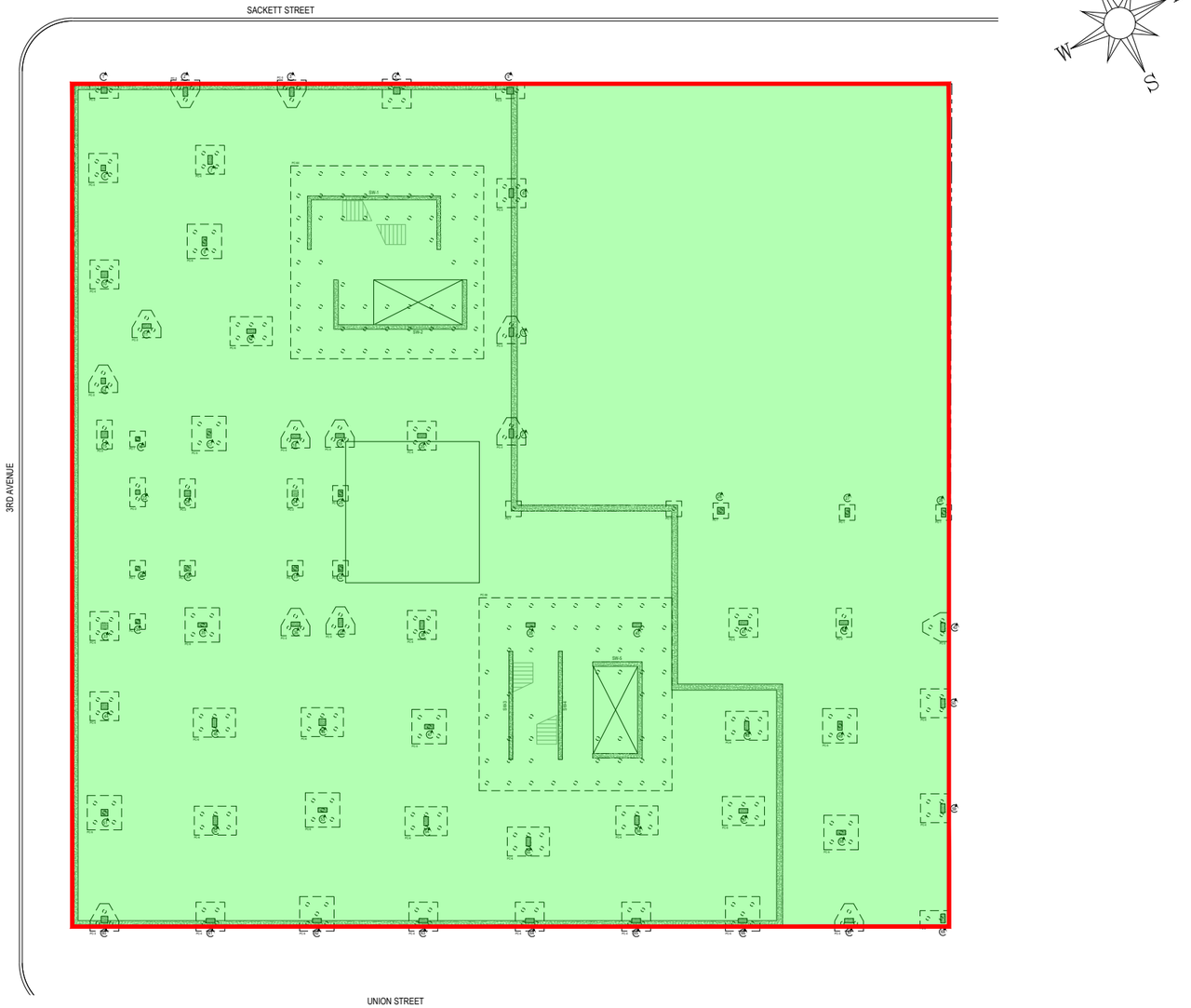
Legend:

- BCP SITE
- EXCAVATION TO 28-30 FEET

Scale:

0 25' 50'

Figure No.	10
Figure Name:	TRACK 1 EXCAVATION WORK PLAN
Report:	RAWP
Date:	10/30/2025
Drawn By:	KB
Site Address:	601-607 UNION STREET, BROOKLYN, NY (C224392)



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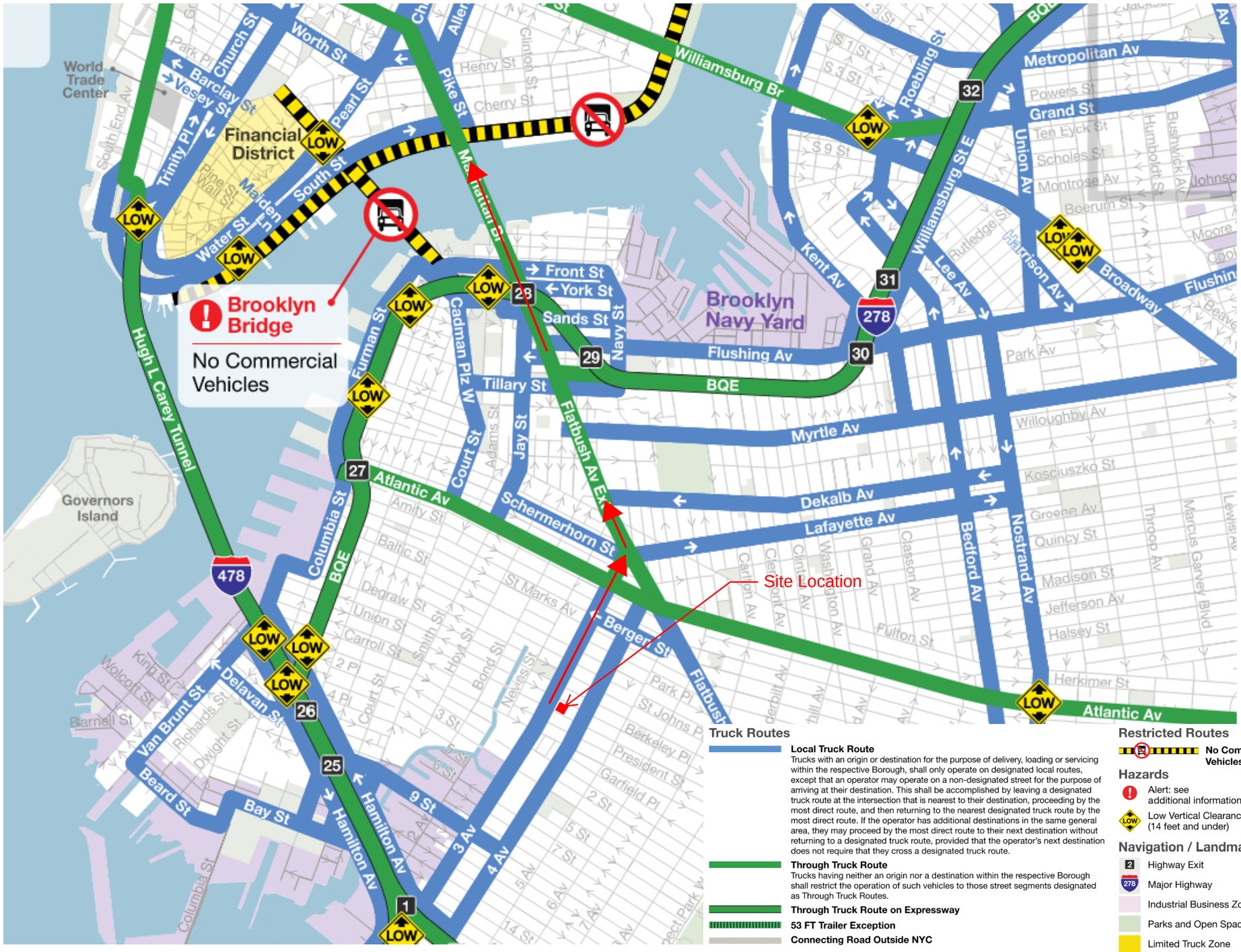
Legend:

- BCP SITE
- EXCAVATION TO 15 FEET

Scale:

0 25' 50'

Figure No.	11
Figure Name:	TRACK 2 EXCAVATION WORK PLAN
Report:	RAWP
Date:	10/30/2025
Drawn By:	KB
Site Address:	601-607 UNION STREET, BROOKLYN, NY (C224392)



Truck Routes

Local Truck Route
Trucks with an origin or destination for the purpose of delivery, loading or servicing within the respective Borough, shall only operate on designated local routes, except that an operator may operate on a non-designated street for the purpose of arriving at their destination. This shall be accomplished by leaving a designated truck route at the intersection that is nearest to their destination, proceeding by the most direct route, and then returning to the nearest designated truck route by the most direct route. If the operator has additional destinations in the same general area, they may proceed by the most direct route to their next destination without returning to a designated truck route, provided that the operator's next destination does not require that they cross a designated truck route.

Through Truck Route
Trucks having neither an origin nor a destination within the respective Borough shall restrict the operation of such vehicles to those street segments designated as Through Truck Routes.

Through Truck Route on Expressway

53 FT Trailer Exception

Connecting Road Outside NYC

Restricted Routes

No Commercial Vehicles

Hazards

Alert: see additional information

Low Vertical Clearance (14 feet and under)

Navigation / Landmarks

Highway Exit

Major Highway

Industrial Business Zone

Parks and Open Spaces

Limited Truck Zone

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Legend:

- BCP Site Boundary
- Truck Route (Towards NJ)
- Local Truck Route
- Through Truck Route

Note: All locations are approximate

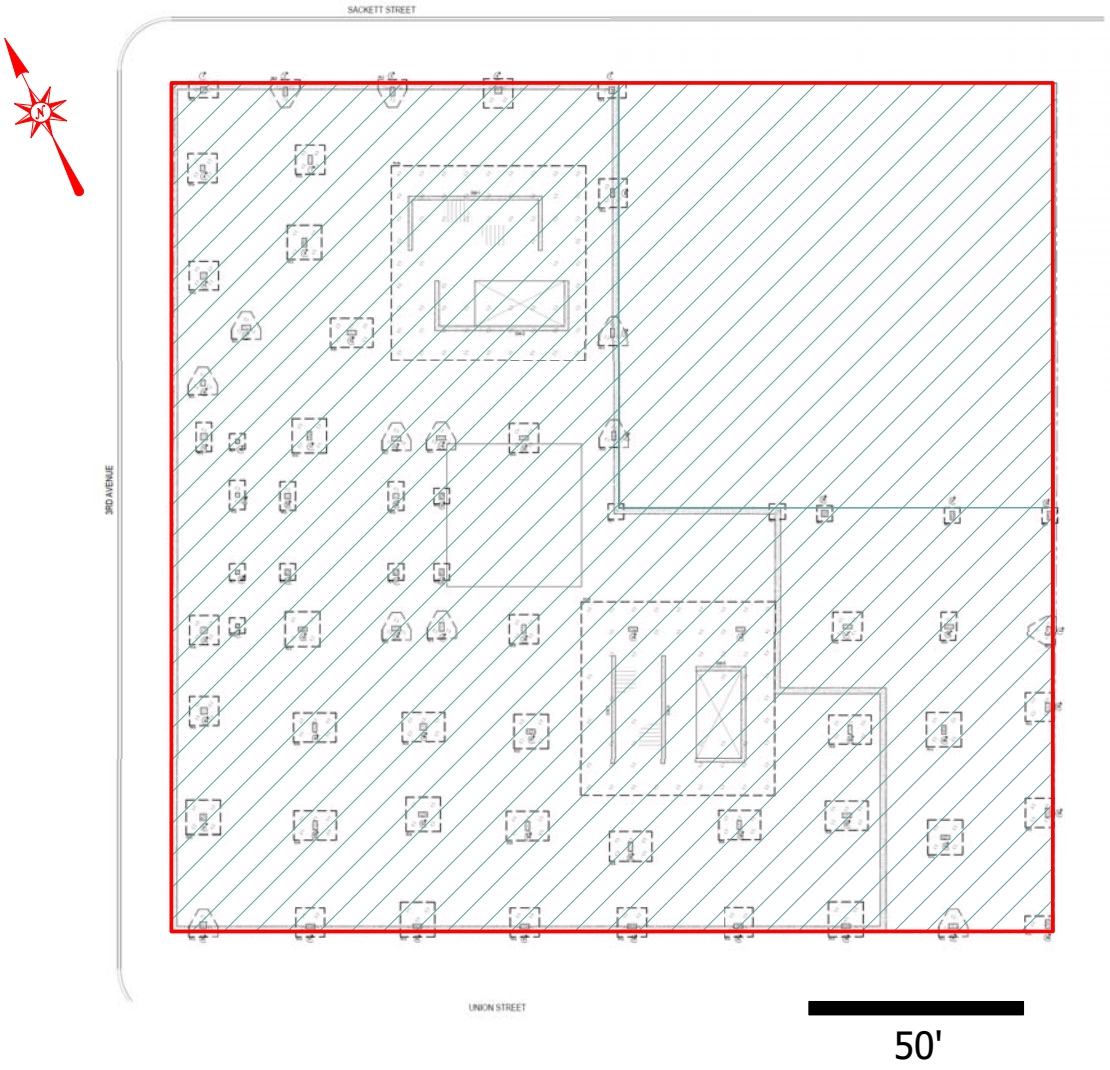
Scale:

0 — 1/2 Mile

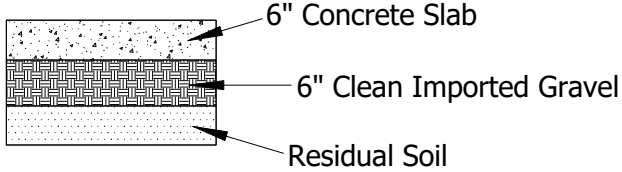
Figure No.	12
Figure Name:	Truck Route Map
Report:	RAWP
Date:	11/3/25
Drawn By:	AK
Site Address:	601-601 Union Street, Brooklyn, NY (C224392)

NOTES:

1. If the Site does not achieve a Track 2 cleanup, the Site will meet a Track 4 cleanup and a composite cover system will be constructed as needed.
2. The composite cover system would consist of a minimum of 6-inch-thick concrete slab over clean gravel.



Detail A



Legend

- BCP Site
- Composite Cover (see Detail A)

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
O: 718.545.0474

Figure No. **13**

DATE: NOV 26, 2025

Site Name: 601-607 Union Street

Site Address: 601-607 Union Street, Brooklyn NY

Drawing Title: Composite Cover Diagram

APPENDICES

APPENDIX A

METES AND BOUNDS

Schedule 1

Legal Description of Land

Premises: 601 & 607 Union Street, Brooklyn, NY
Tax ID: Block 434 Lots 1 and 12

LOT 1:

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

BEGINNING at a point on the easterly corner of 3rd Avenue and Union Street;

RUNNING THENCE southerly along Union Street, 110 feet 10 inches;

THENCE northeasterly parallel with 3rd Avenue, 190 feet to the westerly side of Sackett Street;

THENCE northwesterly along the said westerly side of Sackett Street, 110 feet 10 inches to the southeasterly side of 3rd Avenue;

THENCE southeasterly along the southeasterly side of 3rd Avenue, 190 feet to the corner aforesaid, to the point or place of BEGINNING.

LOT 12:

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

BEGINNING at a point on the southerly side of Sackett Street, distant 110 feet 10 inches easterly from the corner formed by the intersection of the southerly side of Sackett Street with the easterly side of 3rd Avenue;

RUNNING THENCE southerly parallel with 3rd Avenue, 190 feet to the northerly side of Union Street;

THENCE easterly along the northerly side of Union Street, 86 feet 10 1/2 inches;

THENCE northerly parallel with 3rd Avenue 190 feet to the southerly side of Sackett Street;

THENCE westerly along the southerly side of Sackett Street 86 feet 10 1/2 inches to the point or place of BEGINNING.

APPENDIX B

HEALTH AND SAFETY PLAN

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HEALTH AND SAFETY PLAN

Prepared For: 601 Union Street Owner LLC

Project Name: 601-607 Union Street Site

Project Location: 601-607 Union Street, Brooklyn, NY

Date: October 2025

37 West 37th Street, 6th Floor, New York, NY 10018

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Figure 1: Site Location Map

Attachment 1: Hazardous Substance Profiles

Attachment 2: Job Hazard Analysis Worksheet

Attachment 3: Directions to Hospital

Emergency Contacts			
Position	**Name**	**Organization**	**Phone**
Remedial Engineer	Ariel Czemerinski	AMC Engineering	(718) 545-0474
Project Director	Ezgi Karayel	Vektor Consultants	(347) 871-0750
Project Manager	Alex Keenan	Vektor Consultants	(347) 871-0750
Field Leader/Representative	Ben Neumann	Vektor Consultants	(347) 871-0750
Site Health and Safety Supervisor	Alex Keenan	Vektor Consultants	(347) 871-0750
Client Contact	Kemal Atayurt	601 Union Street Owner LLC	(917) 291-0856
Emergency Response	-	FDNY	911
Spill Hotline	-	NYSDEC	(800) 457-7362

Emergency Medical Facility	
Primary	***Alternate***
NewYork-Presbyterian Brooklyn Methodist Hospital 506 6th St, Brooklyn, NY 11215 Tel: (718)-780-3000 Open 24 Hours	The Brooklyn Hospital Center 121 DeKalb Ave, Brooklyn, NY 11201 Tel: (718)-250-8000 Open 24 Hours
Route to emergency medical facility map attached to the back of this health & safety plan	

Sign-in Sheet

Name	Signature	Company	Date

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been prepared on behalf of 601 Union Street Owner LLC for the implementation of a Remedial Action Work Plan (RAWP) by Vektor Consultants, LLC (Vektor), X (X), and their subcontractors at the property located at 601-607 Union Street, Brooklyn, New York (the Site). The Site is identified by the City of New York as Borough of Brooklyn, Block 434, Lots 1 and 12.

This HASP describes lines of authority, responsibility, and communication as they pertain to health and safety functions at this site in compliance with *29 CFR 1910.120(b)(2) and 29 CFR 1926.65(b)(2)*. This plan also details key personnel who are responsible for the development and implementation of the HASP. Vektor and AMC field personnel will implement this HASP during Remedial Action.

1.1 Site Location and Description

The Site is located on the east side of Third Avenue between Sackett Street to the north and Union Street to the south in the Borough of Brooklyn, Kings County, New York. The Site consists of two contiguous tax lots totaling approximately 37,553 square feet (0.862 acres). The legal description of the Site is New York City Department of Finance (NYCDOF) Tax Block 434, Lots 1 and 12. A site location map is provided in Figure 1.

The western parcel: Lot 1 (21,055 square feet) consists of a 1-story office/warehouse building with a partial cellar (approximately 500 square feet) situated in the northeastern portion of the lot. One 550-gallon and one 3,000-gallon aboveground storage tank (AST), containing #2 fuel oil, are located in the cellar. The slab-on-grade and cellar areas are predominantly covered with concrete, except for a small, exposed area resulting from historic tank removal or other intrusive work. The eastern parcel: Lot 12 (16,498 square feet) is used as an open parking and storage yard, fully covered with asphalt.

1.2 Summary of Previous Investigations

The following reports were reviewed during the preparation of this HASP in order to determine potential hazards:

Phase I Environmental Site Assessment at 601-607 Union Street, Brooklyn, New York by Athenica Environmental Services, July 2022

- Athenica Environmental Services, Inc. (Athenica) prepared this report on behalf of Aniska Realty I, LLC, in accordance with ASTM Standard E1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment (ESA) Process.

- The following Recognized Environmental Conditions (RECs) were identified during the Phase I:
    - The presence of E-Designation for hazardous materials at the Site.
    - The historic industrial, manufacturing, auto repair, and fuel oil storage/handling uses of the Site.
    - The historic and/or current industrial, automotive service, and gasoline station uses of the surrounding properties.
    - Presence of open Spill #2009932 that was reported on March 9, 2021, approximately 50 feet west of the Site at 585 Union Street, where investigations identified contamination in soil and groundwater.
    - Presence of an open Spill #9605719 that was reported on August 2, 1996, approximately 315 feet east of the Site at 204-222 4th Avenue, where investigations identified contamination in soil vapor and groundwater.
    - The potential for vapor intrusion from Site operations, and off-Site properties with documented releases to soil vapor and groundwater.

Phase II Investigation Report at 601-607 Union Street, Brooklyn, New York by Hydro Tech Environmental Engineering and Geology, DPC, September 2022

- Based on the review of available Phase I ESA Reports summarized above, Hydro Tech Environmental Engineering and Geology, DPC (Hydro Tech) recommended a Phase II Environmental Site Assessment to evaluate whether historic industrial operations had adversely impacted the subsurface conditions beneath the Site prior to redevelopment.
- A Phase II investigation consisting of a geophysical survey, installation and sampling of seventeen (17) soil borings, installation and sampling of eight (8) temporary groundwater monitoring wells, and the installation and sampling of two (2) soil vapor points, and six (6) sub-slab vapor points was conducted at the Site in September 2022.
- The subsurface materials were generally described as a layer of black silty sand with pebbles and crushed concrete or asphalt pieces from the surface down to 2-6 feet, underlain by brown and black silty sand with or without rocks and pebbles.
- The geophysical survey did not identify any anomalies or areas of concern indicative of underground storage tanks, except for the oil/water separator located in the existing building.
- Seventeen soil borings, SP-1 through SP-17, were installed to 12 feet bgs (i.e., groundwater table), and seventeen soil samples were collected to be analyzed at the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory for the presence of Part 375 Target Compound List (TCL) volatile organic compounds (VOCs) by United States

Environmental Protection Agency (EPA) Method 8260, TCL semi-volatile organic compounds (SVOCs) by EPA Method 8270, Target Analyte List (TAL) Metals by EPA Method 6000/7000, Pesticides by EPA Method 8081, PCBs by EPA Method 8082. Four of the soil samples were analyzed for PFAS compounds using EPA Method 537, and 1,4-dioxane using EPA Method 8270SIM.

- No photoionization detector (PID) readings were detected in the soil samples, except for two soil borings: SP-10 at the 8-10 feet interval and SP-11 at the 10-12 feet interval, which were detected as 428.1 parts per million (ppm) and 465.1 ppm, respectively.
- Based on the field observations, the following soil samples were collected:

Sample ID	Sample Intervals
SP-1	8-10 feet bgs
SP-2	8-10 feet bgs
SP-3	10-12 feet bgs
SP-4	4-6 feet bgs
SP-5	6-8 feet bgs
SP-6	2-4 feet bgs
SP-7	0-2 feet bgs
SP-8	1-3 feet bgs
SP-9	1-3 feet bgs
SP-10	8-10 feet bgs
SP-11	10-12 feet bgs
SP-12	10-12 feet bgs
SP-13	10-12 feet bgs
SP-14	6-8 feet bgs
SP-15	6-8 feet bgs
SP-16	8-10 feet bgs
SP-17	4-6 feet bgs

  - <u>VOCs in Soil:</u>
    Acetone was detected in SP-15 (6'-8') at a concentration of 0.057 parts per million (ppm) exceeding its respective NYSDEC Part 375 Unrestricted Use Soil Cleanup Objective (UUSCO) but below NYSDEC Part 375 Restricted Residential Use Soil Cleanup Objective (RRSCO). Chlorinated VOCs (CVOCs) including 1,4-dichlorobenzene (3.4 ppm) in SP-11 (10'-12') and methylene chloride (max. 5.1 ppm) in SP-1 (8'-10'), SP-2 (8'-10') and SP-6 (2'-4') were detected at concentrations exceeding their respective UUSCOs but below RRSCOs. Petroleum-related VOCs 1,2,4-trimethylbenzene (3.7 ppm), n-butylbenzene (25 ppm), n-propylbenzene, (max. 29 ppm), sec-butylbenzene (22 ppm) and total xylene (1.1 ppm) in SP-10 (8'-10') and SP-11 (10'-12') were detected at concentrations exceeding their respective UUSCOs but below RRSCOs. No other VOCs were detected in any of the soil samples at concentrations exceeding UUSCOs.

  - <u>SVOCs in Soil:</u>

SVOCs, including acenaphthene (23.8 ppm), benzo(a)anthracene (max. 40.5 ppm), benzo(a)pyrene (max. 54.8 ppm), benzo(b)fluoranthene (max. 21 ppm), benzo(k)fluoranthene (max. 28.2 ppm), chrysene (max. 43 mg/kg), dibenzo(a,h)anthracene (max. 4.41 ppm), fluoranthene (107 ppm), indeno(1,2,3 cd)pyrene (max. 24.9 ppm) and pyrene (183 ppm) were detected in SP-1 (8'-10'), SP-2 (8'-10'), SP-4 (4'-6'), SP-6 (2'-4'), SP-9 (1'-3'), SP-12 (10'-12'), SP-14 (6'-8'), SP-15 (6'-8') and SP-16 (8'-10') at concentrations exceeding their respective UUSCOs. Except acenaphthene, all these SVOCs were also detected in most of the samples exceeding their respective RRSCOs.

- Pesticides in Soil:
  No pesticides were detected in any of the soil samples at concentrations exceeding UUSCOs.

- PCBs in Soil:
  No PCBs were detected in any of the soil samples at concentrations exceeding UUSCOs.

- Metals in Soil:
  Metals including arsenic (max. 106 ppm), barium (max. 4,910 ppm), copper (max. 181 ppm), lead (max. 2,400 ppm), nickel (max. 451 ppm), silver (max. 7.08 ppm), zinc (max. 2,980 ppm), mercury (max. 47.1 ppm) and chromium trivalent (max. 109 ppm) were detected individually or collectively in all samples at concentrations exceeding their respective UUSCOs. Of these, arsenic in SP-3 (10'-12'), SP-7 (0-2'), SP-9 (1'-3'), SP-11 (10'-12'), SP-12 (10'-12') and SP-13 (10'-12'), barium in SP-6 (2'-4'), SP-7 (0-2'), SP-9 (1'-3'), and SP-12 (10'-12'), lead in SP-11 (10'-12'), and nickel in SP-9 (1'-3') exceed their respective RRSCOs.

- Emerging Contaminants in Soil:
  1,4-dioxane was not detected above its UUSCO in the samples it was analyzed for.

  Perfluorooctanoic acid (PFOA) in SP-4 (4'-6') was identified at a concentration of 1.62 ppm exceeding its respective UUSCO.

- Petroleum related VOCs were identified most abundant in deeper soil between 8 to 12 feet from the vicinity of the oil/water separator in the mid-northern portion of the existing building, which might be indicative of impact of leakage from the associated subgrade equipment.

- Several SVOCs and metals were detected in shallow and deep soil at concentrations exceeding UUSCOs. Several SVOCs and metals including arsenic, barium, lead, zinc and mercury also exceeded their respective RRSCOs. Lead and mercury also exceeded their respective PGWSCOs. Although the presence of the PAHs and the metals were attributed to the presence of urban fill material beneath the Site during the 2022 Phase II, the presence of elevated concentrations of metals could be attributed to historic Site operations.
- Groundwater was encountered at a range of approximately 12.3 feet to 13.75 feet below grade.
- During the initial investigation in 2022, eight temporary monitoring wells were installed, and eight groundwater samples were collected to be analyzed for the presence of TCL VOCs via USEPA Method 8260, TCL SVOCs via USEPA Method 8270, Target Analyte List (TAL) Metals by EPA Method 6000/7000, Pesticides by EPA Method 8081, PCBs by EPA Method 8082, PFAS compounds vie EPA Method 537, and 1,4-Dioxane by EPA Method 8270SIM. These groundwater samples were collected from temporary groundwater wells in 2022, and their results are considered non-representative of subsurface groundwater conditions at the Site and therefore, will not be included in the evaluation of the remedial data.

    - <u>VOCs in Groundwater:</u>
      One petroleum related-VOC, benzene was detected in MW-7 (6.21 ppb) at a concentration exceeding its GQS. No other VOCs were detected in any of the groundwater samples at concentrations exceeding their respective GQS.

    - <u>SVOCs in Groundwater:</u>
      SVOCs including benzo(a)anthracene (max. 0.36 ppb), benzo(a)pyrene (max. 0.19 ppb), benzo(b)fluoranthene (max. 0.16 ppb), benzo(k)fluoranthene (max. 0.17 ppb), chrysene (max. 0.37 ppb) and indeno(1,2,3-cd) pyrene (max. 0.1 ppb) were detected MW-2 through MW-4, MW-7 and MW-8 at concentrations exceeding their respective GQS. No other SVOCs were detected in any of the groundwater samples at concentrations exceeding their respective GQS.

    - <u>Pesticides in Groundwater:</u>
      No pesticides were detected at concentrations exceeding their respective GQS.

    - <u>PCBs in Groundwater:</u>
      No PCBs were detected in any samples.

- Metals in Groundwater:
  Total metals barium (max. 20,200 ppb), chromium (max. 1,480 ppb), copper (max. 8,790 ppb), lead (max. 52,700 ppb), magnesium (max. 232,000 ppb), manganese (max. 20,200 ppb), nickel (max. 1,550 ppb), Sodium (max. 735,000 ppb), zinc (max. 58,400 ppb), antimony (max. 32.7 ppb), arsenic (max. 4,090 ppb), beryllium (max. 20.2 ppb), cadmium (max. 220 ppb) and selenium (max. 2,040 ppb) were detected at concentrations exceeding their respective GQS.

  Dissolved metals barium (max. 3,170 ppb), chromium (max. 339 ppb), copper (213 ppb), lead (max. 9,230 ppb), magnesium (max. 146,000 ppb), manganese (max. 12,100 ppb), nickel (max. 1,990 ppb), sodium (max. 938,000 ppb), zinc (max. 11,700 ppb), antimony (max. 11.3 ppb), and beryllium (max. 136 ppb) exceeded their respective GQS in part of or all groundwater samples.

- Emerging Contaminants in Groundwater:
  1,4-Dioxane was detected in MW-6 at a concentration of 1.54 ppb, which exceeds its NYSDEC Guidance Value.

  Several PFAs were detected in all groundwater samples including 1H,1H,2H,2HPerfluorooctanesulfonic acid (6:2 FTS), Perfluorobutanesulfonic acid (PFBS), Perfluoroheptanoic acid (PFHpA), Perfluorohexanoic acid (PFHxA), Perfluoro-nbutanoic acid (PFBA), Perfluorooctanesulfonic acid (PFOS), Perfluorooctanoic acid (PFOA) and Perfluoropentanoic acid (PFPeA). The concentrations of PFOS (max. 0.042 ppb) in both MW-5 and MW-7 and PFOA (max. 0.070 ppb) in all groundwater samples with the exception of MW-8 were detected at concentrations exceeding their respective NYSDEC Guidance Values. No notable levels of chlorinated VOCs were observed in the soil. Petroleum-related VOCs and CVOCs were detected in groundwater marginally exceeding their respective regulatory standards but none of the exceedances should be indicative of spills or significant impact from historic use of the Site for auto repair.

- The presence of SVOCs and dissolved metals in the groundwater beneath the Site was attributed to regional groundwater quality or urban fill during the 2022 Phase II.
- During the 2022 Phase II ESA, two soil vapor points were installed to 10 feet, and six sub-slab vapor points were installed 3 inches below the existing building slab, and two soil vapor samples, and six sub-slab vapor samples were collected to be analyzed for VOCs via EPA Method TO-15.
  - Results showed total VOC concentrations range from 109.7 ug/m^3 in SSB-4 to 2,141.7 ug/m^3 in SSB-6. Chlorinated VOCs including 1,1-dichloroethane (3.9

ug/m^3), chloroethane (0.44 ug/m^3), chloroform (max. 4.2 ug/m^3), chloromethane (max. 2.3 ug/m^3), cis-1,2-dichloroethylene (max. 7.2 ug/m^3), dichlorodifluoromethane (max. 2.1 ug/m^3), methylene chloride (max. 5.2 ug/m^3), tetrachloroethylene (PCE) (max. 550 ug/m^3), trans-1,2-dichloroethylene (2.2 ug/m^3), trichloroethylene (TCE) (max. 240 ug/m^3) and trichlorofluoromethane (freon 11) (max. 1.2 ug/m^3) were detected individually or collectively in all vapor samples.

- Petroleum related VOCs including BTEX compounds (benzene, toluene, ethyl benzene and xylenes) and their derivatives were commonly detected in all vapor samples. The total concentration of BTEX compounds range from 13 ug/m^3 in SV-1 to 152.1 ug/m^3 in SSB-3.
- Chlorinated solvents such as PCE and TCE were identified in soil vapor and sub slab vapor at concentrations requiring mitigation as per the NYSDOH Decision Matrix. Since these VOCs were not identified in soil at elevated concentrations, Hydro Tech determined that the presence of CVOCs in soil vapor is likely attributed to an off-Site source.

The soil and soil vapor data of the 2022 Phase II ESA are currently being validated. Therefore, the soil and soil vapor results of the 2022 Phase II are incorporated into this RI. Tables 3B through 8B and Table 17B provide the results of the 2022 Phase II ESA. Figures 5 and 8 include the exceedances in soil and soil vapor, respectively. Since the groundwater samples were collected via temporary monitoring wells and were not available for resampling at the time of the RI, the groundwater results from 2022 are not considered usable.
Copies of the previous reports are provided as Appendix A. All prior reports have been previously submitted to NYSDEC and NYSDOH and can be found in the document repositories which can be found at the following repository link: https://extapps.dec.ny.gov/data/DecDocs/C224392/.

Remedial Investigation Report at 601-607 Union Street, Brooklyn, New York by vEKtor Consultants , October 2025

- Based on the findings of the RI, a historic urban fill layer extending to a maximum of 15 feet below grade surface (bgs) was identified across most of the Site. The fill material predominantly consists of brick, concrete, and miscellaneous debris underlain by silty sand with varying amounts of fine- to coarse-grained gravel. The underlying soils generally consist of medium-dense silty sand with trace to some gravel and clay. Saturated conditions were observed at approximately 12 to 13 feet below grade underlain by medium-dense silty sand with some gravel from 15 feet to

21 feet, followed by intervals of lean clay, gravel and organics. Bedrock was not encountered during the RI. A summary of the analytical results is provided below:

- Summary of Soil Analytical Results

    - Thirty-two (32) soil samples, and a set of MS/MSD samples were analyzed for full-suite TCL analysis during the RI, forty-five (45) soil samples were analyzed for TCLP lead and/or TCLP mercury, and three soil samples were analyzed for TCL SVOCs.
    - Two VOCs, acetone and 2-butanone, were detected above UUSCOs. Acetone is a common laboratory artifact and was detected in several samples at low concentrations. 2-Butanone was detected slightly above its UUSCO in one soil sample 25SB-6 (11-12) located in the northern portion of the Site. No VOCs were detected above RRSCOs.
    - Eleven SVOCs were detected above UUSCOs. Of these, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, ad indeno(1,2,3-cd)pyrene also exceeded their respective RRSCOs, and four SVOCs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene also exceeded their respective PGWSCOs in twenty soil samples between grade and 13 feet across the Site.
    - One pesticide, 4,4'-DDT, was detected slightly exceeding its respective UUSCO but below its RRSCO in one shallow soil sample, 25SB-5 (0-2') located in the southwestern portion of the Site.
    - No PCBs, PFAS, or1,4-dioxane were detected above regulatory standards in soil samples.
    - One or more of up to nine metals, including arsenic, barium, cadmium, copper, lead, mercury, nickel, selenium, and zinc, were detected at concentrations exceeding their respective UUSCOs in all soil samples. Of these, arsenic, barium, lead, and mercury also exceeded their respective RRSCOs in 27 soil samples across the Site.
    - Hazardous concentrations of lead were identified in 13 soil samples extending to 12 feet across the Site.
    - Soil results showed no exceedances of UUSCOs at approximately 28 feet below grade surface.

- Summary of Groundwater Analytical Results
    - One petroleum-related VOC, benzene, was detected in one on-Site groundwater sample slightly above its AWQS. However, three CVOCs specifically cis-1,2-dichloroethene, tetrachloroethene (PCE) and trichloroethene (TCE) were detected above their respective AWQS in the off-Site groundwater samples collected from the two monitoring wells located on the adjacent sidewalks. Therefore, the presence of CVOCs in groundwater is likely due to an off-Site source.
    - Five SVOCs were detected in groundwater samples across the Site above their respective AWQS. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, benzo(k)flouranthene and chrysene were detected above AWQS in 25MW-4. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, and chrysene were detected above AWQS in 25MW-5, and benzo(a)anthracene was detected above AWQS in 25MW-7 and 25MW-8. Due to the lack of SVOCs in off-Site monitoring wells, and presence of SVOCs in soil across the Site, the presence of SVOCs in groundwater could be attributed to the Site soils.
    - No herbicides, pesticides, or PCBs were detected in the groundwater samples above laboratory reporting limits.
    - Four dissolved metals, all of which are naturally occurring metals including iron, magnesium, manganese and sodium, were detected at concentrations exceeding their respective AWQS. It should be noted that naturally occurring metal contaminants in groundwater are not Site-specific contaminants of concern and will not be addressed by a remedy.
    - A total of twelve total metals, including barium, copper, iron, magnesium, manganese, nickel, selenium, and sodium, and three heavy metals, arsenic, chromium, mercury, and lead, were identified at concentrations exceeding their respective AWQS in the on-Site groundwater samples. None of the heavy metals were identified in the off-Site groundwater samples. Only four naturally occurring total metals, iron, magnesium, manganese, and sodium were identified at concentrations exceeding their respective AWQS in the off-Site groundwater samples. Due to the absence of dissolved heavy metals in on-Site groundwater samples, the Site soils were not deemed as the source.
    - Two PFAS compounds, PFOS and PFOA, were detected above the regulatory limits, PFOS in four samples and PFOA in nine groundwater samples. PFAS

samples were not detected in any of the soil samples above laboratory reporting limits.

- Summary of Soil Vapor Analytical Results
    - Results showed low concentrations of petroleum-related VOCs, with the single exception of 2,2,4-Trimethylpentane, which was detected at 4,500 µg/m^3 in soil vapor sample 25SV-1. BTEX was identified between 18.50 µg/m^3 in 25SV-4 to 154.8 µg/m^3 in 25SV-3. The highest concentrations of CVOCs detected were of PCE at 25SV-2 (46.80 µg/m^3) and 14.2 µg/m^3 in 25SV-DUP-1 (collected from the 25SV-2 location), and TCE at 25AI-1 (0.193 µg/m^3), which is located in the western portion of the Site.
    - When the results of the one sub-slab vapor sample and the co-located indoor air sample are evaluated against the NYSDOH Decision Matrices, no further action is required.
    - Soil vapor sample 25SV-1, located on the northwestern portion of the property, showed an elevated detection of isooctane (2,2,4-trimethylpentane) at 4,500 µg/m^3 as well as other elevated petroleum compound detections. Soil vapor sample 25SV-3, located on the northeastern portion of the property, showed low to moderate detections of petroleum and BTEX compounds. Soil vapor samples 25SV-2 and 25SV-4, located on the southwestern and southeastern portions of the Site, appear to have relatively lower detections of petroleum and BTEX compounds. In general, petroleum compound detections appear to be more elevated in the northern portion of the Site along Sackett Street. However, it should be noted that these VOCs were not detected in soil or groundwater samples, except for benzene in one groundwater sample.
    - The highest detection of PCE was identified in soil vapor sample 25SV-2 located in the southwestern portion of the property at 46.8 µg/m^3. On the southeastern portion of the Site, in soil vapor sample 25SV-4, PCE was detected at 7.8 µg/m^3, and on the northern portions of the Site, in soil vapor samples 25SV-1 and 25SV-3, PCE was not detected. Although CVOCs were not in soil samples above UUSCOs, they were detected in the off-site groundwater samples.

1.3 Scope of HASP

This HASP includes safety procedures to be used by Vektor and AMC personnel during the following activities:

- Implementation of remedial oversight and air monitoring activities; and

- Collection of post-remediation endpoint soil samples.

Contractors performing remedial construction work will ensure that the performance of the work is in compliance with this HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site.

2.0 ORGANIZATIONAL STRUCTURE

Vektor will provide a copy of this HASP to each contractor and subcontractor in accordance with 29 CFR 1910.120(b)(1)(iv) and 29 CFR 1926.65(b)(1)(iv) to inform them of site hazards and emergency procedures. All contractors and subcontractors are solely responsible for the safe and healthful performance of all work by each of its employees and/or support personnel who may enter the Site. Each contractor and subcontractor shall provide its own HASP as required by 29 CFR 1910.120 and 29 CFR 1926.65. However, they need to submit a copy of their HASP to Vektor/AMC or they can adopt this HASP during the Remedial activities.

2.1 Site Supervisor

As required by *29 CFR 1910.120(b)(2)(i)(A) and 29 CFR 1926.65(b)(2)(i)(A)*, a Site Supervisor will be assigned to the project prior to the implementation of the Remedial Action Work Plan. The Site Supervisor is responsible for directing all hazardous waste operations. All other site personnel report directly to the Site Supervisor unless otherwise noted. The Site Supervisor is directly responsible for:

- Ensuring the pre-entry briefing and/or tailgate-safety meetings are held prior to initiating any site activity, and at such other times as necessary to ensure that employees are apprised of site hazards
- Ensuring that all work activities conducted are consistent with this HASP and making any modifications as necessary
- Verifying all Job Hazard Analyses and ensuring that ongoing Hazard Analysis is conducted at this Site
- Overseeing the training program and ensuring that employees are trained for all tasks or operations they are asked to perform
- Providing a copy of this HASP to each contractor and subcontractor
- Updating the Site Control Program as needed
- Granting site workers site and zone access approval
- Registering all site visitors
- Establishing and maintaining security measures for this Site
- Directing how each work zone is adjusted
- Notified if emergency assistance is needed
- Supervising PPE use on this Site
- Approving any changes in PPE used on this Site
- Notified when any hazardous substance spill occurs
- Evaluating the quality and safety of response activities after every emergency incident or evacuation of this Site

- Providing site workers with notifications and training on changes to the emergency response plan
- Evaluating confined spaces and responsible for the confined space permit program
- Performing initial monitoring to identify and evaluate any hazardous atmospheres during confined space operations
- Implementing the thermal stress program
- Authorizing the hot-work plan and cutting and welding operations
- Inspecting the hot-work permit area before work is authorized
- Monitoring site activities as they pertain to health and safety at this site
- Stopping any unsafe acts that pose an immediate or imminent health and safety hazard to anyone at this site
- Ensuring that all elements of this HASP are followed and correctly implemented
- Updating the Site Health and Safety Supervisor and other applicable personnel as to changes or work progress reports that may pertain to health and safety functions at this site
- Setting up decontamination lines and the solutions appropriate for the type of chemical contamination on the Site
- Controlling the decontamination of all equipment, personnel, and samples from the contaminated areas
- Ensuring that all required decontamination equipment is available and in working order
- Providing for collection, storage, and disposal of decontamination waste (e.g., rinse water, contaminated sediment, etc.)

2.2 Site Health and Safety Supervisor

As required by *29 CFR 1910.120(b)(2)(i)(B) and 29 CFR 1926.65(b)(2)(i)(B)*, Peter Rathsack (or designated alternate) is the Site Health and Safety Supervisor who has the responsibility and authority for all functions that may pertain to health and safety at this site. This is the individual located on a hazardous waste site that is responsible to the Site Supervisor and has the authority and knowledge necessary to implement the HASP and verify compliance with applicable safety and health requirements. The Site Health and Safety Supervisor is directly responsible for:

- Providing a copy of this HASP to each contractor and subcontractor
- Updating the Site Control Program as needed
- Notified if emergency assistance is needed
- Supervising PPE use on this Site
- Approving any changes in PPE used on this Site
- Notified when any hazardous-substance spill occurs

- Providing site workers with notifications and training on changes to the emergency response plan
- Performing initial monitoring to identify and evaluate any hazardous atmospheres during confined space operations
- Developing and implementing the HASP
- Monitoring site activities as they pertain to health and safety at this Site
- Stopping any unsafe acts that pose an immediate or imminent health and safety hazard to anyone at this Site
- Ensuring that all elements of this HASP are followed and correctly implemented
- Verifying compliance of subcontractors with respect to this HASP and reporting deviations to the SiteSupervisor
- Evaluating site incidents including spills, releases of hazardous substances
- Determining the appropriate response including site evacuations
- Implementing the Emergency Response Plan
- Coordinating emergency response activities on this Site

2.3 Contractors and Subcontractors

Each contractor and subcontractor shall designate a Contractor Site Representative. The Contractor Site Representative will interface directly with the Site Supervisor, and Vektor/AMC, the Site Health and Safety Supervisor, with regards to all areas that relate to this HASP and safe and healthful performance of work conducted by the contractor and/or subcontractor workforce. Contractor/Subcontractor Site Representatives for this site are listed in the Contact Summary Table at the end of this section.

2.4 Local/State/Federal Agency Representative

Local, state, and/or federal agencies are responsible for ensuring the Site is in compliance with appropriate regulatory requirements, permits, and/or legal ruling(s). Local/State/Federal Agency Representatives for this Site are listed in the Contact Summary Table at the end of this section.

The organizational structure shall be reviewed and updated as necessary to reflect the current status of site operations.

Contact Summary Table

Position	Name	Organization	Phone
Remedial Engineer	Ariel Czemerinski	AMC Engineering	(718) 545-0474
Project Director	Ezgi Karayel	Vektor Consultants	(347) 871-0750
Project Manager	Alex Keenan	Vektor Consultants	(347) 871-0750
Field Leader/Representative	Ben Neumann	Vektor Consultants	(347) 871-0750
Site Health and Safety Supervisor	Alex Keenan	Vektor Consultants	(347) 871-0750
Client Contact	Kemal Atayurt	601 Union Street Owner LLC	(917) 291-0856
Project Manager	Michele Dolan	NYSDOH	michele.dolan@health.ny.gov
Project Manager	Rafi Alam	NYSDEC	rafi.alam@dec.ny.gov
Emergency Response	-	FDNY	911
Spill Hotline	-	NYSDEC	(800) 457-7362

3.0 HAZARD ANALYSIS

This section describes the safety and health hazards associated with site work and the control measures selected to protect workers in compliance with *29 CFR 1910.120(b)(4)(ii)(A) and 29 CFR 1926.65(b)(4)(ii)(A)*. This is accomplished by creating a specific Job Hazard Analysis for each task and operation to be conducted at the Site.

The purpose of the Job Hazard Analysis is to identify and, to the extent practicable, quantify the health and safety hazards associated with each site task and operation, and to evaluate the risks of each hazard to workers. With this information, appropriate control methods are selected to eliminate the identified risks if possible, or to effectively control them. The control methods are documented in each task-specific Job Hazard Analysis.

Job Hazard Analyses contained in this HASP have been developed by Vektor Consultants and AMC Engineering, the Site Health and Safety Supervisor. The Site Supervisor is the individual responsible for reviewing and "verifying" that all Job Hazard Analyses are complete and to ensure that ongoing hazard analyses are conducted at this site.

3.1 Hazard Notification Process

The information in the Job Hazard Analysis Worksheets, Hazardous Substance Profiles, and Safety Data Sheets (SDS) is made available to all employees who could be affected in the scope of their work at the Site. This shall be done prior to beginning work activities.

New, or modifications to existing, Job Hazard Analysis Worksheets, Hazardous Substance Profiles, or SDS are communicated during routine briefings.

Consistent with *29 CFR 1910.120(i) and 29 CFR 1926.65(i)*, this information will also be made available to contractors and subcontractors.

The Site Supervisor is responsible for providing Site information, this HASP, and any modifications to it to contractors and/or subcontractors working on this Site.

3.2 Phases, Site Tasks and Hazard Analysis

This HASP applies to the implementation of the Remedial Action Work Plan at the Site. This HASP will apply to the following Tasks and/or Operations that will be accomplished during the implementation of the Remedial Action Work Plan:

1. Excavation, stockpiling, and off-site disposal of contaminated soil/fill and native soil to exceeding Track 1 Unrestricted Use SCOs. It is expected that a Track 1 cleanup will be achieved by developmental excavation with additional localized excavation within areas in the northern portion of the site. It is estimated that 33,000 tons of materials will be removed from the Site in accordance with all Federal, State, and local rules and regulations for handling, transport, and disposal.

2. Installation of support of excavation (SOE) elements to enable excavation of contaminated soil to achieve a Track 1 cleanup.
3. Screening for indications of contamination (by visual means, odor, and monitoring with a PID) of all excavated soil during any intrusive Site work.
4. Collection of post-excavation endpoint samples to evaluate the performance of the remedy with respect to attainment of Track 1 Unrestricted Use SCOs (UUSCOs).
5. Installation of groundwater monitoring wells.
6. Installation of groundwater injection wells.
7. Installation of soil vapor extraction wells.
8. Import of clean material (i.e.: soil meeting UUSCOs, virgin stone, native crushed stone) to backfill over-excavated areas to development depth.
9. Installation of permeable gravel for mitigation systems.

3.3 Chemical Hazards

Exposure to chemical hazards should always be avoided. When working around chemical hazards it is important to be protected by administrative and/or engineered controls or, if administrative and/or engineered controls are not practicable or fully protective, by use of proper personal protective equipment (PPE). A direct reading instrument must be used, as necessary, to establish potential worker exposure.

Below is a list of chemical hazards that may be encountered on this site.

Chemical Name	OSHA PEL (ppm)	OSHA PEL (mg/m^3)	NIOSH REL (ppm)	NIOSH REL (mg/m^3)	IDLH (ppm)	IDLH (mg/m^3)
Polycyclic Aromatic Hydrocarbons (PAHs)		5		0.5		50
Arsenic		0.01		0.002		5
Lead		0.05		0.05		100
Mercury (Vapor)		0.1		0.05		10
Trichloroethylene (TCE)	100		25		1000	
Tetrachlorethylene (PCE)	100		N/A		150	

OSHA PEL. OSHA sets permissible exposure limits (PELs) to protect workers against the health effects of exposure to hazardous substances. PELs are regulatory limits on the amount or concentration of a substance in the air. They may also contain a skin designation. PELs are enforceable. OSHA PELs are based on an 8-hour time-weighted average (TWA) exposure.

IDLH. Immediately dangerous to life or health (IDLH) is a regulatory value defined as the maximum exposure concentration in the workplace from which one could escape within 30 minutes without any escape-impairing symptoms or any irreversible health effects. This value should be referred to in respirator selection.

More specific chemical information is available in the Hazardous Substance Profiles included in Attachment 1 of this HASP. The Hazardous Substance Profiles are designed to assist with "chemical guidelines" in which further information may be needed, including but not limited to an SDS. This information is not intended to replace an SDS but rather to augment one.

3.4 Physical Hazards

Below is a list of physical hazards that may be encountered during the implementation of the Remedial Action Work Plan at this Site. Personal awareness, strict adherence to all safety requirements, and the use of proper PPE when applicable will help keep this work site safe.

- Hand Tool Use
- Heavy Manual Lifting/Moving
- Material Handling
- Noise (Sound Pressure Level), dBA
- Sharp Objects
- Slips/Trips/Falls
- Traffic - On or Near Site
- Utilities (electrical, gas, water, etc.) – Overhead
- Utilities (electrical, gas, water, etc.) – Underground

3.5 Biological Hazards

Below is a list of biological hazards that may be encountered during the implementation of the Remedial Action Work Plan at this Site. Personal awareness, strict adherence to all safety requirements, and the use of proper PPE when applicable will help keep this work site safe.

3.6 Radiological Hazards

Job hazard analysis indicates that workers are not expected to encounter radiological hazards at this Site for the phases, tasks and/or operations and work locations covered by this HASP.

3.7 Job Hazard Analysis Worksheets

The site-specific Job Hazard Analysis Worksheet is included in Attachment 2. A single Job Hazard Analysis Worksheet may be used for multiple locations provided that the task or operation, and hazards and control measures, are the same in each location.

The Job Hazard Analysis Worksheet lists the following information:

- Phase description
- Specific task or operation
- Specific location for task or operation
- Hazard analysis date(s) of task or operation
- Task or operation date(s)
- Person responsible for developing Job Hazard Analysis
- Person responsible for reviewing the Job Hazard Analysis
- Chemical, physical, biological and radiological hazards for each task or operation
- Specific control measures for each task or operation
- Required permit(s), if any

The Job Hazard Analysis Worksheet should be kept updated as information changes and previous copies should be retained.

4.0 TRAINING PROGRAM

The Site Safety and Health Training Program is designed to provide workers with the training necessary to work safely on this Site in compliance with *29 CFR 1910.120(b)(4)(ii)(B) and 29 CFR 1926.65(b)(4)(ii)(B)*. Training requirements for this site are based on the Job Hazard Analysis, contained in Attachment 2 of this HASP, and relevant OSHA requirements. Employees who have not been trained to a level required by their job function and responsibility are not permitted to participate in or supervise field activities.

4.1 Initial HazWoper Training

Initial training requirements for field personnel are based on the personnel's potential for exposure and compliance with the requirements of *29 CFR 1910.120(e)(3) and 29 CFR 1926.65(e)(3)*.

General Site Workers (such as equipment operators, general laborers, and supervisory personnel) engaged in hazardous substance removal or other activities that expose, or potentially expose, them to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction off site, and a minimum of three days of actual field experience under direct supervision of a trained, experienced supervisor as per *29 CFR 1910.120(e)(3)(i) and 29 CFR 1926.65(e)(3)(i)*.

Specific Limited Task Workers on site only occasionally for a specific limited task (such as, but not limited to, field sampling, land surveying, geophysical surveying, or drilling) and who are unlikely to be exposed over permissible exposure limits and published exposure limits shall receive a minimum of 24 hours of instruction off site, and a minimum of one day of actual field experience under direct supervision of a trained, experienced supervisor as per *29 CFR 1910.120(e)(3)(ii) and 29 CFR 1926.65(e)(3)(ii)*.

4.2 Site-Specific Training

In addition to the initial HAZWOPER training requirements outlined above, site personnel shall be trained on the following site-specific elements:

- Names of personnel and alternates responsible for site safety and health
- Health, safety, and other hazards present
- Use of specific personal protective equipment (PPE) detailed in this HASP
- Standard work practices by which the personnel can minimize risks from the hazards detailed in this HASP
- Safe use of administrative and/or engineering controls and equipment detailed in this HASP
- Medical surveillance requirements detailed in this HASP
- Decontamination procedures detailed in this HASP

- The emergency response plan detailed in this HASP
- Heat and cold stress prevention
- Working safely around heavy equipment

4.3 Site Briefings

A site-specific briefing shall be provided to visitors who enter this Site beyond the designated entry point. For visitors, the site-specific briefing shall include information about site hazards, the site layout including work zones and places of refuge, the emergency alarm system and emergency evacuation procedures, and other pertinent safety and health requirements, as appropriate.

5.0 MEDICAL SURVEILLANCE PROGRAM

The Medical Surveillance Program is designed to medically monitor worker health to ensure that personnel are not adversely affected by site hazards in compliance with *29 CFR 1910.120(b)(4)(ii)(D) and 29 CFR 1926.65(b)(4)(ii)(D)*.

Medical surveillance is not required at this site due to:

- There is NO potential for worker exposure to hazardous substances at levels above OSHA permissible exposure limits or other published limits for 30 days or more per year, without regard to use of respiratory protection.
- Personnel DO NOT wear a respirator for 30 days or more a year or as required by *29 CFR 1910.134 and 29 CFR 1926.103*.

Any worker who is injured, becomes ill, or develops signs or symptoms of possible over-exposure to hazardous substances or health hazards on this Site shall receive a medical examination as soon as possible after the occurrence, with follow-up examinations provided as required by the attending physician. Physical Exams shall be consistent with *29 CFR 1910.120(f) and 29 CFR 1926.65(f)*.

6.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) will be used at this Site to protect employees from biological, chemical and physical hazards in compliance with *29 CFR 1910.120(b)(4)(ii)(C) and 29 CFR 1926.65(b)(4)(ii)(C)*. This includes hazards associated with, but not limited to, the implementation of the Remedial Action Work Plan.

With employee safety being the number one priority, site health hazards will be eliminated or reduced to the greatest extent possible through administrative and/or engineering controls and safe work practices. Where hazards are still present, a combination of administrative and/or engineering controls, work practices, and PPE will be used to protect employees.

The Site Supervisor and/or Health and Safety Supervisor are responsible for PPE use on this Site.

6.1 PPE Selection Criteria

PPE shall be selected and used to protect site workers from the hazards and potential hazards they are likely to encounter, as identified during the site characterization and Job Hazard Analysis (see Attachment 2). A PPE ensemble shall be assigned to each work task or operation.

PPE selection shall be based upon many factors. Materials providing the greatest duration of protection shall be used. Tear and seam strength of the PPE shall also be considered to ensure ensemble durability while work is performed.

When necessary, multiple layers of protection shall be used to accommodate the range of hazards that may be encountered. All PPE shall be properly fitted.

PPE selection criteria shall also include:

- Level of PPE required (Level A, B, C, or D)
- PPE components
- Chemical suit and glove compatibility

All PPE ensembles shall be consistent with Appendix B of *29 CFR 1910.120 and 29 CFR 1926.65* and used in accordance with manufacturers' recommendations.

The following criteria were used to select PPE levels at this Site:

<u>Level D Protection was selected due to the following:</u>

- The atmosphere contains no known or suspected hazardous substances at concentrations that meet or exceed the published exposure limits

- Contact with hazardous levels of any chemicals through splashes, immersion, or by other means will not occur
- There is no potential for unexpected inhalation or contact with hazardous levels of any chemical

Training In Use of PPE

Employees receive general training regarding proper selection, use and inspection of PPE during initial HAZWOPER training and subsequent refresher training. Site-specific PPE requirements, including task-specific PPE, ensemble components, cartridge and canister service times, and inspection and maintenance procedures, as applicable, shall be communicated as identified in the Training Program.

Because chemical exposure levels present do not create a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape, positive pressure self-contained breathing apparatus or positive-pressure air-line respirators equipped with an escape air supply are not required.

7.0 ENVIRONMENTAL MONITORING

This section of the HASP describes how site worker exposures to hazardous substances will be monitored in compliance with *29 CFR 1910.120(b)(4)(ii)(E) and 29 CFR 1926.65(b)(4)(ii)(E)*.

7.1 Air Monitoring Procedures

Exposures to airborne hazardous substances shall be fully characterized throughout site operations to ensure that exposure controls are effectively selected and modified as needed. Air monitoring shall be used to identify and quantify airborne levels of hazardous substances and safety and health hazards to determine the appropriate level of site worker protection needed on site. Air monitoring procedures shall be consistent with OSHA requirements in *29 CFR 1910.120(c)(6) and 29 CFR 1926.65(c)(6)*.

Air monitoring shall be conducted using direct-reading instruments. Air monitoring includes:

- Initial monitoring prior to the beginning of remedial activities to identify conditions that may cause death or serious harm and to permit preliminary selection of site controls
- Periodic monitoring throughout the implementation of the Remedial Action Work Plan
- Implementation of a Community Air Monitoring Plan (CAMP) throughout Remedial activities

7.2 Initial Monitoring Procedures

Upon initial entry, representative air monitoring shall be conducted to identify any IDLH condition, exposure over permissible exposure limits or published exposure levels, exposure over a radioactive material's dose limits, or other dangerous condition such as the presence of flammable atmospheres or oxygen-deficient environments.

7.3 Periodic Monitoring

Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed, or when there is indication that exposure may have risen over permissible exposure limits or published exposure levels since previous monitoring was conducted. Situations where it shall be considered that the possibility exposures have risen are as follows:

- When work begins on a portion of the Site that has not been previously monitored

- When contaminants other than those previously identified are being handled
- When a change in environmental conditions exist
- When site workers handle leaking drums or containers, or work in areas with obvious liquid contamination
- When site workers report or exhibit signs of exposure

7.4 Direct-Reading Instrument Monitoring Procedures

Direct-reading instrument monitoring will be used on this site as follows:

- VOCs by photoionization detector (PID)
- Dust particulate by dust monitor

Monitoring equipment calibration and maintenance procedures on this site are:

- Every morning

7.5 Community Air Monitoring Program Procedures

CAMP was developed for this site in accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan included within DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) and is discussed in more detail in Appendix E of the Remedial Action Work Plan. All instruments will be operated and calibrated as per the manufacturer's specifications.

CAMP instrument monitoring will be used on this site as follows:

- VOCs by photoionization detector (PID)
- Dust particulate by dust monitor

Monitoring equipment calibration and maintenance procedures on this site are:

- Every morning

A CAMP requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind and upwind perimeters 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 in Appendix E of the

Remedial Action Work Plan 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.

8.0 DECONTAMINATION

This HASP element describes procedures for decontaminating site workers and equipment when exiting the Exclusion Zone in compliance with *29 CFR 1910.120(b)(4)(ii)(G) and 29 CFR 1926.65(b)(4)(ii)(G)*. This section also describes disposal of waste from decontamination processes. Site decontamination procedures are designed to achieve a safe, logical removal or neutralization of contaminants that may accumulate on site workers and/or equipment. The Site Supervisor is responsible for decontamination procedures at this site.

These procedures are intended to minimize site worker contact with contaminants and protect against the transfer of contamination to clean areas of the site and away from the site. They may also extend the useful life of personal protective equipment (PPE) by reducing the amount of time that contaminants contact and permeate or otherwise affect the surfaces of PPE.

Decontamination procedures shall be communicated to site workers and implemented before any site workers or equipment are permitted to enter areas on site where potential for exposure to hazardous substances exists.

Emergency decontamination procedures are detailed in Section 8, the Emergency Response Plan of this HASP.

The decontamination procedures described below are designed to meet the requirements of *29 CFR 1910.120(k) and 29 CFR 1926.65(k)* and include site-specific information about:

- General and Specific Decontamination Procedures for Personnel and PPE
- General and Specific Decontamination Procedures for Equipment
- Location and Type of Site Decontamination Procedures
- Disposal of Residual Waste from Decontamination
- Monitoring the Effectiveness of Decontamination Procedures

8.1 General and Specific Decontamination Procedures for Site Workers and PPE

All site workers and PPE leaving a contaminated area shall be appropriately decontaminated. General decontamination guidelines for site workers and PPE include:

- Decontamination is required for all site workers exiting a contaminated area. Site workers may only re-enter uncontaminated areas after undergoing the decontamination procedures described in the next section.
- Protective clothing is decontaminated, cleaned, laundered, maintained and/or replaced as needed to ensure its effectiveness.
- PPE used at this site is decontaminated or prepared for proper disposal.
- The site requires and trains site workers that if their permeable clothing is splashed or becomes wetted with a hazardous substance, they will immediately exit the work zone, perform applicable decontamination procedures, shower, and change into uncontaminated clothing.

8.2 General and Specific Decontamination Procedures for Equipment

All contaminated clothing and equipment leaving a contaminated area shall be appropriately disposed of or decontaminated. General decontamination guidelines for equipment include:

- Decontamination is required for all equipment exiting a contaminated area. Equipment may only re-enter uncontaminated areas after undergoing specific decontamination as described in the Job Hazard Analysis Worksheets.
- Particular attention is given to decontaminating tires, scoops, and other parts of heavy equipment that are directly exposed to contaminants and contaminated soil.

8.3 Location and Type of Site Decontamination Procedures

Decontamination shall be performed in areas that will minimize the exposure of uncontaminated site workers or equipment to contaminated site workers or equipment. Decontamination on this site shall be conducted in the Contamination Reduction Zone. The Contamination Reduction Zone acts as a buffer between the Exclusion Zone and Support Zone. The location and design of decontamination stations minimize the spread of contamination beyond these stations.

8.4 Disposal of Waste from Decontamination

Procedures for disposal of decontamination waste shall meet applicable local, State, and Federal regulations.

8.5 Monitoring the Effectiveness of Decontamination Procedures

Decontamination procedures shall be monitored by a representative of Vektor Consultants or AMC Engineering, the Site Health and Safety Supervisor, to determine effectiveness. If procedures are found to be deficient, appropriate steps shall be taken to correct any deficiencies.

9.0 EMERGENCY RESPONSE PLAN

This section describes the site-specific Emergency Response Plan in compliance with *29 CFR 1910.120(b)(4)(ii)(H) and 29 CFR 1926.65(b)(4)(ii)(H)*. Specifically, the Emergency Response Plan addresses potential emergencies at this site, procedures for responding to these emergencies, roles and responsibilities during emergency response, and training. This element also describes the provisions this site has made to coordinate its emergency response planning with other contractors on site and with off-site emergency response organizations.

This Emergency Response Plan shall be available for inspection and copying by site workers, their representatives, OSHA personnel, and other governmental agencies with relevant responsibilities as required by *29 CFR 1910.120(l)(1)(i) and 29 CFR 1926.65(l)(1)(i)*.

In accordance with *29 CFR 1910.120(l)(3)(ii) and 29 CFR 1926.65(l)(3)(ii)*, this Emergency Response Plan is a separate section of the HASP.

9.1 Pre-Emergency Planning

This Emergency Response Plan is compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies.

This Site has been evaluated for potential emergency occurrences based on site hazards, the tasks within the work plan, the site topography, and prevailing weather conditions.

9.2 Personnel Roles, Lines of Authority, and Communication

Anyone may activate the Emergency Response Plan; however, Peter Rathsack (or designated alternate), Site Health and Safety Supervisor, is responsible for implementing the Emergency Response Plan and coordinating emergency response activities on this Site. Peter Rathsack (or designated alternate) also provides specific direction for emergency action based upon information available regarding the incident and response capabilities, initiates emergency procedures including protection of the public, and ensures appropriate authorities are notified.

In accordance with *29 CFR 1910.38(a) and 29 CFR 1926.35*, in the event of an emergency, site workers are evacuated and do not participate in emergency response activities.

This Site relies upon the off-site emergency response organizations listed in the Emergency Response Contact Information list to respond to site emergencies. These organizations are appropriately trained, staffed, and equipped to provide emergency response to this site.

These organizations are contacted at least annually to verify the accuracy of phone numbers and contact names.

Communication on this site will be conducted by the following methods:

- Face to face
- Cell phone
- Hand signals

9.3 Site Security and Control

In case of an on-site emergency, site security and control for this site shall be provided by:

- Warning Signs
- Barrier Tape
- Locked Doors and Gates

9.4 Emergency Medical Treatment and First Aid

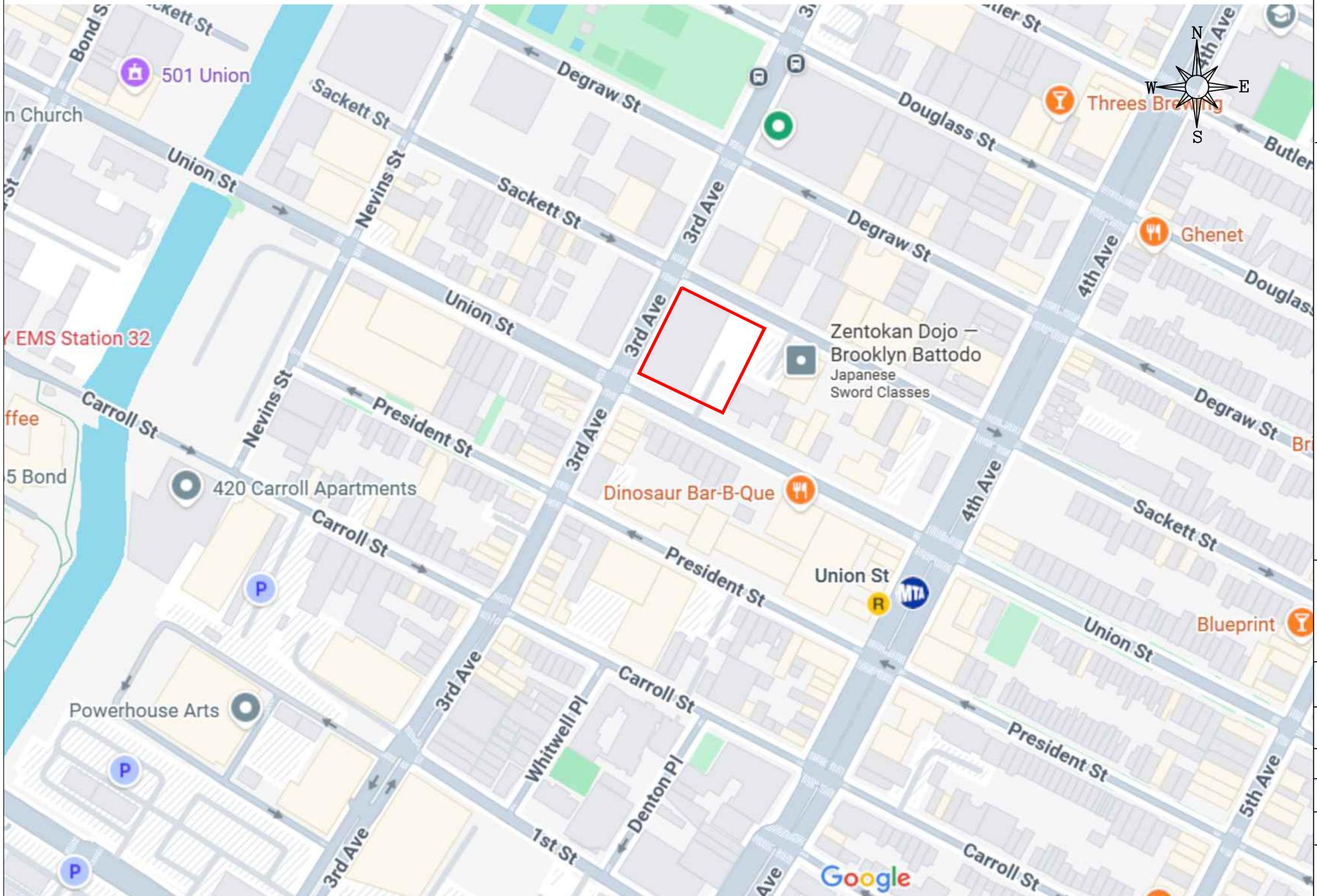
Any site worker who requires medical care and/or is transferred to a medical facility shall be accompanied by Hazardous Substance Profiles included in Attachment 1 of this HASP and other applicable information to apprise caregivers of the chemicals and hazards to which the victim has potentially been exposed. The emergency medical care facility for this site is:

NewYork-Presbyterian Brooklyn Methodist Hospital
506 6th St, Brooklyn, NY 11215
Tel: (718)-780-3000
Open 24 Hours

The route to the facility is shown on the map included in Attachment 3 of this HASP.

FIGURE 1

SITE LOCATION MAP



vEKtor consultants

t: +1.347.871.0750
f: +1.347.402.7735
e: info@vektorconsultants.com
www.vektorconsultants.com

Legend:

SITE BOUNDARY

Notes:

1. BASE MAP PROVIDED BY GOOGLE MAPS

Scale:

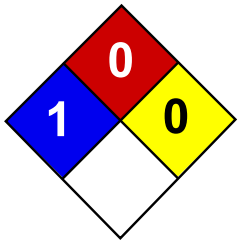
0 125' 250'

Figure No.	1
Figure Name:	SITE LOCATION MAP
Report:	RAWP-HASP
Date:	10/30/2025
Drawn By:	KB
Site Address:	601-607 UNION STREET, BROOKLYN, NY (C224392)

ATTACHMENT 1

HAZARDOUS SUBSTANCE PROFILES





Health	1
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Lead MSDS

Section 1: Chemical Product and Company Identification

Product Name: Lead

Catalog Codes: SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

CAS#: 7439-92-1

RTECS: OF7525000

TSCA: TSCA 8(b) inventory: Lead

CI#: Not available.

Synonym: Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

Chemical Name: Lead

Chemical Formula: Pb

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Lead	7439-92-1	100

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

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

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

Serious Inhalation: Not available.

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

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

Special Remarks on Fire Hazards: When heated to decomposition it emits highly toxic fumes of lead.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

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

Section 8: Exposure Controls/Personal Protection

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

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

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.05 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m3) from OSHA (PEL) [United States] TWA: 0.03 (mg/m3) from NIOSH [United States] TWA: 0.05 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

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

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

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

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

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

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungsby mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually abssorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, deliriuim, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead cholic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

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

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

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

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

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

Health: 1

Flammability: 0

Reactivity: 0

Specific hazard:

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

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:21 PM

Last Updated: 05/21/2013 12:00 PM

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SAFETY DATA SHEET

Version 6.6
Revision Date 05/25/2023
Print Date 11/11/2023

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

1.1 Product identifiers

Product name : Arsenic

Product Number : 267961
Brand : Aldrich
Index-No. : 033-001-00-X
CAS-No. : 7440-38-2

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

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

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

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

1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3), H301
Acute toxicity, Inhalation (Category 3), H331
Skin irritation (Category 2), H315
Serious eye damage (Category 1), H318
Carcinogenicity (Category 1A), H350
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

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Pictogram	
Signal Word	Danger

Hazard statement(s)

H301 + H331	Toxic if swallowed or if inhaled.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H350	May cause cancer.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P391	Collect spillage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

SECTION 3: Composition/information on ingredients

3.1 Substances

Formula	:	As
Molecular weight	:	74.92 g/mol
CAS-No.	:	7440-38-2
EC-No.	:	231-148-6
Index-No.	:	033-001-00-X

Component	Classification	Concentration

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arsenic		
	Acute Tox. 3; Skin Irrit. 2; Eye Dam. 1; Carc. 1A; Aquatic Acute 1; Aquatic Chronic 1; H301, H331, H315, H318, H350, H400, H410 M-Factor - Aquatic Acute: 10 M-Factor - Aquatic Chronic: 1	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice
First aiders need to protect themselves. Show this material safety data sheet to the doctor in attendance.

If inhaled
After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

In case of skin contact
In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact
After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed
If swallowed: give water to drink (two glasses at most). Seek medical advice immediately. In exceptional cases only, if medical care is not available within one hour, induce vomiting (only in persons who are wide awake and fully conscious), administer activated charcoal (20 - 40 g in a 10% slurry) and consult a doctor as quickly as possible.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

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SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media
For this substance/mixture no limitations of extinguishing agents are given.

5.2 Special hazards arising from the substance or mixture

Nature of decomposition products not known.
Not combustible.
Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

5.4 Further information

Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Advice for non-emergency personnel: Avoid generation and inhalation of dusts in all circumstances. Avoid substance contact. Ensure adequate ventilation. Evacuate the danger area, observe emergency procedures, consult an expert.
For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully. Dispose of properly. Clean up affected area. Avoid generation of dusts.

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling
Work under hood. Do not inhale substance/mixture.

Hygiene measures
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.
For precautions see section 2.2.

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7.2 Conditions for safe storage, including any incompatibilities

Storage conditions
Tightly closed. Dry. Keep in a well-ventilated place. Keep locked up or in an area accessible only to qualified or authorized persons.

Storage class
Storage class (TRGS 510): 6.1A: Combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
arsenic	7440-38-2	TWA	0.01 mg/m3	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Lung cancer Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed human carcinogen		
		C	0.0020 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential Occupational Carcinogen See Appendix A 15 minute ceiling value		

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
arsenic	7440-38-2	inorganic arsenic plus methylated metabolites	35µg As/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of the workweek (After four or five consecutive working days with exposure)			

8.2 Exposure controls

Appropriate engineering controls
Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

Personal protective equipment

Eye/face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

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Skin protection
This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).
Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:KCL 741 Dermatril® L

Body Protection
protective clothing

Respiratory protection
required when dusts are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Control of environmental exposure
Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Color: gray
b)	Odor	No data available
c)	Odor Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: 817 °C (1503 °F) - lit.
f)	Initial boiling point and boiling range	613 °C 1135 °F - lit.
g)	Flash point	()Not applicable
h)	Evaporation rate	No data available

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i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapor pressure	No data available
l)	Vapor density	No data available
m)	Density	5.727 g/mL at 25 °C (77 °F) - lit.
	Relative density	5.622.4 °C - OECD Test Guideline 109
n)	Water solubility	ca.0.0106 g/l at 20 °C (68 °F) - OECD Test Guideline 105 - slightly soluble
o)	Partition coefficient: n-octanol/water	Not applicable for inorganic substances
p)	Autoignition temperature	> 430 °C (> 806 °F)does not ignite
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	none

9.2 Other safety information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
The product is chemically stable under standard ambient conditions (room temperature) .

10.3 Possibility of hazardous reactions
Exothermic reaction with:
Aluminum
Bromine
bromates
chlorates
iodates
Nitric acid
Risk of ignition or formation of inflammable gases or vapours with:
nitrates
Alkali metals
Zinc
Reducing agents
Strong oxidizing agents

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Risk of explosion with:
potassium permanganate
azides
halogen-halogen compounds
Peroxides
nitrogen trichloride

10.4 Conditions to avoid
Heat. Exposure to air may affect product quality.
no information available

10.5 Incompatible materials
No data available

10.6 Hazardous decomposition products
In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Mouse - 145 mg/kg
Remarks: Behavioral:Ataxia.
Diarrhea
(RTECS)
Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)
Inhalation: No data available
Dermal: No data available
No data available

Skin corrosion/irritation
Skin - In vitro study
Result: Irritating to skin. - 15 min
Remarks: (ECHA)

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Causes serious eye damage. - 24 h
(OECD Test Guideline 405)

Respiratory or skin sensitization
Maximization Test - Guinea pig
Result: negative
(OECD Test Guideline 406)

Germ cell mutagenicity
Test Type: Ames test
Test system: Escherichia coli
Result: negative
Remarks: (ECHA)

Carcinogenicity
May cause cancer. Positive evidence from human epidemiological studies.

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IARC: 1 - Group 1: Carcinogenic to humans (arsenic)

NTP: Known - Known to be human carcinogen (arsenic)

OSHA: OSHA specifically regulated carcinogen (arsenic)

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

11.2 Additional Information

RTECS: CG0525000
To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

The following applies to arsenic and its compounds in general: they take effect as capillary and enzyme toxins. Symptoms of arsenic poisoning: acute: after inhalation, mucosal irritations with coughing, dyspnoea, pain in the thorax. Perforations within the respiratory tract are possible. After oral uptake, gastrointestinal disorders with vomiting, diarrhoea, and spasms, CNS disorders with headache, confusion, shaking fits and disturbed consciousness, cardiovascular disorders all the way to circulatory collapse. Chronic: exanthema, dermal lesions in the form of hyperkeratosis and hypermelanosis, loss of hair, conjunctivitis and polyneuropathy, impaired hepatic function, and renal damage. After accumulation in the liver, kidneys, and skin, arsenic is eliminated from the organism only slowly. Experience has shown arsenic compounds to be carcinogenic in man.

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	static test LC50 - Oreochromis mossambicus (Mozambique tilapia) - 28.68 mg/l - 96 h Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Bosmina longirostris (water flea) - 0.85 mg/l - 48 h Remarks: (ECHA)

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Toxicity to algae	static test NOEC - Macrocystis pyrifera (brown algae) - 0.04 mg/l - 42 h Remarks: (ECHA)
Toxicity to bacteria	static test EC50 - activated sludge - 10.6 mg/l - 10 Days Remarks: (ECHA)
Toxicity to fish(Chronic toxicity)	flow-through test NOEC - Pimephales promelas (fathead minnow) - 2.13 mg/l - 35 d Remarks: (ECHA)
Toxicity to daphnia and other aquatic invertebrates(Chronic toxicity)	flow-through test NOEC - Shrimp - 0.631 mg/l - 51 d Remarks: (ECHA)

12.2 Persistence and degradability
The methods for determining biodegradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Endocrine disrupting properties
No data available

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

SECTION 14: Transport information

DOT (US)
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic

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Reportable Quantity (RQ): 1 lbs
Reportable Quantity (RQ): 1 lbs
Poison Inhalation Hazard: No

IMDG
UN number: 1558 Class: 6.1 Packing group: II EMS-No: F-A, S-A
Proper shipping name: ARSENIC
Marine pollutant : yes

IATA
UN number: 1558 Class: 6.1 Packing group: II
Proper shipping name: Arsenic

SECTION 15: Regulatory information

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
arsenic	7440-38-2	2015-11-23

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

Reportable Quantity : D004 lbs

Massachusetts Right To Know Components

	CAS-No.	Revision Date
arsenic	7440-38-2	2015-11-23

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
arsenic	7440-38-2	2015-11-23

California Prop. 65 Components

	CAS-No.	Revision Date
, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.arsenic	7440-38-2	2007-09-28

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

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Version: 6.6 Revision Date: 05/25/2023 Print Date: 11/11/2023

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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

Material Safety Data Sheet
PAH Contaminated Soil

ACC# 17974

Section 1 - Chemical Product and Company Identification

MSDS Name: PAH Contaminated Soil
Catalog Numbers: SRS103100
Synonyms: API separator sludge
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
Not available	Soil	78-99	unlisted
120-12-7	Anthracene	0-2	204-371-1
129-00-0	Pyrene	0-2	204-927-3
132-64-9	Dibenzofuran	0-2	205-071-3
205-99-2	Benzo(b)fluoranthene	0-2	205-911-9
206-44-0	Fluoranthene	0-2	205-912-4
208-96-8	Acenaphthylene	0-2	205-917-1
218-01-9	1,2-benzphenanthrene	0-2	205-923-4
50-32-8	Benzo(a)pyrene	0-2	200-028-5
56-55-3	1,2-Benzanthracene	0-2	200-280-6
83-32-9	Acenaphthene	0-2	201-469-6
85-01-8	Phenanthrene	0-2	201-581-5
86-73-7	Fluorene	0-2	201-695-5
87-86-5	Pentachlorophenol	0-2	201-778-6
91-20-3	Naphthalene	0-2	202-049-5
91-57-6	2-methylnaphthalene	0-2	202-078-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: not available solid.
Warning! May cause allergic skin reaction. Causes eye and skin irritation. May cause cancer based on animal studies.

Target Organs: Eyes, skin.

Potential Health Effects

Eye: May cause eye irritation.
Skin: May cause skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Naphthalene can cause cataracts, optical neuritis, and cornea injuries. Ingestion of large quantities may cause severe hemolytic anemia and
Inhalation: Causes respiratory tract irritation. May cause effects similar to those described for ingestion.
Chronic: May cause cancer according to animal studies. Prolonged exposure to respirable crystalline quartz may cause delayed lung injury/fibrosis (silicosis).

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: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion: 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.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: Not published.

Section 6 - Accidental Release Measures

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

Section 7 - Handling and Storage

Handling: Avoid generating dusty conditions. Use with adequate ventilation. Avoid contact with skin and

eyes. Keep container tightly closed. Avoid ingestion and inhalation.
Storage: Store in a cool, dry place.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Soil	none listed	none listed	none listed
Anthracene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Dibenzofuran	none listed	none listed	none listed
Benzo(b)fluoranthene	none listed	none listed	none listed
Fluoranthene	none listed	none listed	none listed
Acenaphthylene	none listed	none listed	none listed
1,2-benzphenanthrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Benzo(a)pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
1,2-Benzanthracene	none listed	none listed	none listed
Acenaphthene	none listed	none listed	none listed
Phenanthrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Fluorene	none listed	none listed	none listed
Pentachlorophenol	0.5 mg/m3 TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.5 mg/m3 TWA 2.5 mg/m3 IDLH	0.5 mg/m3 TWA
	10 ppm TWA; 15 ppm STEL; Skin - potential	10 ppm TWA; 50 mg/m3	10 ppm TWA; 50 mg/m3

Naphthalene	significant contribution to overall exposure by the cutaneous r oute	TWA 250 ppm IDLH	TWA
2-methylnaphthalene	0.5 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	none listed	none listed

OSHA Vacated PELs: Soil: No OSHA Vacated PELs are listed for this chemical. Anthracene: No OSHA Vacated PELs are listed for this chemical. Pyrene: No OSHA Vacated PELs are listed for this chemical. Dibenzofuran: No OSHA Vacated PELs are listed for this chemical. Benzo(b)fluoranthene: No OSHA Vacated PELs are listed for this chemical. Fluoranthene: No OSHA Vacated PELs are listed for this chemical. Acenaphthylene: No OSHA Vacated PELs are listed for this chemical. 1,2-benzphenanthrene: No OSHA Vacated PELs are listed for this chemical. Benzo(a)pyrene: No OSHA Vacated PELs are listed for this chemical. 1,2-Benzanthracene: No OSHA Vacated PELs are listed for this chemical. Acenaphthene: No OSHA Vacated PELs are listed for this chemical. Phenanthrene: No OSHA Vacated PELs are listed for this chemical. Fluorene: No OSHA Vacated PELs are listed for this chemical. Pentachlorophenol: 0.5 mg/m3 TWA Naphthalene: 10 ppm TWA; 50 mg/m3 TWA 2-methylnaphthalene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

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

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

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

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: not available
Odor: none reported
pH: Not available.
Vapor Pressure: Not applicable.
Vapor Density: Not available.
Evaporation Rate: Not applicable.
Viscosity: Not applicable.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: Insoluble in water.
Specific Gravity/Density: Not available.
Molecular Formula: Mixture
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures.
Incompatibilities with Other Materials: None reported.

Hazardous Decomposition Products: No data available.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 120-12-7: CA9350000
CAS# 129-00-0: UR2450000; UR2450100
CAS# 132-64-9: HP4430000
CAS# 205-99-2: CU1400000
CAS# 206-44-0: LL4025000
CAS# 208-96-8: AB1254000; AB1254200
CAS# 218-01-9: GC0700000
CAS# 50-32-8: DJ3675000
CAS# 56-55-3: CV9275000
CAS# 83-32-9: AB1000000
CAS# 85-01-8: SF7175000
CAS# 86-73-7: LL5670000
CAS# 87-86-5: SM6300000; SM6314000; SM6321000
CAS# 91-20-3: QJ0525000
CAS# 91-57-6: QJ9635000
LD50/LC50:
CAS# 120-12-7:
Oral, mouse: LD50 = 4900 mg/kg;
.

CAS# 129-00-0:
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, rat: LC50 = 170 mg/m3;
Inhalation, rat: LC50 = 170 mg/m3;
Oral, mouse: LD50 = 800 mg/kg;
Oral, rat: LD50 = 2700 mg/kg;
.

CAS# 132-64-9:
.

CAS# 205-99-2:
.

CAS# 206-44-0:
Oral, rat: LD50 = 2 gm/kg;
Skin, rabbit: LD50 = 3180 mg/kg;
.

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

CAS# 218-01-9:
.

CAS# 50-32-8:
.

CAS# 56-55-3:
.

CAS# 83-32-9:
.

CAS# 85-01-8:
Oral, mouse: LD50 = 700 mg/kg;
Oral, rat: LD50 = 1.8 gm/kg;
.

CAS# 86-73-7:
.

CAS# 87-86-5:
Draize test, rabbit, eye: 100 uL/24H Mild;
Inhalation, mouse: LC50 = 225 mg/m3;
Inhalation, mouse: LC50 = 225 mg/m3;
Inhalation, rat: LC50 = 355 mg/m3;
Inhalation, rat: LC50 = 200 mg/m3;
Inhalation, rat: LC50 = 335 mg/m3;
Oral, mouse: LD50 = 36 mg/kg;
Oral, mouse: LD50 = 117 mg/kg;
Oral, mouse: LD50 = 30 mg/kg;
Oral, rabbit: LD50 = 200 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 50 mg/kg;
Skin, rat: LD50 = 96
CAS# 91-20-3:
Draize test, rabbit, eye: 100 mg Mild;
Inhalation, rat: LC50 = >340 mg/m3/1H;
Oral, mouse: LD50 = 316 mg/kg;
Oral, rat: LD50 = 490 mg/kg;
Skin, rabbit: LD50 = >20 gm/kg;
Skin, rat: LD50 = >2500 mg/kg;
.

CAS# 91-57-6:
Oral, rat: LD50 = 1630 mg/kg;
.

Carcinogenicity:
CAS# 120-12-7:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 129-00-0:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 132-64-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 205-99-2:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 206-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 208-96-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 218-01-9:

- **ACGIH:** A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 50-32-8:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 1 carcinogen

CAS# 56-55-3:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 83-32-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 85-01-8:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 86-73-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 87-86-5:

- **ACGIH:** A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

CAS# 91-20-3:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 4/19/02
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 91-57-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

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

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

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 206-44-0: waste number U120.
CAS# 218-01-9: waste number U050.
CAS# 50-32-8: waste number U022.
CAS# 56-55-3: waste number U018.
CAS# 91-20-3: waste

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

Soil is not listed on the TSCA inventory. It is for research and development use only.
CAS# 120-12-7 is listed on the TSCA inventory.
CAS# 129-00-0 is listed on the TSCA inventory.
CAS# 132-64-9 is listed on the TSCA inventory.
CAS# 205-99-2 is not listed on the TSCA inventory. It is for research and development use only.
CAS# 206-44-0 is listed on the TSCA inventory.
CAS# 208-96-8 is listed on the TSCA inventory.
CAS# 218-01-9 is listed on the TSCA inventory.
CAS# 50-32-8 is listed on the TSCA inventory.
CAS# 56-55-3 is listed on the TSCA inventory.
CAS# 83-32-9 is listed on the TSCA inventory.
CAS# 85-01-8 is listed on the TSCA inventory.
CAS# 86-73-7 is listed on the TSCA inventory.

CAS# 87-86-5 is listed on the TSCA inventory.
CAS# 91-20-3 is listed on the TSCA inventory.
CAS# 91-57-6 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 129-00-0: Effective 6/1/87, Sunset 6/1/97 CAS# 91-20-3: Effective 6/1/87, Sunset 6/1/97

Chemical Test Rules

CAS# 91-20-3: 40 CFR 799.5115

Section 12b

CAS# 91-20-3: Section 4, 0.1 % de minimus concentration

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 120-12-7: 5000 lb final RQ; 2270 kg final RQ CAS# 129-00-0: 5000 lb final RQ; 2270 kg final RQ CAS# 132-64-9: 100 lb final RQ; 45.4 kg final RQ CAS# 205-99-2: 1 lb final RQ; 0.454 kg final RQ CAS# 206-44-0: 100 lb final RQ; 45.4 kg final RQ CAS# 208-96-8: 5000 lb final RQ; 2270 kg final RQ CAS# 218-01-9: 100 lb final RQ; 45.4 kg final RQ CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ CAS# 56-55-3: 10 lb final RQ; 4.54 kg final RQ CAS# 83-32-9: 100 lb final RQ; 45.4 kg final RQ CAS# 85-01-8: 5000 lb final RQ; 2270 kg final RQ CAS# 86-73-7: 5000 lb final RQ; 2270 kg final RQ CAS# 87-86-5: 10 lb final RQ; 4.54 kg final RQ CAS# 91-20-3: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

CAS# 129-00-0: 1000 lb lower threshold TPQ; 10000 lb upper threshold T PQ

SARA Codes

CAS # 120-12-7: immediate.
CAS # 129-00-0: immediate, delayed.
CAS # 206-44-0: immediate.
CAS # 50-32-8: immediate, delayed.
CAS # 56-55-3: delayed.
CAS # 83-32-9: immediate.
CAS # 85-01-8: immediate.
CAS # 91-20-3: immediate, delayed, fire.
CAS # 91-57-6: immediate.

Section 313

This material contains Anthracene (CAS# 120-12-7, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Dibenzofuran (CAS# 132-64-9, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Benzo(b)fluoranthene (CAS# 205-99-2, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Fluoranthene (CAS# 206-44-0, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains 1,2-benzphenanthrene (CAS# 218-01-9, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Benzo(a)pyrene (CAS# 50-32-8, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains 1,2-Benzanthracene (CAS# 56-55-3, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Phenanthrene (CAS# 85-01-8, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Pentachlorophenol (CAS# 87-86-5, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Naphthalene (CAS# 91-20-3, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 132-64-9 is listed as a hazardous air pollutant (HAP).

CAS# 87-86-5 is listed as a hazardous air pollutant (HAP).
CAS# 91-20-3 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 87-86-5 is listed as a Hazardous Substance under the CWA. CAS# 91-20-3 is listed as a Hazardous Substance under the CWA. CAS# 120-12-7 is listed as a Priority Pollutant under the Clean Water Act. CAS# 129-00-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 205-99-2 is listed as a Priority Pollutant under the Clean Water Act. CAS# 206-44-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 208-96-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 218-01-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 56-55-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 83-32-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 85-01-8 is listed as a Priority Pollutant under the Clean Water Act.

CAS# 86-73-7 is listed as a Priority Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Priority Pollutant under the Clean Water Act. CAS# 91-20-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 206-44-0 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 83-32-9 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 91-20-3 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 120-12-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 129-00-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 132-64-9 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 205-99-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 206-44-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

CAS# 208-96-8 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 218-01-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 50-32-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 56-55-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 83-32-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

CAS# 85-01-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 86-73-7 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 87-86-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 91-20-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 91-57-6 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

WARNING: This product contains Benzo(b)fluoranthene, a chemical known to the state of California to cause cancer. WARNING: This product contains 1,2-benzphenanthrene, a chemical known to the state of California to cause cancer. WARNING: This product contains Benzo(a)pyrene, a chemical known to the state of California to cause cancer. WARNING: This product contains 1,2-Benzanthracene, a chemical known to the state of California to cause cancer. WARNING: This product contains Pentachlorophenol, a chemical known to the state of California to cause cancer. WARNING: This product contains Naphthalene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 205-99-2: 0.096 æg/day NSRL (oral) CAS# 218-01-9: 0.35 æg/day NSRL (oral) CAS# 50-32-8: 0.06 æg/day NSRL CAS# 56-55-3: 0.033 æg/day NSRL (oral) CAS# 87-86-5: 40 æg/day NSRL CAS# 91-20-3: 5.8 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

Not available.

Risk Phrases:

Safety Phrases:

WGK (Water Danger/Protection)

CAS# 120-12-7: 2
CAS# 129-00-0: No information available.
CAS# 132-64-9: No information available.
CAS# 205-99-2: No information available.
CAS# 206-44-0: No information available.
CAS# 208-96-8: No information available.
CAS# 218-01-9: No information available.
CAS# 50-32-8: No information available.
CAS# 56-55-3: No information available.
CAS# 83-32-9: No information available.
CAS# 85-01-8: No information available.
CAS# 86-73-7: No information available.
CAS# 87-86-5: 3
CAS# 91-20-3: 2
CAS# 91-57-6: No information available.

Canada - DSL/NDSL

CAS# 120-12-7 is listed on Canada's DSL List.
CAS# 129-00-0 is listed on Canada's DSL List.
CAS# 132-64-9 is listed on Canada's DSL List.
CAS# 218-01-9 is listed on Canada's DSL List.
CAS# 50-32-8 is listed on Canada's DSL List.
CAS# 83-32-9 is listed on Canada's DSL List.
CAS# 85-01-8 is listed on Canada's DSL List.
CAS# 86-73-7 is listed on Canada's DSL List.
CAS# 87-86-5 is listed on Canada's DSL List.
CAS# 91-20-3 is listed on Canada's DSL List.
CAS# 91-57-6 is listed on Canada's DSL List.
CAS# 206-44-0 is listed on Canada's NDSL List.
CAS# 208-96-8 is listed on Canada's NDSL List.
CAS# 56-55-3 is listed on Canada's NDSL List.

Canada - WHMIS

This product has a WHMIS classification of 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.

Canadian Ingredient Disclosure List

CAS# 120-12-7 is listed on the Canadian Ingredient Disclosure List.
CAS# 129-00-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 205-99-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 206-44-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 208-96-8 is not listed on the Canadian Ingredient Disclosure List.
CAS# 218-01-9 is listed on the Canadian Ingredient Disclosure List.
CAS# 50-32-8 is listed on the Canadian Ingredient Disclosure List.
CAS# 56-55-3 is listed on the Canadian Ingredient Disclosure List.
CAS# 83-32-9 is listed on the Canadian Ingredient Disclosure List.
CAS# 85-01-8 is listed on the Canadian Ingredient Disclosure List.
CAS# 86-73-7 is not listed on the Canadian Ingredient Disclosure List.
CAS# 87-86-5 is not listed on the Canadian Ingredient Disclosure List.
CAS# 91-20-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #5 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Material Safety Data Sheet
PAH Contaminated Soil

ACC# 17974

Section 1 - Chemical Product and Company Identification

MSDS Name: PAH Contaminated Soil
Catalog Numbers: SRS103100
Synonyms: API separator sludge
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
Not available	Soil	78-99	unlisted
120-12-7	Anthracene	0-2	204-371-1
129-00-0	Pyrene	0-2	204-927-3
132-64-9	Dibenzofuran	0-2	205-071-3
205-99-2	Benzo(b)fluoranthene	0-2	205-911-9
206-44-0	Fluoranthene	0-2	205-912-4
208-96-8	Acenaphthylene	0-2	205-917-1
218-01-9	1,2-benzphenanthrene	0-2	205-923-4
50-32-8	Benzo(a)pyrene	0-2	200-028-5
56-55-3	1,2-Benzanthracene	0-2	200-280-6
83-32-9	Acenaphthene	0-2	201-469-6
85-01-8	Phenanthrene	0-2	201-581-5
86-73-7	Fluorene	0-2	201-695-5
87-86-5	Pentachlorophenol	0-2	201-778-6
91-20-3	Naphthalene	0-2	202-049-5
91-57-6	2-methylnaphthalene	0-2	202-078-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: not available solid.
Warning! May cause allergic skin reaction. Causes eye and skin irritation. May cause cancer based on animal studies.

Target Organs: Eyes, skin.

Potential Health Effects

Eye: May cause eye irritation.
Skin: May cause skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Naphthalene can cause cataracts, optical neuritis, and cornea injuries. Ingestion of large quantities may cause severe hemolytic anemia and
Inhalation: Causes respiratory tract irritation. May cause effects similar to those described for ingestion.
Chronic: May cause cancer according to animal studies. Prolonged exposure to respirable crystalline quartz may cause delayed lung injury/fibrosis (silicosis).

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: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion: 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.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: Not published.

Section 6 - Accidental Release Measures

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

Section 7 - Handling and Storage

Handling: Avoid generating dusty conditions. Use with adequate ventilation. Avoid contact with skin and

eyes. Keep container tightly closed. Avoid ingestion and inhalation.
Storage: Store in a cool, dry place.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Soil	none listed	none listed	none listed
Anthracene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Dibenzofuran	none listed	none listed	none listed
Benzo(b)fluoranthene	none listed	none listed	none listed
Fluoranthene	none listed	none listed	none listed
Acenaphthylene	none listed	none listed	none listed
1,2-benzphenanthrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Benzo(a)pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
1,2-Benzanthracene	none listed	none listed	none listed
Acenaphthene	none listed	none listed	none listed
Phenanthrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).
Fluorene	none listed	none listed	none listed
Pentachlorophenol	0.5 mg/m3 TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.5 mg/m3 TWA 2.5 mg/m3 IDLH	0.5 mg/m3 TWA
	10 ppm TWA; 15 ppm STEL; Skin - potential	10 ppm TWA; 50 mg/m3	10 ppm TWA; 50 mg/m3

Naphthalene	significant contribution to overall exposure by the cutaneous r oute	TWA 250 ppm IDLH	TWA
2-methylnaphthalene	0.5 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	none listed	none listed

OSHA Vacated PELs: Soil: No OSHA Vacated PELs are listed for this chemical. Anthracene: No OSHA Vacated PELs are listed for this chemical. Pyrene: No OSHA Vacated PELs are listed for this chemical. Dibenzofuran: No OSHA Vacated PELs are listed for this chemical. Benzo(b)fluoranthene: No OSHA Vacated PELs are listed for this chemical. Fluoranthene: No OSHA Vacated PELs are listed for this chemical. Acenaphthylene: No OSHA Vacated PELs are listed for this chemical. 1,2-benzphenanthrene: No OSHA Vacated PELs are listed for this chemical. Benzo(a)pyrene: No OSHA Vacated PELs are listed for this chemical. 1,2-Benzanthracene: No OSHA Vacated PELs are listed for this chemical. Acenaphthene: No OSHA Vacated PELs are listed for this chemical. Phenanthrene: No OSHA Vacated PELs are listed for this chemical. Fluorene: No OSHA Vacated PELs are listed for this chemical. Pentachlorophenol: 0.5 mg/m3 TWA Naphthalene: 10 ppm TWA; 50 mg/m3 TWA 2-methylnaphthalene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

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

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

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

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: not available
Odor: none reported
pH: Not available.
Vapor Pressure: Not applicable.
Vapor Density: Not available.
Evaporation Rate: Not applicable.
Viscosity: Not applicable.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: Insoluble in water.
Specific Gravity/Density: Not available.
Molecular Formula: Mixture
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures.
Incompatibilities with Other Materials: None reported.

Hazardous Decomposition Products: No data available.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 120-12-7: CA9350000
CAS# 129-00-0: UR2450000; UR2450100
CAS# 132-64-9: HP4430000
CAS# 205-99-2: CU1400000
CAS# 206-44-0: LL4025000
CAS# 208-96-8: AB1254000; AB1254200
CAS# 218-01-9: GC0700000
CAS# 50-32-8: DJ3675000
CAS# 56-55-3: CV9275000
CAS# 83-32-9: AB1000000
CAS# 85-01-8: SF7175000
CAS# 86-73-7: LL5670000
CAS# 87-86-5: SM6300000; SM6314000; SM6321000
CAS# 91-20-3: QJ0525000
CAS# 91-57-6: QJ9635000
LD50/LC50:
CAS# 120-12-7:
Oral, mouse: LD50 = 4900 mg/kg;
.

CAS# 129-00-0:
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, rat: LC50 = 170 mg/m3;
Inhalation, rat: LC50 = 170 mg/m3;
Oral, mouse: LD50 = 800 mg/kg;
Oral, rat: LD50 = 2700 mg/kg;
.

CAS# 132-64-9:
.

CAS# 205-99-2:
.

CAS# 206-44-0:
Oral, rat: LD50 = 2 gm/kg;
Skin, rabbit: LD50 = 3180 mg/kg;
.

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

CAS# 218-01-9:
.

CAS# 50-32-8:
.

CAS# 56-55-3:
.

CAS# 83-32-9:
.

CAS# 85-01-8:
Oral, mouse: LD50 = 700 mg/kg;
Oral, rat: LD50 = 1.8 gm/kg;
.

CAS# 86-73-7:
.

CAS# 87-86-5:
Draize test, rabbit, eye: 100 uL/24H Mild;
Inhalation, mouse: LC50 = 225 mg/m3;
Inhalation, mouse: LC50 = 225 mg/m3;
Inhalation, rat: LC50 = 355 mg/m3;
Inhalation, rat: LC50 = 200 mg/m3;
Inhalation, rat: LC50 = 335 mg/m3;
Oral, mouse: LD50 = 36 mg/kg;
Oral, mouse: LD50 = 117 mg/kg;
Oral, mouse: LD50 = 30 mg/kg;
Oral, rabbit: LD50 = 200 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 50 mg/kg;
Skin, rat: LD50 = 96
CAS# 91-20-3:
Draize test, rabbit, eye: 100 mg Mild;
Inhalation, rat: LC50 = >340 mg/m3/1H;
Oral, mouse: LD50 = 316 mg/kg;
Oral, rat: LD50 = 490 mg/kg;
Skin, rabbit: LD50 = >20 gm/kg;
Skin, rat: LD50 = >2500 mg/kg;
.

CAS# 91-57-6:
Oral, rat: LD50 = 1630 mg/kg;
.

Carcinogenicity:
CAS# 120-12-7:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 129-00-0:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 132-64-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 205-99-2:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 206-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 208-96-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 218-01-9:

- **ACGIH:** A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 50-32-8:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 1 carcinogen

CAS# 56-55-3:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 83-32-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 85-01-8:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 86-73-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 87-86-5:

- **ACGIH:** A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

CAS# 91-20-3:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 4/19/02
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 91-57-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

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

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

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 206-44-0: waste number U120.
CAS# 218-01-9: waste number U050.
CAS# 50-32-8: waste number U022.
CAS# 56-55-3: waste number U018.
CAS# 91-20-3: waste

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

Soil is not listed on the TSCA inventory. It is for research and development use only.
CAS# 120-12-7 is listed on the TSCA inventory.
CAS# 129-00-0 is listed on the TSCA inventory.
CAS# 132-64-9 is listed on the TSCA inventory.
CAS# 205-99-2 is not listed on the TSCA inventory. It is for research and development use only.
CAS# 206-44-0 is listed on the TSCA inventory.
CAS# 208-96-8 is listed on the TSCA inventory.
CAS# 218-01-9 is listed on the TSCA inventory.
CAS# 50-32-8 is listed on the TSCA inventory.
CAS# 56-55-3 is listed on the TSCA inventory.
CAS# 83-32-9 is listed on the TSCA inventory.
CAS# 85-01-8 is listed on the TSCA inventory.
CAS# 86-73-7 is listed on the TSCA inventory.

CAS# 87-86-5 is listed on the TSCA inventory.
CAS# 91-20-3 is listed on the TSCA inventory.
CAS# 91-57-6 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 129-00-0: Effective 6/1/87, Sunset 6/1/97 CAS# 91-20-3: Effective 6/1/87, Sunset 6/1/97

Chemical Test Rules

CAS# 91-20-3: 40 CFR 799.5115

Section 12b

CAS# 91-20-3: Section 4, 0.1 % de minimus concentration

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 120-12-7: 5000 lb final RQ; 2270 kg final RQ CAS# 129-00-0: 5000 lb final RQ; 2270 kg final RQ CAS# 132-64-9: 100 lb final RQ; 45.4 kg final RQ CAS# 205-99-2: 1 lb final RQ; 0.454 kg final RQ CAS# 206-44-0: 100 lb final RQ; 45.4 kg final RQ CAS# 208-96-8: 5000 lb final RQ; 2270 kg final RQ CAS# 218-01-9: 100 lb final RQ; 45.4 kg final RQ CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ CAS# 56-55-3: 10 lb final RQ; 4.54 kg final RQ CAS# 83-32-9: 100 lb final RQ; 45.4 kg final RQ CAS# 85-01-8: 5000 lb final RQ; 2270 kg final RQ CAS# 86-73-7: 5000 lb final RQ; 2270 kg final RQ CAS# 87-86-5: 10 lb final RQ; 4.54 kg final RQ CAS# 91-20-3: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

CAS# 129-00-0: 1000 lb lower threshold TPQ; 10000 lb upper threshold T PQ

SARA Codes

CAS # 120-12-7: immediate.
CAS # 129-00-0: immediate, delayed.
CAS # 206-44-0: immediate.
CAS # 50-32-8: immediate, delayed.
CAS # 56-55-3: delayed.
CAS # 83-32-9: immediate.
CAS # 85-01-8: immediate.
CAS # 91-20-3: immediate, delayed, fire.
CAS # 91-57-6: immediate.

Section 313

This material contains Anthracene (CAS# 120-12-7, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Dibenzofuran (CAS# 132-64-9, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Benzo(b)fluoranthene (CAS# 205-99-2, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Fluoranthene (CAS# 206-44-0, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains 1,2-benzphenanthrene (CAS# 218-01-9, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Benzo(a)pyrene (CAS# 50-32-8, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains 1,2-Benzanthracene (CAS# 56-55-3, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Phenanthrene (CAS# 85-01-8, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Pentachlorophenol (CAS# 87-86-5, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Naphthalene (CAS# 91-20-3, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 132-64-9 is listed as a hazardous air pollutant (HAP).

CAS# 87-86-5 is listed as a hazardous air pollutant (HAP).
CAS# 91-20-3 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 87-86-5 is listed as a Hazardous Substance under the CWA. CAS# 91-20-3 is listed as a Hazardous Substance under the CWA. CAS# 120-12-7 is listed as a Priority Pollutant under the Clean Water Act. CAS# 129-00-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 205-99-2 is listed as a Priority Pollutant under the Clean Water Act. CAS# 206-44-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 208-96-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 218-01-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 56-55-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 83-32-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 85-01-8 is listed as a Priority Pollutant under the Clean Water Act.

CAS# 86-73-7 is listed as a Priority Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Priority Pollutant under the Clean Water Act. CAS# 91-20-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 206-44-0 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 83-32-9 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 91-20-3 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 120-12-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 129-00-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 132-64-9 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 205-99-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 206-44-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

CAS# 208-96-8 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 218-01-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 50-32-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 56-55-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 83-32-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

CAS# 85-01-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 86-73-7 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 87-86-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 91-20-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 91-57-6 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

WARNING: This product contains Benzo(b)fluoranthene, a chemical known to the state of California to cause cancer. WARNING: This product contains 1,2-benzphenanthrene, a chemical known to the state of California to cause cancer. WARNING: This product contains Benzo(a)pyrene, a chemical known to the state of California to cause cancer. WARNING: This product contains 1,2-Benzanthracene, a chemical known to the state of California to cause cancer. WARNING: This product contains Pentachlorophenol, a chemical known to the state of California to cause cancer. WARNING: This product contains Naphthalene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 205-99-2: 0.096 æg/day NSRL (oral) CAS# 218-01-9: 0.35 æg/day NSRL (oral) CAS# 50-32-8: 0.06 æg/day NSRL CAS# 56-55-3: 0.033 æg/day NSRL (oral) CAS# 87-86-5: 40 æg/day NSRL CAS# 91-20-3: 5.8 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

Not available.

Risk Phrases:

Safety Phrases:

WGK (Water Danger/Protection)

CAS# 120-12-7: 2
CAS# 129-00-0: No information available.
CAS# 132-64-9: No information available.
CAS# 205-99-2: No information available.
CAS# 206-44-0: No information available.
CAS# 208-96-8: No information available.
CAS# 218-01-9: No information available.
CAS# 50-32-8: No information available.
CAS# 56-55-3: No information available.
CAS# 83-32-9: No information available.
CAS# 85-01-8: No information available.
CAS# 86-73-7: No information available.
CAS# 87-86-5: 3
CAS# 91-20-3: 2
CAS# 91-57-6: No information available.

Canada - DSL/NDSL

CAS# 120-12-7 is listed on Canada's DSL List.
CAS# 129-00-0 is listed on Canada's DSL List.
CAS# 132-64-9 is listed on Canada's DSL List.
CAS# 218-01-9 is listed on Canada's DSL List.
CAS# 50-32-8 is listed on Canada's DSL List.
CAS# 83-32-9 is listed on Canada's DSL List.
CAS# 85-01-8 is listed on Canada's DSL List.
CAS# 86-73-7 is listed on Canada's DSL List.
CAS# 87-86-5 is listed on Canada's DSL List.
CAS# 91-20-3 is listed on Canada's DSL List.
CAS# 91-57-6 is listed on Canada's DSL List.
CAS# 206-44-0 is listed on Canada's NDSL List.
CAS# 208-96-8 is listed on Canada's NDSL List.
CAS# 56-55-3 is listed on Canada's NDSL List.

Canada - WHMIS

This product has a WHMIS classification of 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.

Canadian Ingredient Disclosure List

CAS# 120-12-7 is listed on the Canadian Ingredient Disclosure List.
CAS# 129-00-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 205-99-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 206-44-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 208-96-8 is not listed on the Canadian Ingredient Disclosure List.
CAS# 218-01-9 is listed on the Canadian Ingredient Disclosure List.
CAS# 50-32-8 is listed on the Canadian Ingredient Disclosure List.
CAS# 56-55-3 is listed on the Canadian Ingredient Disclosure List.
CAS# 83-32-9 is listed on the Canadian Ingredient Disclosure List.
CAS# 85-01-8 is listed on the Canadian Ingredient Disclosure List.
CAS# 86-73-7 is not listed on the Canadian Ingredient Disclosure List.
CAS# 87-86-5 is not listed on the Canadian Ingredient Disclosure List.
CAS# 91-20-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #5 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

SAFETY DATA SHEET

Creation Date 10-Dec-2009 **Revision Date** 24-Dec-2021 **Revision Number** 6

1. Identification

Product Name **Tetrachloroethylene**

Cat No. : **AC138010000; AC138010010; AC138010025; AC138010100; AC138015000**

CAS No 127-18-4
Synonyms Perchloroethylene

Recommended Use Laboratory chemicals.
Uses advised against Food, drug, pesticide or biocidal product use.

Details of the supplier of the safety data sheet

Company

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

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

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

2. Hazard(s) identification

Classification

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

Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Toxic to aquatic life with long lasting effects
WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Tetrachloroethylene	127-18-4	>95

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.
Skin Contact	Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.
Inhalation	Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.
Ingestion	Clean mouth with water and drink afterwards plenty of water.
Most important symptoms and effects	None reasonably foreseeable. May cause allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam.
Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	No information available
Explosion Limits	
Upper	No data available
Lower	No data available
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated.

Hazardous Combustion Products
Chlorine. Phosgene. Hydrogen chloride gas.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	0	0	N/A

6. Accidental release measures

Personal Precautions	Use personal protective equipment as required. Ensure adequate ventilation.
Environmental Precautions	Do not flush into surface water or sanitary sewer system.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling	Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Ensure adequate ventilation. Avoid ingestion and inhalation.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from sunlight. Incompatible Materials. Strong acids. Strong oxidizing agents. Strong bases. Metals. Zinc. Amines. Aluminium.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Tetrachloroethylene	TWA: 25 ppm STEL: 100 ppm	(Vacated) TWA: 25 ppm (Vacated) TWA: 170 mg/m^3 Ceiling: 200 ppm TWA: 100 ppm	IDLH: 150 ppm	TWA: 25 ppm STEL: 100 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

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

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

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

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

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Characteristic, sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-22 °C / -7.6 °F
Boiling Point/Range	120 - 122 °C / 248 - 251.6 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	6.0 (Ether = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	18 mbar @ 20 °C
Vapor Density	No information available
Density	1.619
Specific Gravity	1.625
Solubility	0.15 g/L water (20°C)
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 150°C

Viscosity	0.89 mPa s at 20 °C
Molecular Formula	C2 Cl4
Molecular Weight	165.83

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Stable under normal conditions.

Conditions to Avoid Incompatible products. Excess heat. Exposure to moist air or water.

Incompatible Materials Strong acids, Strong oxidizing agents, Strong bases, Metals, Zinc, Amines, Aluminium

Hazardous Decomposition Products Chlorine, Phosgene, Hydrogen chloride gas

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tetrachloroethylene	LD50 = 2629 mg/kg (Rat)	LD50 > 10000 mg/kg (Rat)	LC50 = 27.8 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

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

Irritation Irritating to eyes and skin

Sensitization No information available

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

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Tetrachloroethylene	127-18-4	Group 2A	Reasonably Anticipated	A3	X	A3

IARC (International Agency for Research on Cancer)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Kidney Liver Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Tetrachloroethylene	Group II Chemical	Not applicable	Not applicable

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

12. Ecological information

Ecotoxicity

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

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Tetrachloroethylene	EC50: > 500 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 12.4 - 14.4 mg/L, 96h flow-through (Pimephales promelas) LC50: 8.6 - 13.5 mg/L, 96h static (Pimephales promelas) LC50: 11.0 - 15.0 mg/L, 96h static (Lepomis macrochirus) LC50: 4.73 - 5.27 mg/L, 96h flow-through (Oncorhynchus mykiss)	EC50 = 100 mg/L 24 h EC50 = 112 mg/L 24 h EC50 = 120.0 mg/L 30 min	EC50: 6.1 - 9.0 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Insoluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its volatility.

Component	log Pow
Tetrachloroethylene	2.88

13. Disposal considerations

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

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Tetrachloroethylene - 127-18-4	U210	-

14. Transport information

DOT

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

TDG

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No UN1897
Proper Shipping Name TETRACHLOROETHYLENE
Hazard Class 6.1
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Tetrachloroethylene	127-18-4	X	ACTIVE	-

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed

TSCA 12(b) - Notices of Export Not applicable

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Tetrachloroethylene	127-18-4	X	-	204-825-9	X	X	X	X	X	KE-33294

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 %
Tetrachloroethylene	127-18-4	>95	0.1

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

CWA (Clean Water Act)

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

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors

Tetrachloroethylene	X		-

OSHA - Occupational Safety and Health Administration: Not applicable

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

Component	Hazardous Substances RQs	CERCLA EHS RQs
Tetrachloroethylene	100 lb 1 lb	-

California Proposition 65: This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Tetrachloroethylene	127-18-4	Carcinogen	14 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Tetrachloroethylene	X	X	X	X	X

U.S. Department of Transportation

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

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

Other International Regulations

Mexico - Grade: No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Tetrachloroethylene	-	Use restricted. See item 75. (see link for restriction details)	-

https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Tetrachloroethylene	127-18-4	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Tetrachloroethylene	127-18-4	Not applicable	Not applicable	Not applicable	Annex I - Y45

16. Other information

Prepared By	Regulatory Affairs Thermo Fisher Scientific Email: EMSDS.RA@thermofisher.com
Creation Date	10-Dec-2009
Revision Date	24-Dec-2021
Print Date	24-Dec-2021
Revision Summary	This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

SAFETY DATA SHEET

Creation Date 03-Feb-2010 **Revision Date** 26-Dec-2021 **Revision Number** 5

1. Identification

Product Name **Trichloroethylene**

Cat No. : **AC421520000; AC421520025; AC421525000**

CAS No 79-01-6
Synonyms Triclene; Trichloroethene; Ethylene trichloride

Recommended Use Laboratory chemicals.
Uses advised against .

Details of the supplier of the safety data sheet

Company

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

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

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

2. Hazard(s) identification

Classification

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

Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Germ Cell Mutagenicity	Category 2
Carcinogenicity	Category 1A
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Heart, spleen, Blood.	

Label Elements

Signal Word

Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness
Suspected of causing genetic defects
May cause cancer
May cause damage to organs through prolonged or repeated exposure



Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Harmful to aquatic life with long lasting effects
WARNING. Cancer and Reproductive Harm - https://www.p65warnings.ca.gov/.

3. Composition/Information on Ingredients

Component	CAS No	Weight %
Trichloroethylene	79-01-6	>95

4. First-aid measures

General Advice Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

Eye Contact	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	May cause allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing
Notes to Physician	Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media	Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam.
Unsuitable Extinguishing Media	No information available
Flash Point	No information available
Method -	No information available
Autoignition Temperature	410 °C / 770 °F
Explosion Limits	
Upper	44.8 vol %
Lower	8 vol %
Oxidizing Properties	Not oxidising
Sensitivity to Mechanical Impact	No information available
Sensitivity to Static Discharge	No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Chlorine. Phosgene. Carbon monoxide (CO). Carbon dioxide (CO_2). Hydrogen chloride gas.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions	Ensure adequate ventilation. Use personal protective equipment as required. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. 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. Protect from light. Do not store in aluminum containers. Incompatible Materials. Strong oxidizing agents. Strong bases. Amines. Alkali metals. Metals. .

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Trichloroethylene	TWA: 10 ppm STEL: 25 ppm	(Vacated) TWA: 50 ppm (Vacated) TWA: 270 mg/m³ Ceiling: 200 ppm (Vacated) STEL: 200 ppm (Vacated) STEL: 1080 mg/m³ TWA: 100 ppm	IDLH: 1000 ppm	TWA: 10 ppm STEL: 25 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

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

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

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

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

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Characteristic
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-85 °C / -121 °F
Boiling Point/Range	87 °C / 188.6 °F
Flash Point	No information available
Evaporation Rate	0.69 (Carbon Tetrachloride = 1.0)

Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	44.8 vol %
Lower	8 vol %
Vapor Pressure	77.3 mbar @ 20 °C
Vapor Density	4.5 (Air = 1.0)
Specific Gravity	1.460
Solubility	Insoluble in water
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	410 °C / 770 °F
Decomposition Temperature	> 120°C
Viscosity	0.55 mPa.s (25°C)
Molecular Formula	C2 H Cl3
Molecular Weight	131.39

10. Stability and reactivity

Reactive Hazard None known, based on information available

Stability Light sensitive.

Conditions to Avoid Incompatible products. Excess heat. Exposure to light. Exposure to moist air or water.

Incompatible Materials Strong oxidizing agents, Strong bases, Amines, Alkali metals, Metals,

Hazardous Decomposition Products Chlorine, Phosgene, Carbon monoxide (CO), Carbon dioxide (CO_2), Hydrogen chloride gas

Hazardous Polymerization Hazardous polymerization does not occur.

Hazardous Reactions None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Trichloroethylene	LD50 = 4920 mg/kg (Rat)	LD50 = 29000 mg/kg (Rabbit)	LC50 = 26 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

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

Irritation Irritating to eyes and skin

Sensitization May cause sensitization by skin contact

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

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Trichloroethylene	79-01-6	Group 1	Known	A2	X	A2

IARC (International Agency for Research on Cancer)

IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen

A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mutagenic Effects Mutagenic effects have occurred in humans.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Kidney Liver Heart spleen Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information No information available

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

12. Ecological information

Ecotoxicity

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Do not empty into drains. The product contains following substances which are hazardous for the environment. Contains a substance which is:. Harmful to aquatic organisms. Toxic to aquatic organisms.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Trichloroethylene	EC50: = 175 mg/L, 96h (Pseudokirchneriella subcapitata) EC50: = 450 mg/L, 96h (Desmodesmus subspicatus)	LC50: 31.4 - 71.8 mg/L, 96h flow-through (Pimephales promelas) LC50: 39 - 54 mg/L, 96h static (Lepomis macrochirus)	EC50 = 0.81 mg/L 24 h EC50 = 115 mg/L 10 min EC50 = 190 mg/L 15 min EC50 = 235 mg/L 24 h EC50 = 410 mg/L 24 h EC50 = 975 mg/L 5 min	EC50: = 2.2 mg/L, 48h (Daphnia magna)

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Trichloroethylene	2.4

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
Trichloroethylene - 79-01-6	U228	-

14. Transport information

DOT

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1

Packing Group III

TDG

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IATA

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

IMDG/IMO

UN-No UN1710
Proper Shipping Name TRICHLOROETHYLENE
Hazard Class 6.1
Packing Group III

15. Regulatory information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Trichloroethylene	79-01-6	X	ACTIVE	R;S

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

TSCA 12(b) - Notices of Export

Component	CAS No	**TSCA 12(b)** - Notices of Export
Trichloroethylene	79-01-6	Section 5 Section 6

International Inventories
Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Trichloroethylene	79-01-6	X	-	201-167-4	X	X	X	X	X	X

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Component	CAS No	Weight %	SARA 313 - Threshold Values %
Trichloroethylene	79-01-6	>95	0.1

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

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Trichloroethylene	X	100 lb	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors

Trichloroethylene	X		-

OSHA - Occupational Safety and Health Administration: Not applicable

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

Component	Hazardous Substances RQs	CERCLA EHS RQs
Trichloroethylene	100 lb 1 lb	-

California Proposition 65: This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Trichloroethylene	79-01-6	Carcinogen Developmental Male Reproductive	14 µg/day 50 µg/day	Developmental Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Trichloroethylene	X	X	X	X	X

U.S. Department of Transportation

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

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

Other International Regulations

Mexico - Grade: No information available

Authorisation/Restrictions according to EU REACH

Component	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Trichloroethylene	Carcinogenic Category 1B Article 57 Application date: October 21, 2014 Sunset date: April 21, 2016 Exemption - None	Use restricted. See item 28. (see link for restriction details) Use restricted. See item 75. (see link for restriction details)	SVHC Candidate list - 201-167-4 - Carcinogenic, Article 57a

After the sunset date the use of this substance requires either an authorization or can only be used for exempted uses, e.g. use in scientific research and development which includes routine analytics or use as intermediate.

https://echa.europa.eu/authorisation-list
https://echa.europa.eu/substances-restricted-under-reach
https://echa.europa.eu/candidate-list-table

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Trichloroethylene	79-01-6	Listed	Not applicable	Not applicable	Not applicable

Component	CAS No	Seveso III Directive	Seveso III Directive	Rotterdam	Basel Convention

		(2012/18/EC) - Qualifying Quantities for Major Accident Notification	(2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Convention (PIC)	(Hazardous Waste)
Trichloroethylene	79-01-6	Not applicable	Not applicable	Not applicable	Annex I - Y45

16. Other information

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

Creation Date 03-Feb-2010
Revision Date 26-Dec-2021
Print Date 26-Dec-2021
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

ATTACHMENT 2

JOB HAZARD ANALYSIS WORKSHEET

JOB HAZARD ANALYSIS WORKSHEET			
Phase Description:	Remedial Action (Construction Phase)		
Task or Operation:	Mobilization, Support of Excavation, Excavation, Soil Export, Sampling		
Specific Location:	Entire Site		
Task or Operation Start Date(s):	January 2025	**Task or Operation Duration:**	6 Months
Date of Hazard Analysis:	October 2025		
Job Hazard Analysis Developed by:	AK		
Job Hazard Analysis Reviewed by:	AK		

POTENTIAL HAZARDS DURING THIS TASK and/or OPERATION			
Chemical*	**Physical**	**Biological**	**Radiological**
» SVOCs (PAHs) » Metals »TCLP Haz Lead » Trichloroethylene (TCE) » Tetrachlorethylene (PCE)	» Hand Tool Use » Heavy Manual Lifting/Moving » Material Handling » Noise (Sound Pressure Level), dBA » Sharp Objects » Slips/Trips/Falls » Traffic - On or Near Site » Utilities (electrical, gas, water, etc.) - Overhead » Utilities (electrical, gas, water, etc.) - Underground		» N/A

HAZARD CONTROL MEASURES USED DURING THIS TASK and/or OPERATION

Administrative Controls: Log In/Out Sheets

PPE Description:

Component	Description
Level A Ensemble	
Boots, chemical-resistant, steel toe and shank	
Gloves, inner, chemical-resistant	
Gloves, outer, chemical-resistant	
Supplied Air Respirator - air-line	
Totally-encapsulating vapor tight chemical protective suit	
Level B Ensemble	
Boots, chemical-resistant, steel toe and shank	
Disposable one-piece hooded chemical resistant splash clothing suit	
Gloves, inner, chemical-resistant	
Gloves, outer, chemical-resistant	

Supplied Air Respirator - air-line

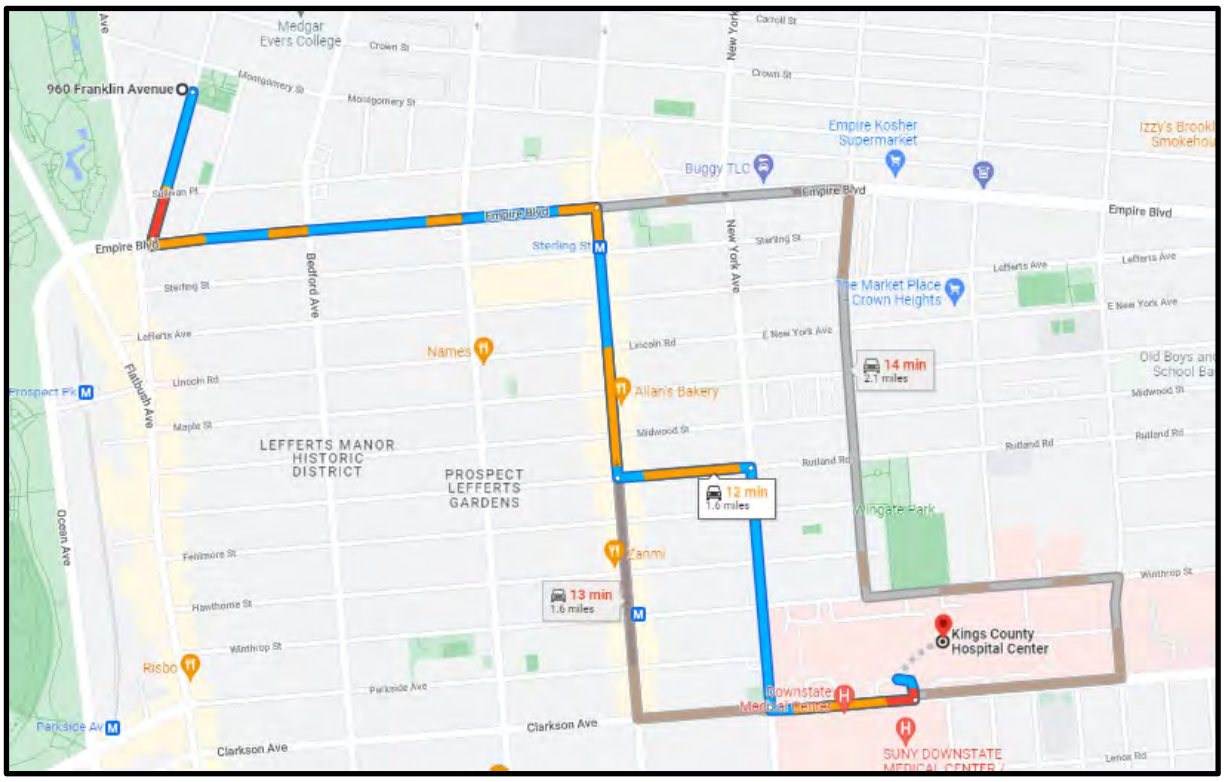
	Level C Ensemble
	Air purifying respirator - full face
	Boots, chemical-resistant, steel toe and shank
	Coveralls
	Disposable one-piece hooded chemical resistant splash clothing suit
	Escape Mask
	Gloves, inner, chemical-resistant
	Gloves, outer, chemical-resistant
	Level D Ensemble
	Dust Mask
	Escape Mask
	Gloves
Air-Purifying Respirator Cartridge/Canister Change Schedule:	
Decon Procedures for People & Equipment:	Alconox Tap Water Distilled Water
Required Permit(s):	N/A
Other Information:	

*Detailed Chemical Information is listed on attached Hazardous Substance Profiles and/or SDS

ATTACHMENT 3

DIRECTIONS TO HOSPITAL

Directions to Hospital



960 Franklin Ave
Brooklyn, NY 11225

- Head south on Franklin Ave toward Sullivan Pl — 0.2 mi
- Turn left onto Empire Blvd — 0.5 mi
- Turn right onto Nostrand Ave./Toussaint Louverture Blvd — 0.3 mi
- Turn left onto Rutland Rd — 0.2 mi
- Turn right at the 1st cross street onto New York Ave — 0.3 mi
- Turn left onto Clarkson Ave — 0.2 mi
- Turn left — 197 ft

Kings Cnty Hospital Ctr
451 Clarkson Ave, Brooklyn, NY 11203

APPENDIX C

COMMUNITY AIR MONITORING PLAN

vEKtor consultants

t: +1.347.871.0750 info@vektorconsultants.com
f: +1.347.402.7735 www.vektorconsultants.com

COMMUNITY AIR MONITORING PLAN

Prepared For: 601 Union Street Owner LLC

Project Name: 601-607 Union Street Site

Project Location: 601-607 Union Street, Brooklyn, NY

Date: October 2025

37 West 37th Street, 6th Floor, New York, NY 10018

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COMMUNITY AIR MONITORING PLAN 2

2.0 VOC Monitoring, Response Levels, and Actions 4

3.0 Particulate Monitoring, Response Levels, and Actions 5

Appendix A: Action Limit Report

1.0 INTRODUCTION

This site-specific Community Air Monitoring Plan (CAMP) has been prepared on behalf of 601 Union Street Owner LLC for the implementation of a Remedial Action Work Plan (RAWP) by Vektor Consultants, LLC (Vektor), AMC Engineering, PLLC (AMC), and their subcontractors at the property located at 601-607 Union Street, Brooklyn, New York (the Site). The Site is identified by the City of New York as Borough of Brooklyn, Block 434, Lots 1 and 12.

This CAMP was developed in accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan included within DER-10 Technical Guidance for Site Investigation and Remediation (May 2010). All instruments will be operated and calibrated as per the manufacturer's specifications.

A CAMP requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind and upwind perimeters 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.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Based on the information that public schools and a public playground are located east of the Site, beyond Franklin Avenue, a robust CAMP will be implemented when intrusive remedial activities are conducted along the eastern boundary area of the site.

A Special Requirements CAMP (SR-CAMP) will need to be implemented when remedial investigation activities are occurring within 20 feet of exposed populations or occupied eastern adjacent buildings.

COMMUNITY AIR MONITORING PLAN

Previous limited subsurface investigations were conducted by the Elm Group Inc. in 2017, with their findings provided in a Phase II Environmental Site Assessment Report in March 2017, and Brussee Environmental Corp. in 2022, with their findings provided in a Supplemental Phase II Environmental Site Assessment dated August 2022. A remedial investigation and a supplemental remedial investigation were conducted by Vektor

Consultants, Inc. (Vektor) in 2023 and 2024, respectively, and the findings of the assessments were provided in a Remedial Investigation Report dated April 2024. Based on the results of the previous assessments and the recent investigation, semi-volatile organic compounds (SVOCs), and metals in soils are the constituents of concern at the Site. Elevated concentrations of trichloroethene (TCE), tetrachlorethylene (PCE), and 1,1,1-trichloroethane were also detected in soil vapor samples in the northeastern and central portions of the Site. Therefore, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary.

Continuous monitoring will be required for all ground-intrusive activities. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings, soil vapor points, or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

Meteorological monitoring including temperature, wind direction and speed will be conducted by the field personnel and the data will be logged in the field book on a daily basis. CAMP station(s) will be relocated based on the direction of the wind.

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

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

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

2.0 VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

Volatile organic compounds (VOCs) must be monitored at the downwind and upwind perimeters of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Concentrations will 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.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.
- All 15-minute readings must be recorded and be available for the NYSDEC and NYSDOH personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

SR-CAMP

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring will occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions will be pre-determined). Background readings in the occupied spaces will be taken

prior to commencement of the planned work. Any unusual background readings will be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities will be suspended until controls are implemented and are successful in reducing the total particulate concentration to150 mcg/m^3 or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions will be pre-determined, as necessary.

3.0 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 (i.e.: DustTrak). The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/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.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped, and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.
- All readings must be recorded and be available for the NYSDEC and NYSDOH personnel to review.

Dust suppression will be achieved by applying water as needed.

CAMP exceedances will immediately be reported to the NYSDEC and NYSDOH Project Managers at the time of exceedance via email, in addition to inclusion in the daily status reports. The NYSDEC Project Manager and NYSDOH Project Manager for the Site is:

Rafi Alam
Project Manager
NYSDEC Division of Remediation,
Bureau B, Section D

Angela Martin
Project Manager
NYSDOH
angela.martin@health.ny.gov

APPENDIX A

ACTION LIMIT REPORT

CAMP
ACTION LIMIT REPORT

Project Location: 960 Franklin Avenue, Brooklyn, NY

Date: _____ Time: _____

Name: _____

Contaminant: _____ PM-10: _____ VOC: _____

Wind Speed: _____ Wind Direction: _____

Temperature: _____ Barometric Pressure: _____

DOWNWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

UPWIND DATA

Monitor ID #: _____ Location: _____ Level Reported: _____

Monitor ID#: _____ Location: _____ Level Reported: _____

BACKGROUND CORRECTED LEVELS

Monitor ID #: Location: _____ Level Reported: Level Reported: _____

ACTIONS TAKEN

_____
_____
_____
_____
_____
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_____
_____
_____
_____
_____

APPENDIX D

QUALITY ASSURANCE PROJECT PLAN

vEKtor consultants

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QUALITY ASSURANCE PROJECT PLAN

Prepared For: 601 Union Street Owner LLC

Project Name: 601-607 Union Street Site

Project Location: 601-607 Union Street, Brooklyn, NY

Date: October 2025

37 West 37th Street, 6th Floor, New York, NY 10018

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared on behalf of 601 Union Street Owner II LLC for the implementation of a Remedial Action Work Plan (RAWP) by Vektor Consultants, LLC (Vektor), AMC Engineering, PLLC (AMC), and their subcontractors at the property located at 601-607 Union Street, Brooklyn, New York (the Site). The Site is identified by the City of New York as Borough of Brooklyn, Block 434, Lots 1 and 12.

A Brownfield Cleanup Agreement (BCA) was executed on January 26, 2024, and the Applicant (601 Union Street Owner LLC) was accepted into the BCP as a Volunteer.

This QAPP describes the protocols and procedures to be followed during the implementation of the RAWP. This QAPP was prepared in accordance with the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation and the NYSDEC BCP Guide.

1.1 Scope of Work

The proposed scope of work covered under this QAPP includes the collection and analysis of post-remedial endpoint soil samples.

The objective of the QAPP is to detail the policies, organization, objectives, functional activities, and specific quality assurance/quality control activities designed to achieve the data quality goals or objectives of the Remedial Action Work Plan. This QAPP addresses how the acquisition and handling of samples, as well as the review and reporting of data, will be documented for quality control (QC) purposes. Specifically, this QAPP addresses the following:

- The procedures to be used to collect, preserve, package, and transport samples;
- Field data collection and record keeping;
- Data management;
- Chain-of-custody procedures; and,
- Determination of precision, accuracy, completeness, representativeness, decision rules, comparability and level of quality control effort.

2.0 PROJECT TEAM

Vektor's and AMC's team of trained and experienced environmental scientists, geologists, and engineers, along with their licensed subcontractors, will perform the below-listed tasks in a manner consistent with DER-10 Technical Guidance for Site Investigation and Remediation (DER-10).

Remedial Engineer, P.E.	Ariel Czemerinski	AMC Engineering PLLC
Project Director, QEP	Ezgi Karayel	Vektor Consultants
Project Manager	Alex Keenan	Vektor Consultants
Field Leader	Ben Neumann	Vektor Consultants
Laboratory QA/QC Officer	Sarah Widomski	York Analytical Laboratories, Inc.
Third-party Data Validator	Don Anne	Alpha Geoscience

2.1 Principal Engineer

Ariel Czemerinski, Professional Engineer, will act as the Remedial Engineer and will oversee the successful completion of this project. He will have direct responsibility for the preparation and certification of the Remedial Action Work Plan (RAWP). A field scientist/geologist, under the supervision of the PE, will provide full-time oversight during the implementation of the RAWP. Although the QEP and PE are each separately contracted by the Applicant (i.e., remedial party), the PE will oversee and certify all work performed by the QEP under this RAWP. Work conducted in accordance with this RAWP will be documented in daily field reports, monthly progress reports, and in the FER.

2.2 Project Director

Ezgi Karayel, Qualified Environmental Professional, will act as the Project Director and Quality Assurance/Quality Control (QA/QC) officer and will ensure the successful implementation of the RAWP.

2.3 Project Manager

Alex Keenan of Vektor will act as the Project Manager. She will oversee the field activities and coordinate for all elements of implementation of the RAWP. She will be responsible for coordinating with the field leader and other field crew as necessary.

2.4 Field Leader

Ben Neumann of Vektor will lead the field activities and ensure the implementation of the Health and Safety Plan (HASP) during all field work. He has the authority to stop all work if unsafe conditions are observed. He will be responsible for coordinating with all subcontractors. He will oversee the subcontractors in the field and collect samples outlined in the RAWP and in this QAPP in coordination with the Project Manager.

2.5 Laboratory Quality Assurance/Quality Control Officer

Laboratory analysis will be completed by York Analytical Laboratories (York) of Stratford, CT. York is a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) certified laboratory (NY Cert. Numbers 10854 and 12058). Kimberly Karcich is the Client Manager who will ensure that all glassware including laboratory prepared trip blanks and chain of custodies are properly packaged and shipped. QA/QC Officer is Sarah Widomski who will ensure that quality assurance procedures are followed. Quality Assurance requirements for analytical laboratory data include accuracy, precision, sensitivity, representativeness, and completeness. Data will be supplied in Analytical Services Protocol (ASP) Category B Data Packages.

2.6 Third-Party Data Validator

Don Anne of Alpha Geoscience will be the third-party validator. Data validation will be performed in accordance with the EPA validation guidelines for organic and inorganic data review. A Data Usability Summary Report (DUSR) will be prepared by Don Anne upon receipt of the analytical laboratory reports. The DUSR will present the results of the data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness of each analytical method.

3.0 SAMPLING METHODS PROCEDURES

This section describes the field protocol and procedures to be followed during the collection of endpoint samples during the implementation of the Remedial Action Work Plan.

Table 1 provides a copy of the endpoint sampling summary. Figure 1 provides a copy of the proposed endpoint sampling plan.

3.1 Soil Sampling

A total of 43 endpoint samples are proposed to be collected at 15 feet below grade are proposed to assess the performance with respect to the attainment of Track 2 Restricted Residential Use SCOs. The total number of bottom endpoint samples in this QAPP is estimated and the total samples collected in the field will rely on field conditions.

- A Geologist will be on Site to log the soils, visually characterize them, and field screen them with a photo ionization detector (PID) equipped with 10.6 electron Volt (eV) lamp for the presence of petroleum contamination.
- All soil samples will be collected with disposable dedicated spoons to prevent cross contamination.
- All soil samples will immediately be placed in laboratory supplied glassware and labeled properly. Sample labels include Site address, sample identification and depth, date and time of sampling, analysis to be performed, and sampler's initials.
- Soil samples will be placed in coolers with ice to maintain a temperature of 4^{o} C.
- A chain of custody that includes Site name and address, sample identification and depth, analysis to be performed, glassware summary, sampler's name and signature, turn-around-time and any additional notes will be prepared.
- All field observations including boring logs and PID readings will be recorded in a field book.
- Sampling equipment will be decontaminated between borings as further described in Section 3.0.
- All samples will be picked up from the Site on a daily basis by the laboratory's courier. The courier will sign the chain of custody upon pick up and provide a copy to Vektor or AMC.

The soil samples will be analyzed for:

- Target Compound List (TCL) volatile organic compounds (VOCs) via Environmental Protection Agency (EPA) Method 8260C/5035
- TCL semi-volatile organic compounds (SVOCs) via EPA Method 8270D
- Total analyte list (TAL) metals via EPA Method 6010D/7471B
- Polychlorinated biphenyls (PCBs) via EPA Method 8082A

- TLC pesticides via EPA Method 8081B
- NYSDEC list per and polyfluoroalkyl substances (PFAS) via EPA Method 1633
- 1,4-dioxane via EPA Method 8270 SIM.

3.2 PFAS Sampling Procedures

- PFAS samples will be collected first in order to prevent cross-contamination since sample containers for other methods may have PFAS present on the containers.
- Nitrile gloves will be using during sampling.
- No food or drink will be present during PFAS sampling.
- No waterproof field notebooks, plastic clipboards, sharpies, or adhesives will be used.
- PFAS samples will be kept in a separate cooler away from other sampling containers that may contain PFAS.
- Coolers will be filled with regular ice only.
- Only Alconox will be used for decontamination.
- Sampler will not wear clothing washed with fabric softener or containing Tyvek or PVC.
- Sampler will not use cosmetics, moisturizer, hand cream or other similar products on the day of the sampling.
- Sampler will not wear sunscreen or insect repellants.

Attachment 1 provides a copy of the NYSDEC Guidance document for sampling and analysis, and assessment of PFAS under NYSDEC's Part 375 Remedial Programs.

Attachment 2 provides a copy of York Analytical Laboratories' Standard Operating Procedure Summary for PFAS in Groundwater, Surface Water, and Soils.

Attachment 3 provides a copy of York Analytical Laboratories' PFOS/PFOA Certification and Reporting Limits for PFAS.

Attachment 4 provides a copy of blank chain of custody samples.

3.3 Quality Assurance (QA)/ Quality Control (QC) Sampling

The accuracy, precision and completeness of the samples will be addressed by the certified laboratory for all data generated. One blind duplicate sample and one matrix spike/matrix spike duplicate (MS/MSD) sample will be collected for every 20 samples media and submitted to the laboratory for analysis of the same parameters. One field blank per sampling media will be collected and analyzed for the same parameters as the respective media. Trip blanks will be included in each cooler whenever samples are collected and transported to the laboratory for analysis of VOCs.

3.3.1 Trip Blanks

A trip blank consisting of two 40-ml vials filled with distilled, deionized water, will be provided by the laboratory. Trip blanks will be included in each cooler and will be analyzed for VOCs.

3.3.2 Field Blanks

Field blanks will be collected at a rate of one per 20 soil samples. Field blanks will be analyzed for the same analysis as the soil samples collected on the day of the sampling.

3.3.3 PFAS Field Blank

A PFAS field blank will be prepared on each day that PFAS sampling occurs. The laboratory will provide PFAS blank bottles as well as pre-filled PFAS field blank water containers. The contents of the PFAS field blank water container will be transferred into the PFAS field blank bottle. Both bottles will be returned to the laboratory along with the PFAS samples that were collected.

3.3.4 Blind Duplicate

A blind duplicate sample will be collected at a rate of one per 20 soil samples. Blind duplicates will be analyzed for the same analysis as the soil and samples collected on the day of the sampling.

3.3.5 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD samples will be collected at a rate of one per 20 soil samples. MS/MSD samples will be analyzed for the same analysis as the soil samples collected on the day of the sampling.

Table 2 provides laboratory analytical methods, glassware, and holding times for each analysis.

3.4 Field Instrumentation

The field instruments to be used during the implementation of the remedial action work plan will be calibrated at the beginning of each day as per the manufacturers' specifications. Calibration records will be recorded in the field book.

4.0 DECONTAMINATION

All sampling equipment will be decontaminated between sampling locations unless they are dedicated disposable tools. Decontamination of non-dedicated sampling equipment will consist of the following procedure:

- Gently tap or scrape to remove adhered soil
- Rinse with tap water
- Wash with Alconox detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

TABLES

Table 1
Endpoint Sampling Rationale and Summary
601-607 Union Street, Brooklyn, New York

Sample Matrix	Sample ID	Sample Interval (feet below surface grade)	Rationale	Estimated Number of Samples	Analysis
SOIL	EP-1	Collect at 15 feet below grade and el. 4.50 A	To assess if Track 2 SCOs are achieved at the bottom of excavation or Track 4, contingency at 15 feet	1	Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Pesticides, Total Analyte List (TAL) Metals, Cyanide total, per- and poly-fluoroalkyl substances (PFAS), and 1,4-dioxane
	EP-2	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-3	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-4	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-5	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-6	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-7	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-8	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-9	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-10	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-11	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-12	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-13	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-14	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-15	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-16	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-17	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-18	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-19	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-20	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-21	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-22	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-23	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-24	Collect at 15 feet below grade and el. 4.50 A		1	

* Additional soil samples may be collected based on field conditions (i.e: post excavation lab results, elevated PID readings, odor, sheen, etc.)

Table 1
Endpoint Sampling Rationale and Summary
601-607 Union Street, Brooklyn, New York

Sample Matrix	Sample ID	Sample Interval (feet below surface grade)	Rationale	Estimated Number of Samples	Analysis
SOIL	EP-25	Collect at 15 feet below grade and el. 4.50 A	To assess if Track 2 SCOs are achieved at the bottom of excavation or Track 4, contingency at 15 feet	1	Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Pesticides, Total Analyte List (TAL) Metals, Cyanide total, per- and poly-fluoroalkyl substances (PFAS), and 1,4-dioxane
	EP-26	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-27	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-28	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-29	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-30	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-31	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-32	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-33	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-34	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-35	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-36	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-37	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-38	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-39	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-40	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-41	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-42	Collect at 15 feet below grade and el. 4.50 A		1	
	EP-43	Collect at 15 feet below grade and el. 4.50 A		1	
	SB-DUP-1(Depth)	Blind Duplicate: One per 20 soil samples	QA/QC	1	
	SB-DUP-2(Depth)	Blind Duplicate: One per 20 soil samples	QA/QC	1	
	SB-DUP-3(Depth)	Blind Duplicate: One per 20 soil samples	QA/QC	1	
	SB-MS/MSD-1 (Depth)	One per 20 soil samples	QA/QC	2	
	SB-MS/MSD-2(Depth)	One per 20 soil samples	QA/QC	2	

* Additional soil samples may be collected based on field conditions (i.e: post excavation lab results, elevated PID readings, odor, sheen, etc.)

Table 1
Endpoint Sampling Rationale and Summary
601-607 Union Street, Brooklyn, New York

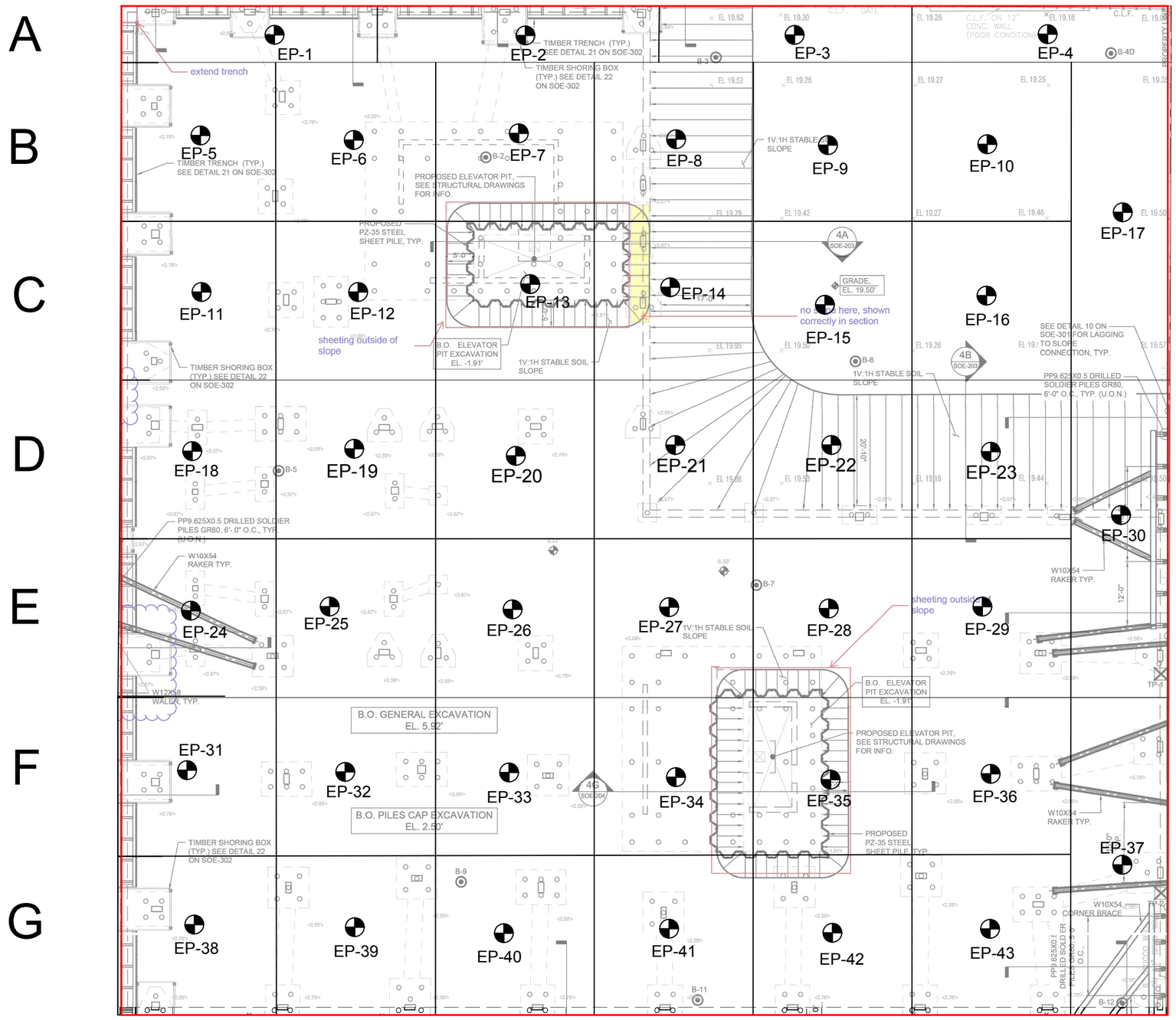
Sample Matrix	Sample ID	Sample Interval (feet below surface grade)	Rationale	Estimated Number of Samples	Analysis
SOIL	SB-MS/MSD-3 (Depth)	Field Blank per 20 samples	QA/QC	2	Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), Pesticides, Total Analyte List (TAL) Metals, Cyanide total, per- and poly-fluoroalkyl substances (PFAS), and 1,4-dioxane
	FB-1	Field Blank per 20 samples	QA/QC	1	
	FB-2	Field Blank per 20 samples	QA/QC	1	
	FB-3	Field Blank per 20 samples	QA/QC	1	
Water	TB-1	Trip Blank: 1 per cooler per day (Lab-prepared)	QA/QC	15	TCL VOCs

Totals

Sample #s	Rationale	Total
EP-1 through EP-43	Assess Track 2 at Remedial Depth	174
Field Duplicate	QA/QC	3
MS/MSD		6
Field Blank		3
Trip Blank		15
Total Samples		201

* Additional soil samples may be collected based on field conditions (i.e: post excavation lab results, elevated PID readings, odor, sheen, etc.)

FIGURES



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Legend:

- Site Boundary
- EP-X — Proposed End Point Sample ID and Location
- Alpha Numeric Grid

Scale: 0 15 20

Figure No.	1
Figure Name:	PROPOSED ENDPOINT SAMPLE LOCATIONS
Report:	RAWP-QAPP
Date:	10/30/2025
Drawn By:	KB
Site Address:	601-607 UNION STREET, BROOKLYN, NY (C224392)

ATTACHMENTS

ATTACHMENT 1

NYSDEC Guidance for PFAS Sampling

NEW YORK STATE OF OPPORTUNITY.

Department of Environmental Conservation

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

Under NYSDEC's Part 375 Remedial Programs

April 2023



www.dec.ny.gov

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ERRATA SHEET for

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

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Data Assessment and Application to Site Cleanup Page 3	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	3/28/2023
Water Sample Results Page 3	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below.	NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt).Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.	3/28/2023
Soil Sample Results Page 3	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values:	NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:	3/28/2023
Protection of Groundwater Page 3	PFOA (ppb) 1.1 PFOS (ppb) 3.7	PFOA (ppb) 0.8 PFOS (ppb) 1.0	3/28/2023

Citation and Page Number	Current Text	Corrected Text	Date
Footnote 2 Page 3	The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	3/28/2023
Testing for Imported Soil Page 4	If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.	If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.	3/28/2023
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…) If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020

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

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

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil…	In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil…	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021
Water Sample Results Page 9	"In addition, further assessment of water may be warranted if either of the following screening levels are met: a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L"	Deleted	6/15/2021

Citation and Page Number	Current Text	Corrected Text	Date
Routine Analysis, Page XX	Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids).	Deleted	5/31/2022
Analysis and Reporting, Page XX	As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.	Deleted	5/31/2022
Routine Analysis, Page XX	LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.	EPA Method 1633 is the procedure to use for environmental samples.	
Soil Sample Results, Page XX	Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6	
Appendix A	"Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1"	"Include in the text ….EPA Method 1633"	
Appendix A	"Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101"	Deleted	
Appendix B	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	

Citation and Page Number	Current Text	Corrected Text	Date
Appendix C	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix D	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix G		Updated to include all forty PFAS analytes in EPA Method 533	
Appendix H		Deleted	
Appendix I	Appendix I	Appendix H	
Appendix H	"These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report."	"These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER)."	
Appendix H	"The holding time is 14 days…"	"The holding time is 28 days…"	
Appendix H, Initial Calibration	"The initial calibration should contain a minimum of five standards for linear fit…"	"The initial calibration should contain a minimum of six standards for linear fit…"	
Appendix H, Initial Calibration	Linear fit calibration curves should have an R^2 value greater than 0.990.	Deleted	
Appendix H, Initial Calibration Verification	Initial Calibration Verification Section	Deleted	
Appendix H	secondary Ion Monitoring Section	Deleted	
Appendix H	Branched and Linear Isomers Section	Deleted	

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

Objective

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

Applicability

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

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

Field Sampling Procedures

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

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

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

Analysis and Reporting

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

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

Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

Additional Analysis

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

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

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

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

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

Data Assessment and Application to Site Cleanup

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

Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

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

Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	0.8	1.0

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

[2] The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

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

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

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

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

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

General Guidelines in Accordance with DER-10

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

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
-
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

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

General

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

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

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

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix D - Sampling Protocols for PFAS in Surface Water

General

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

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

Equipment

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

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

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

- stainless steel cup

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

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

General

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

Laboratory Analysis and Container

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

Equipment

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled "General Fish Handling Procedures for Contaminant Analysis" (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

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

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

Version: 8

Previous Version Date: 21 March 2018

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

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

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

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

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

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

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

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

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

   1. Project and Site Name.

   2. DEC Region.

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

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

   5. Preservation Method.

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

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

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

   3. Date collected.

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

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

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

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

D. General data collection recommendations:

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

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

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

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

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

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

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

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

the same information.

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

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

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

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

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

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

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

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

Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

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

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

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

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

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

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

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

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

Town of _____, in _____ County.

Item(s) _____

_____

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

_____ _____
Signature Date

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

_____ _____
Signature Date

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

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

NOTICE OF WARRANTY

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

HANDLING INSTRUCTIONS

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

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2

Group	Chemical Name	Abbreviation	CAS Number
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

ATTACHMENT 2

Laboratory Standard Operating Procedure Summary for PFAS

Standard Operating Procedure - Summary
PFAS in Groundwater, Surface water and Soils

1.0 Summary

Target PFAS compounds are prepared and analyzed using EPA Method 537.1 modified. Aqueous and Soil samples are fortified with isotopic surrogates of the target PFAS compounds, extracted and concentrated to a known volume. The extracts are then analyzed employing LC-MSMS techniques.

Each preparation batch (per matrix) includes a preparation blank, lab control sample (blank spike), sample matrix spike and matrix spike duplicate and up to 20 samples.

2.0 Sample Preparation

Sample preparation involves extraction/clean-up and final concentration to a known volume before analysis. Isotopic surrogates are added to all preparation batch samples/QC.

2.1 Aqueous Samples

A known volume of sample is spiked with isotopic surrogates and extracted using Solid Phase Extraction (SPE) techniques. The SPE tubes are eluted with solvent and the eluant is then concentrated using nitrogen evaporation to a final volume of 1.0 mL. The final concentrated extract is fortified with Internal Standard and analyzed by LC-MSMS.

2.2 Soil Samples

A known weight of sample is fortified with isotopic surrogates, mixed then extracted in methanolic potassium hydroxide employing vortex mixing, followed by orbital shaking and finally ultrasonic extraction.

The extract is centrifuged and the supernatant solvent is quantitatively poured off and a small volume of PFAS free water is added to the solvent. The solvent mixture is evaporated using nitrogen evaporation and the remaining aqueous extract is brought to a known volume with PFAS free water.

The aqueous extract is then pH adjusted to 6-8 using glacial acetic acid and the resulting aqueous solution is extracted using SPE techniques. The SPE tube is eluted with solvent and the eluant is then concentrated using nitrogen evaporation to a final volume of 2.0 mL. The final concentrated extract is fortified with Internal Standard and analyzed by LC-MSMS.

3.0 **Analysis**

Analysis is conducted utilizing an Agilent Infinity 1290 HPLC system interfaced to an Agilent 6470AAR LC-MSMS with an Agilent Jet Stream-ElectroSpray Ionization (AJS-ESI)interface. The system is operated in the dynamic MRM (multiple reaction monitoring) mode for specific PFAS target isotopes and native analogs.

Where possible, multiple MRM transitions are used for targets and isotopes. Some species only exhibit single MRM transitions. Precursors and product ions are used for Quantitative and Qualitative purposes respectively.

3.1 Initial Calibration

The LC-MSMS is calibrated with 7 standards of a total of 40 isotopes and analog target PFAS compounds. Calibration is conducted from 0.25 to 20 ng/mL. Calibration employs internal standard techniques and either average response factor or quadratic regression is used depending upon the best calibration model based upon accuracy across the calibration range.

3.2 Continuing Calibration Verification

Each analytical sequence includes an opening continuing calibration verification (CCV) and a CCV after every 10 injections and at the end of the analysis sequence.

The CCV acceptance criteria are $\pm$ 30% of the expected value. Internal Standard areas are acceptable when -50% to +50% of the average response in the initial calibration.

3.3 Isotopic Surrogates (Isotope Dilution Analytes (IDA)

18 IDAs are utilized for this procedure. These isotopes are used to correct for recovery of detected target analog PFAS compounds through the preparation/analysis processes. The recovery limits currently are 25-150 % recovery and these limits are adjusted based upon laboratory determined control limits when sufficent data points per matrix are available.

3.4 Method Blanks (MBLK)

Each preparation batch includes a laboratory method blank. Any result greater than the Reporting Limit or 2 ng/L (aqueous) or 0.5 ug/kG (soil) is "B" flagged according with the exception of any detection of PFOA, PFOS or PFNA above the RL will require re-extraction of the batch.

3.5 Blank Spike (LCS)

Each preparation batch includes and BS/LCS. Recoveries are calculated and based upon isotope dilution. Recovery acceptance limits are 50-150% with RPD of 30% for a BSD if performed.

3.6 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

Each preparation batch includes and MS/MSD pair. Recoveries are calculated and based upon isotope dilution. Recovery acceptance limits are 25-150% with RPD of 35% for samples.

4.0 Data Review and Reporting

All quantitation reports and LIMS output files are generated using the Agilent Mass Hunter reporting programs. The Quant reports include all Quantitative data and MRM transition data which are reviewed. The LIMS output file is in a format that allows upload to Element LIMS.

Isotope Dilution calculations are performed using our custom PFAS.mdb program which automatically uploads to the LIMS output file for upload to Element LIMS.

Once uploaded to ELEMENT, any exceptions/outliers are noted, flagged and set to reviewed.

All data reported are isotopically corrected for all QC and samples.

5.0 Revision History

May 1, 2019 Revision 1.0 First Issue

6.0 Approvals:

Laboratory Director Ben Gulizia

Corp. Technical Director Robert Bradley

Corp. QA Officer Sarah Widomski

ATTACHMENT 3

Laboratory Certification and Reporting Limits for PFAS

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2020
Issued April 01, 2019
Revised April 30, 2019

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. KRZYSZTOF TRAFALSKI
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Perfluorinated Alkyl Acids

Perfluorooctanesulfonic acid (PFOS)	EPA 537
Perfluorooctanoic acid (PFOA)	EPA 537

NEW YORK STATE | Department of Health

Serial No.: 60182

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

NELAP RECOGNIZED TNI ACCREDITATION BODY

York Analytical Laboratories, Inc.

10/30/2019

Analytical Method Information

PFAS Target compounds by LC/MS-MS

Dept.: PFAS

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
PFAS, NYSDEC Target List in Water (EPA 537m)					Units: ng/L			
Preservation: Cool 4°C						**Hold Time to Analysis** 28 days		
Container: 10_250mL Plastic Cool to 4° C		**Amount Required:** 250 mL				**Hold Time to Extr.** 14 days		
1H,1H,2H,2H-Perfluorodecanesulfonic aci	0.877	2.00 ng/L		30	25 - 150	35	50 - 130	30
1H,1H,2H,2H-Perfluorooctanesulfonic aci	1.16	5.00 ng/L		30	25 - 150	35	50 - 130	30
surr: d3-N-MeFOSAA			25 - 150					
surr: d5-N-EtFOSAA			25 - 150					
surr: M2-6:2 FTS			25 - 150					
surr: M2-8:2 FTS			25 - 150					
surr: M2PFTeDA			10 - 150					
surr: M3PFBS			25 - 150					
surr: M3PFHxS			25 - 150					
surr: M4PFHpA			25 - 150					
surr: M5PFHxA			25 - 150					
surr: M6PFDA			25 - 150					
surr: M7PFUdA			25 - 150					
surr: M9PFNA			25 - 150					
MPFOA		0.100 ng/L						
N-EtFOSAA	0.436	2.00 ng/L		30	25 - 150	35	50 - 130	30
N-MeFOSAA	0.364	2.00 ng/L		30	25 - 150	35	50 - 130	30
surr: Perfluoro-1-[13C8]octanesulfonamid			10 - 150					
surr: Perfluoro-1-[13C8]octanesulfonic aci			25 - 150					
Perfluoro-1-decanesulfonic acid (PFDS)	0.491	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluoro-1-heptanesulfonic acid (PFHpS)	0.418	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluoro-1-octanesulfonamide (FOSA)	0.877	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluorobutanesulfonic acid (PFBS)	0.436	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluorodecanoic acid (PFDA)	0.493	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluorododecanoic acid (PFDoA)	0.611	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluoroheptanoic acid (PFHpA)	0.447	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluorohexanesulfonic acid (PFHxS)	0.494	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluorohexanoic acid (PFHxA)	0.442	2.00 ng/L		30	25 - 150	35	50 - 130	30
surr: Perfluoro-n-[1,2-13C2]dodecanoic ac			25 - 150					
surr: Perfluoro-n-[13C4]butanoic acid (MF			25 - 150					
surr: Perfluoro-n-[13C5]pentanoic acid (M			25 - 150					
surr: Perfluoro-n-[13C8]octanoic acid (M8			25 - 150					
Perfluoro-n-butanoic acid (PFBA)	1.01	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluorononanoic acid (PFNA)	0.361	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluorooctanesulfonic acid (PFOS)	0.472	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluorooctanoic acid (PFOA)	0.360	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluoropentanoic acid (PFPeA)	0.511	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluorotetradecanoic acid (PFTA)	0.701	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluorotridecanoic acid (PFTrDA)	0.660	2.00 ng/L		30	25 - 150	35	50 - 130	30
Perfluoroundecanoic acid (PFUnA)	0.534	2.00 ng/L		30	25 - 150	35	50 - 130	30

York Analytical Laboratories, Inc.

10/30/2019

Analytical Method Information

PFAS Target compounds by LC/MS-MS

Dept.: PFAS

Analyte	MDL	Reporting Limit	Surrogate %R	Duplicate RPD	Matrix Spike %R	Matrix Spike RPD	Blank Spike / LCS %R	Blank Spike / LCS RPD
PFAS, NYSDEC Target List in Soil (EPA 537m)					Units: ug/kg			
Preservation: Cool 4°C						**Hold Time to Analysis** 28 days		
Container: 10_250mL Plastic Cool to 4° C		**Amount Required:** 250 mL				**Hold Time to Extr.** 14 days		
1H,1H,2H,2H-Perfluorodecanesulfonic aci	0.344	0.750 ug/kg		30	25 - 150	35	50 - 130	30
1H,1H,2H,2H-Perfluorooctanesulfonic aci	0.521	0.750 ug/kg		30	25 - 150	35	50 - 130	30
surr: d3-N-MeFOSAA			25 - 150					
surr: d5-N-EtFOSAA			25 - 150					
surr: M2-6:2 FTS			25 - 150					
surr: M2-8:2 FTS			25 - 150					
surr: M2PFTeDA			10 - 150					
surr: M3PFBS			25 - 150					
surr: M3PFHxS			25 - 150					
surr: M4PFHpA			25 - 150					
surr: M5PFHxA			25 - 150					
surr: M6PFDA			25 - 150					
surr: M7PFUdA			25 - 150					
surr: M9PFNA			25 - 150					
MPFOA								
N-EtFOSAA	0.109	0.750 ug/kg		30	25 - 150	35	50 - 130	30
N-MeFOSAA	0.0910	0.750 ug/kg		30	25 - 150	35	50 - 130	30
surr: Perfluoro-1-[13C8]octanesulfonamid			10 - 150					
surr: Perfluoro-1-[13C8]octanesulfonic aci			25 - 150					
Perfluoro-1-decanesulfonic acid (PFDS)	0.177	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluoro-1-heptanesulfonic acid (PFHpS)	0.198	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluoro-1-octanesulfonamide (FOSA)	0.455	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluorobutanesulfonic acid (PFBS)	0.109	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluorodecanoic acid (PFDA)	0.123	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluorododecanoic acid (PFDoA)	0.110	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluoroheptanoic acid (PFHpA)	0.112	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluorohexanesulfonic acid (PFHxS)	0.106	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluorohexanoic acid (PFHxA)	0.111	0.750 ug/kg		30	25 - 150	35	50 - 130	30
surr: Perfluoro-n-[1,2-13C2]dodecanoic ac			25 - 150					
surr: Perfluoro-n-[13C4]butanoic acid (MF			25 - 150					
surr: Perfluoro-n-[13C5]pentanoic acid (M			25 - 150					
surr: Perfluoro-n-[13C8]octanoic acid (M8			25 - 150					
Perfluoro-n-butanoic acid (PFBA)	0.278	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluorononanoic acid (PFNA)	0.0900	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluorooctanesulfonic acid (PFOS)	0.118	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluorooctanoic acid (PFOA)	0.0900	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluoropentanoic acid (PFPeA)	0.211	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluorotetradecanoic acid (PFTA)	0.192	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluorotridecanoic acid (PFTrDA)	0.132	0.750 ug/kg		30	25 - 150	35	50 - 130	30
Perfluoroundecanoic acid (PFUnA)	0.133	0.750 ug/kg		30	25 - 150	35	50 - 130	30

ATTACHMENT 4

Chain of Custody Examples

York Analytical Laboratories, Inc.
120 Research Drive, Stratford, CT 06615
132-02 89th Ave, Queens, NY 11418
clientservices@yorklab.com
www.yorklab.com

Field Chain-of-Custody Record

YORK Project No.

NOTE: YORK's Standard Terms & Conditions are listed on the back side of this document.
This document serves as your written authorization for YORK to proceed with the analyses requested below.
Your signature binds you to YORK's Standard Terms & Conditions.

Page _____ of _____

YOUR Information	Report To:	Invoice To:	YOUR Project Number	Turn-Around Time
Company:	Company:	Company:		RUSH - Next Day
Address:	Address:	Address:		RUSH - Two Day
Phone.:	Phone.:	Phone.:	YOUR Project Name	RUSH - Three Day
Contact:	Contact:	Contact:		RUSH - Four Day
E-mail:	E-mail:	E-mail:		**Standard (5-7 Day)**
			YOUR PO#:	

Please print clearly and legibly. All information must be complete. Samples will not be logged in and the turn-around-time clock will not begin until any questions by YORK are resolved.

Samples Collected by: (print your name above and sign below)

Matrix Codes

S - soil / solid
GW - groundwater
DW - drinking water
WW - wastewater
O - Oil ⋮ Other

Samples From

New York
New Jersey
Connecticut
Pennsylvania
Other

Report / EDD Type (circle selections)

Summary Report
QA Report
NY ASP A Package
NY ASP B Package
CT RCP
CT RCP DQA/DUE
NJDEP Reduced Deliverables
NJDKQP
Standard Excel EDD
EQuIS (Standard)
NYSDEC EQuIS
NJDEP SRP HazSite
Other:

YORK Reg. Comp.

Compared to the following Regulation(s): (please fill in)

Sample Identification	Sample Matrix	Date/Time Sampled	Analysis Requested	Container Description

Comments:

Preservation: (check all that apply)

HCl ___ MeOH ___ HNO_3 ___ H_2SO_4 ___ NaOH ___ ZnAc ___
Ascorbic Acid ___ Other: _____

Special Instruction

Field Filtered ____
Lab to Filter _____

Samples Relinquished by / Company	Date/Time	Samples Received by / Company	Date/Time	Samples Relinquished by / Company	Date/Time
Samples Received by / Company	**Date/Time**	**Samples Relinquished by / Company**	**Date/Time**	**Samples Received by / Company**	**Date/Time**
Samples Relinquished by / Company	**Date/Time**	**Samples Received by / Company**	**Date/Time**	**Samples Received in LAB by**	**Date/Time**

Temp. Received at Lab

Degrees C

ATTACHMENT 5

Resumes

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (516) 417-8588

ARIEL CZEMERINSKI, P.E.
Email: Ariel@AMC-Engineering.com

SUMMARY:

New York State Professional Engineer. Chemical and Environmental Engineer, with 29 years of experience in the chemical and environmental areas. Areas of expertise include inspections and sign off on Large Scale Vapor Barrier Installations at Various NYC schools, Design and inspections of Sub Slab Depressurization Systems, wastewater treatment systems, Large scale dewatering system design for construction, process control and automation, process optimization, productivity improvement, quality systems, environmental compliance, Phase I Environmental Site Assessments, Phase II Environmental Investigations, Phase III: Remedial Activities, process and plant safety, and management of a production facility. Special Inspector with New York City Department of Buildings. Registered PE in NY.

Professional Experience:

AMC: 18 Years
Prior: 6 years

Education

Master of Science in Chemical Engineering, Columbia University, New York, NY, Feb. 1990.
Bachelor of Science in Chemical Engineering, University Of Buenos Aires, Buenos Aires, Argentina, May 1987

Areas of Expertise

- Vapor Intrusion - Barrier and Sub Slab Venting System Design
- Environmental Assessment Statements under CEQR, ULURP
- Remedial Program Design and Management
- Environmental Compliance, Clean Water Act, Clean Air Act, Hazardous Materials
- Dewatering & Treatment System Design
- SWPPP design and implementation. Preparation and Submittal of NOIs.
- NYCDEP Sewer Discharge Permitting
- Transfer Station Permitting and Compliance
- Wastewater Treatment Systems and Permitting, SPDES, LI Well permit, Water Withdrawal Permit.
- Air Permits and Registration
- Zoning Regulations and Permitting
- Safety and Environmental Training
- Waste Management Plans
- Professional Certifications
- OSHA 40-hr HAZWOPER
- OSHA 10-hr Construction Safety and Health

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (516) 417-8588

Project Experience

Project: Bergen Basin Sewer - CS-JA-BBS -Queens, NY
Project Description: NYC infrastructure (sewer, water) upgrade, drainage channel installation. Dewatering Design. Permits with NYCDEP and NYSDEC. Soil contaminated with petroleum requiring excavation, soil management and disposal under a Materials Handling Plan, Construction Health and Safety Plan. SWPPP design and implementation.
Client: JR Cruz - NYCDDC
Regulatory Authority: NYSDEC, NYCDEP
Role: Mr. Czemerinski served as the Environmental Consultant for the project.

Project: SER002326- Storm and Sanitary Sewers in Wardwell Avenue, Staten Island, New York
Project Description: NYC infrastructure (sewer, water) upgrade.
Dewatering Design. Permits with NYCDEP and NYSDEC. SWPPP design and implementation.
Client: E.E. Cruz - NYCDDC
Regulatory Authority: NYSDEC, NYCDEP
Role: Mr. Czemerinski served as the Environmental Consultant for the project.

Project: HED568-Installation of New 20" Subaqueous water main extension, and new 12" sub-aqueous high pressure gas main from the Bronx to Randall's Island, New York
Project Description: NYC infrastructure (gas, water) upgrade.
Soil contaminated with petroleum requiring excavation, soil management and disposal under a Materials Handling Plan, Construction Health and Safety Plan. Dewatering Design. Permits with NYCDEP and NYSDEC.
Client: E.E. Cruz - NYCDDC
Regulatory Authority: NYSDEC, NYCDEP
Role: Mr. Czemerinski served as the Environmental Consultant for the project.

Project: Domsey Fiber Corp. - 431 Kent Avenue, Brooklyn NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: Express Builders
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: SE-807 –Construction of Storm and Sanitary Sewers and Water Main in 20th Ave between 126th St and US Bulkhead Line Area, College Point, Queens, NY
Project Description: NYC Residential infrastructure (sewer, water) upgrade, outfall reconstruction, Soil characterization, soil management and disposal under a Materials Handling Plan, Construction Health and Safety Plan and Community Air Monitoring Plan. SWPPP design and implementation, Public Participation Plan, Marine HASP, Dewatering Design and permit application.

Client: EIC Associates
Regulatory Authority: NYCDDC
Role: Mr. Czemerinski served as the Environmental Consultant for the project.

Project: Springfield Gardens Residential Area BMP - Springfield Gardens, Queens, NY
Project Description: NYC Residential infrastructure (sewer, gas, water) upgrade, drainage channel installation and pond restoration. Soil contaminated with, petroleum and heavy metals requiring excavation, soil management and disposal under a Materials Handling Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: EIC Associates - NYCEDC
Regulatory Authority: NYSDEC, NYCParks
Role: Mr. Czemerinski served as the Environmental Consultant for the project.

Project: Former Domino Sugar Site - Kent Avenue, Brooklyn NY
Project Description: NYC E-Designation. Soil contaminated with semi-volatile organic compounds and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: Two Trees Management
Regulatory Authority: NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former Uniforms For Industry Site - Jamaica Avenue, Queens NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum, mop oil and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: The Arker Companies
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project

Project: Former Sunbelt Equipment Site – 25 Kent Avenue, Brooklyn, NY
Project Description: NYS Brownfield cleanup project. Soil contaminated with petroleum, and heavy metals and coal tar, requiring deep excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan, Dewatering Design and implementation, SWPPP design and implementation
Client: 19 Kent Acquisition LLC
Regulatory Authority: NYSDEC
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (516) 417-8588

Project Experience

Project: Former Charles Pfizer & Co. Site - 407 Marcy Avenue, Brooklyn, NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: The Rabsky Group
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former East Coast Industrial Uniforms Site - 39 Skillman Street, Brooklyn, NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: Riverside Builders
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former BP Amoco Service Station Site - 1800 Southern Boulevard, Bronx, NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: SoBro, Joy Construction
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former Dico G Auto & Truck Repair Site - 3035 White Plains Road, Bronx, NY
Project Description: NYS Brownfield cleanup project. Soil contaminated with petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: The Arker Companies
Regulatory Authority: NYSDEC
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Ezgi Karayel

Principal

Contact

347.871.0750
ezgi@vektorconsultants.com

Ezgi Karayel is an environmental engineer with extensive experience in brownfield redevelopment. She is the founder and Principal of Vektor Consultants and serves as Operations Officer of the firm. Ms. Karayel guides firm's clients through their due diligence processes. She manages all aspects of the firm strongly focusing on brownfield redevelopment and E-Designation projects across New York Metropolitan area. She has worked with major real estate developers and shareholders by developing strategic approaches to the environmental challenges of complex real estate transactions and brownfield redevelopment. Her experience also includes a broad range of environmental services including regulatory compliance, due diligence assessments, acquisition support, design and implementation of engineering controls and remediation systems, excavation support and soil disposal plans, and facility decommissioning.
She is the chair of the Partnership's Scholarship Program and works closely with committee members to support the education and training of students who are pursuing environmental careers.

Education

B.S. Environmental Engineering
University at Buffalo

Professional Registration

OSHA 10-hour Construction and 40-hour General Industry
OSHA 40-hour HAZWOPER and 8-hour HAZWOPER Refresher
Certified Environmental Manager and Certified Environmental Inspector

Affiliations

New York City Brownfield Partnership, President

Brownfield Coalition of the Northeast, Advisory Board Member

Select Projects

Linden Boulevard, Queens, New York – Site Investigation and Remediation of a 7-acre former landfill with a Restrictive Declaration. The scope of work for the project included preparation of a Remedial Investigation Work Plan for review and approval by the NYCOER, NYSDEC and NYCDOH, implementation of Remedial Investigation, preparation of Remedial Investigation Report, Remedial Action Work Plan, preparation and implementation of a waste characterization plan for soils for proper disposal, supervision of site remediation activities, coordination with remediation engineer to design a methane mitigation system as well as vapor barrier system and managing field staff during remediation.

Ezgi Karayel, Principal

Former Tunnel Diner, Jersey City, New Jersey – Remedial Investigation (RI) of a 1⁄2-acre property in accordance with the New Jersey Technical Requirements for Site Remediation. Ms. Karayel worked closely with the Licensed Site Remediation Professional (LSRP) of the project. Followed by the approval of the RAWP prepared by her, Ms. Karayel directed remediation activities at the site and managed field staff on a daily basis. Upon completion of remediation, she has prepared Remedial Action Outcome for review and certification of the LSRP.

249 North 7th Street, Brooklyn, New York – As a Project Director for a Remedial Investigation of a former auto repair shop with an active spill, Ms. Karayel was responsible for remediation of the property under the direct supervision of NYCOER and NYSDEC. Her responsibilities consisted of preparing the required reports and supervision of remediation including excavation, and installation of engineering controls. By successful coordination with NYCOER, she has managed to enroll the project in City's Clean Soil Bank program and saving the client over $160,000 for soil disposal.

9029 Flatlands Avenue, Brooklyn, New York – E-Designation for HazMat. She conducted a Phase I ESA prior to development, followed by remedial investigation and preparation of Remedial Investigation Report and Remedial Action Work Plan for the remediation. Remediation for the project included design and implementation of an active sub-slab depressurization system. For the engineering controls design and implementation, Ms. Karayel worked closely with the Professional Engineer for the project and performed all required pilot tests, initial start-up and inspections.

37-23 33rd Street, Queens, New York – Removal of "P" Designation. Ms. Karayel managed to prevent the property from becoming a Class II site by performing a thorough due-diligence and disproving the prior consultant's findings and recommendations. Furthermore, her due-diligence study and evaluation saved the client over $1,000,000 clean-up costs, regulatory and legal fees.

261 Grand Concourse, Bronx, New York – Brownfield Redevelopment
1-9 Wythe Avenue, Brooklyn, New York – Brownfield Redevelopment
42 Reeve Place, Brooklyn, New York – Spill Closure
21-01 21st Street, Queens, New York – Former Gasoline Station Decommissioning and Storage Tank Removal
260-262 Van Brunt Street, Brooklyn, New York – Brownfield Cleanup
299 East 161st Street, Bronx, New York – Voluntary Cleanup Program
122 East 32nd Street, New York, New York – Community Center, Remediation under Voluntary Cleanup Program
346 Metropolitan Avenue, Brooklyn, New York – Voluntary Cleanup Program
574 Broome Street, New York, New York – Voluntary Cleanup Program
173-175 McGuinness Boulevard, Brooklyn, New York – Voluntary Cleanup Program
4790 Broadway, New York, New York – Voluntary Cleanup Program

Alex Keenan

Project Manager

Contact

347.871.0750
akeenan@vektorconsultants.com

Alex Keenan is a Project Manager with Vektor Consultants. Alex is responsible for managing construction activities, drilling teams, excavations, tank removals, and waste disposals at multiple sites concurrently, as well as preparation of Remedial Action Work Plans, Remedial Investigation Reports, Remedial Action Reports, Final Engineering Reports, Noise Sampling Reports, Soil Vapor/Air Sampling Work Plans, Construction Health and Safety Plans, Summary Reports, Brownfield Cleanup Program Applications, Volunteer Cleanup Program Applications, Disposal Facility Applications, Petroleum Bulk Storage Applications, Underground Storage Tank Closure Reports, Phase I and Phase II Environmental Site Assessment Reports.

Education

B.S. Geology
Virginia Polytechnic and State University

Professional Registration

OSHA 30-hour Construction
OSHA 40-hour HAZWOPER and 8-hour HAZWOPER Refresher
10-Hour Site Safety Training

Affiliations

New York City Brownfield Partnership

Select Projects & Prior Experience

Gowanus Redevelopment Projects, Brooklyn, New York:
Prior to joining Vektor, Alex was responsible for implementation and oversight of field investigations and delineation of MGP Coal tar at Significant Threat Sites, oversight of In-Situ Stabilization applications, preparation of Remedial Investigation Reports, Remedial Action Work Plans, Source Removal Work Plans, Remedial Action Reports, Final Engineering Reports, various NYSDEC technical submittals and daily reports for multiple sites in the Gowanus Redevelopment area, as well as project coordination and oversight of drilling, excavation, and waste disposal and ensuring compliance with EPA hazardous waste reporting requirements.
251 Douglass Street, Brooklyn, New York – Brownfield Redevelopment
318 Nevins Street, Brooklyn, New York – Brownfield Redevelopment
585 Union Street, Brooklyn, New York – Brownfield Redevelopment

Ben Neumann

Assistant Project Manager

Contact

347.871.0750
bneumann@vektorconsultants.com

Ben Neumann is an Assistant Project Manager with Vektor Consultants. He is responsible for conducting and overseeing field investigations and site assessments. In addition, Ben authors Phase I and Phase II Environmental Site Assessments, Remedial Investigation Workplans, Remedial Investigation Reports, Remedial Action Workplans, Remedial Action Reports, and Installation Reports. His responsibilities include providing environmental oversight at construction project sites in the New York City Metropolitan area, performing site visits, conducting subsurface investigations and waste characterization sampling. Ben's experience and education in environmental remediation and project management provides valuable knowledge and insight for navigating projects through different regulatory programs.

Education

B.S. Environmental Science
Environmental Engineering & Technology Focus
Union College, Schenectady, NY

Professional Registration

Project Management Professional (PMP)

OSHA 30-hour Construction

OSHA 40-hour HAZWOPER

10-Hour Site Safety Training (SST)

Affiliations

The New York City Brownfield Partnership

Select Projects & Prior Experience

1533-1541 60th Street – Voluntary Cleanup Program
1547-1555 60th Street – Voluntary Cleanup Program
601 Union Street – Brownfield Cleanup Program

Prior to joining Vektor, Ben assisted Licensed Site Remediation Professionals (LSRPs) and carried out project management duties on over 100 projects within the New Jersey Department of Environmental Protection's (NJDEP) Site Remediation Program (SRP). Ben performed and oversaw Site Investigation, Remedial Investigation, and Remedial Action activities to achieve site remediation goals and obtain project closure via the issuance of Response Action Outcome (RAO) and No Further Action (NFA) Letters.

APPENDIX E

CITIZEN PARTICIPATION PLAN

NEW YORK STATE | Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan
for
601-607 Union Street Site

October 2025

C224392
601-607 Union Street, Brooklyn, New York 11215

Contents

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* * * * *

Note: The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site's investigation and cleanup process.

Applicant: **601 Union Street Owner LLC ("Applicant")**
Site Name: **601-607 Union Street ("Site")**
Site Address: **601-607 Union Street**
Site County: **Brooklyn**
Site Number: **C224392**

1. What is New York's Brownfield Cleanup Program?

New York's Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as "brownfields" so that they can be reused and developed. These uses include recreation, housing, and business.

A *brownfield* is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants who conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at:
http://www.dec.ny.gov/chemical/8450.html .

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well-being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interested in site investigation and cleanup programs is important for many reasons. These include:

- Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment

- Improving public access to, and understanding of, issues and information related to a particular site and that site's investigation and cleanup process

- Providing citizens with early and continuing opportunities to participate in NYSDEC's site investigation and cleanup process

- Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community

- Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site's investigation and cleanup program. The public's suggestions about this CP Plan and the CP program for the site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the site's investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC web site. If this occurs, NYSDEC will inform the public in fact sheets distributed about the site and by other means, as appropriate.

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site's investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the project. These will include notifications of upcoming activities at the site (such as fieldwork), as well as availability of project documents and announcements about public comment periods.
The site contact list includes, at a minimum:

- Chief executive officer and planning board chairperson of each county, city, town and village in which the site is located;
- Residents, owners, and occupants of the site and properties adjacent to the site;
- The public water supplier which services the area in which the site is located;
- Any person who has requested to be placed on the site contact list;
- The administrator of any school or day care facility located on or near the site for purposes of posting and/or dissemination of information at the facility;
- Location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

Note: The first site fact sheet (usually related to the draft Remedial Investigation Work Plan) is distributed both by paper mailing through the postal service and through DEC Delivers, its email listserv service. The fact sheet includes instructions for signing up with the appropriate county listserv to receive future notifications about the site. See http://www.dec.ny.gov/chemical/61092.html .

Subsequent fact sheets about the site will be distributed exclusively through the listserv, except for households without internet access that have indicated the need to continue to receive site information in paper form. Please advise the NYSDEC site project manager identified in Appendix A if that is the case. Paper mailings may continue during the investigation and cleanup process for some sites, based on public interest and need.

CP Activities

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site's investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation

and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site's investigation and cleanup.

The public is encouraged to contact project staff at any time during the site's investigation and cleanup process with questions, comments, or requests for information.

This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

Technical Assistance Grant

NYSDEC must determine if the site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the site, as described in Section 5.

If the site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the site, and that its members' health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the site.

As of the date the declaration (page 2) was signed by the NYSDEC project manager, **the significant threat determination for the site had not yet been made**.

To verify the significant threat status of the site, the interested public may contact the NYSDEC project manager identified in Appendix A.

For more information about TAGs, go online at
http://www.dec.ny.gov/regulations/2590.html

Note: The table identifying the citizen participation activities related to the site's investigation and cleanup program follows on the next page:

Citizen Participation Activities	Timing of CP Activity(ies)
Application Process:	
• Prepare site contact list • Establish document repository(ies)	At time of preparation of application to participate in the BCP.
• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period • Publish above ENB content in local newspaper • Mail above ENB content to site contact list • Conduct 30-day public comment period	When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.
After Execution of Brownfield Site Cleanup Agreement (BCA):	
• Prepare Citizen Participation (CP) Plan	Before start of Remedial Investigation **Note:** Applicant must submit CP Plan to NYSDEC for review and approval within 20 days of the effective date of the BCA.
Before NYSDEC Approves Remedial Investigation (RI) Work Plan:	
• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan • Conduct 30-day public comment period	Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.
After Applicant Completes Remedial Investigation:	
• Distribute fact sheet to site contact list that describes RI results	Before NYSDEC approves RI Report
Before NYSDEC Approves Remedial Work Plan (RWP):	
• Distribute fact sheet to site contact list about draft RWP and announcing 45-day public comment period • Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager) • Conduct 45-day public comment period	Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.
Before Applicant Starts Cleanup Action:	
• Distribute fact sheet to site contact list that describes upcoming cleanup action	Before the start of cleanup action.
After Applicant Completes Cleanup Action:	
• Distribute fact sheet to site contact list that announces that cleanup action has been completed and that NYSDEC is reviewing the Final Engineering Report • Distribute fact sheet to site contact list announcing NYSDEC approval of Final Engineering Report and issuance of Certificate of Completion (COC)	At the time the cleanup action has been completed. **Note:** The two fact sheets are combined when possible if there is not a delay in issuing the COC.

3. Major Issues of Public Concern

This section of the CP Plan identifies major issues of public concern that relate to the site. Additional major issues of public concern may be identified during the course of the site's investigation and cleanup process.

As the date of this plan, no major issues of public concern were identified since direct contract to soil and/or groundwater contamination is not readily present. However, in the future, major issues of public concern, including but not limited to nuisance odors, noise, and construction-related traffic, may be identified. These potential issues will be addressed during the remedial program.

Contaminants of concern that have been identified to date include semi-volatile organic compounds (SVOCs) and metals including hazardous lead in soil, chlorinated volatile organic compounds (CVOCs) in soil vapor, and SVOCs in groundwater. Contaminants are discussed in further detail in Section 4 below. The identified contaminants will be assessed, delineated, and remediated in accordance with NYSDEC-approved work plans.

Site information is available through Project Contacts mentioned in Section 2 and Appendix A. The BCP Application, which includes the previous site investigations and identifies future reports that will be prepared for the NYSDEC, is available in the document repository discussed above in Section 2 and in Appendix A.

4. Site Information

Appendix C contains a map identifying the location of the site.

Site Description
The Site is located on the east side of Third Avenue between Sackett Street to the north and Union Street to the south.. The Site consists of two contiguous tax lots totaling approximately 37,553-square feet (0.862 acres). The legal description of the subject property is Tax Block 434 and Lots 1 and 12.. Lot 1 (21,055 square feet) consists of a 1-story office/warehouse building with a partial cellar (approximately 500 square feet) situated in the northeastern portion of the lot. One 550-gallon and one 3,000-gallon aboveground storage tank (AST), containing #2 fuel oil, are located in the cellar. The slab-on-grade and cellar areas are predominantly covered with concrete, except for a small, exposed area resulting from historic tank removal or other intrusive work. Lot 12 (16,498 square feet) is used as an open parking and storage yard, fully covered with asphalt. The Site is secured with fencing and gated entrances. The Site is currently vacant, with occasional parking.

The Site is located within a mixed residential, commercial, and industrial area of Kings County. The Site is zoned as M1-4/R7A, which is part of the Special Mixed-Use District.

This zoning permits light manufacturing, commercial, community facility, and residential uses, promoting a blend of uses consistent with the character of the surrounding area.

The Site is not located in an Environmental Justice Area. Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice efforts focus on improving the environment in communities, specifically minority and low income communities, and addressing disproportionate adverse environmental impacts that may exist in those communities.

The site is located in an area with a large Hispanic population nearby. Future fact sheets will be translated into Spanish.

For additional information, visit:
https://statisticalatlas.com/neighborhood/New-York/New-York/Gowanus/Race-and-Ethnicity

History of Site Use, Investigation, and Cleanup

Both parcels of the Site were undeveloped as early as 1888. Lot 1 of the Site was developed with a lumber yard (Ross & Snyder), including one- and two-story lumber sheds located in the western portion between 1906 and 1926. The lumber yard operations continued between 1906 until at least 1950s. By 1951, Lot 1 was redeveloped as the current warehouse with a partial cellar, and utilized as offices, a machine shop, and a repair station for trucks and buses.

Lot 12 of the Site was developed with 4-story residential dwellings between 1906 and 126. These structures were demolished, and a one-story warehouse was built at Lot 12 circa 1951. This structure was demolished sometime between 1965 and 1978, and remained vacant until 2003, when it was utilized as truck parking.

The previous investigations performed at the Site include the following:

- Phase I Environmental Site Assessment by Athenica Environmental Services, July 2022
- Phase II Investigation Report by Hydro Tech Environmental Engineering and Geology DPC, September 2022
- Remedial Investigation Report by Vektor, October 2025

These reports identified contaminants in soil, soil vapor, and groundwater exceeding applicable regulatory standards. Known contaminants consist semi-volatile organic compounds (SVOCs) and metals including hazardous lead in soil, chlorinated volatile organic compounds (CVOCs) in soil vapor, and SVOCs in groundwater.

5. Investigation and Cleanup Process

Application

The Applicant has applied for and been accepted into New York's Brownfield Cleanup Program as a Volunteer. This means that the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination onsite, and must conduct a "qualitative exposure assessment," a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the site and to contamination that has migrated from the site.

The Applicant in its Application proposed that the site will be used for restricted residential purposes.

To achieve this goal, the Applicant will conduct investigation and cleanup activities at the site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC, and the Applicant sets forth the responsibilities of each party in conducting these activities at the site.

Investigation

The Applicant has conducted an investigation of the site, which was officially called a "remedial investigation" (RI). This investigation was performed with NYSDEC oversight. The Applicant developed a remedial investigation work plan, which was subject to public comment.

The site investigation has several goals:

1) Define the nature and extent of contamination in soil, surface water, groundwater and any other parts of the environment that may be affected;
2) Identify the source(s) of the contamination;
3) Assess the impact of the contamination on public health and the environment; and
4) Provide information to support the development of a proposed remedy to address the contamination or the determination that cleanup is not necessary.

When the investigation was completed, the Applicant prepared and submitted a report that summarizes the results. This report also recommended that cleanup action is needed to address site-related contamination. The investigation report was subject to review and approval by NYSDEC.

NYSDEC will use the information in the investigation report to determine if the site poses a significant threat to public health or the environment. If the site is a "significant threat," it must be cleaned up using a remedy selected by NYSDEC from an analysis of alternatives prepared by the Applicant and approved by NYSDEC. If the site does not pose a significant threat, the Applicant may select the remedy from the approved analysis

of alternatives.

Interim Remedial Measures

An Interim Remedial Measure (IRM) is an action that can be undertaken at a site when a source of contamination or exposure pathway can be effectively addressed before the site investigation and analysis of alternatives are completed. If an IRM is likely to represent all or a significant part of the final remedy, NYSDEC will require a 30-day public comment period.

Remedy Selection

When the investigation of the site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a "Certificate of Completion" (described below) to the Applicant.

or

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a "Remedial Work Plan". The Remedial Work Plan describes the Applicant's proposed remedy for addressing contamination related to the site.

When the Applicant submits a draft Remedial Work Plan for approval, NYSDEC would announce the availability of the draft plan for public review during a 45-day public comment period.

Cleanup Action

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The New York State Department of Health (NYSDOH) must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy. The selected remedy is formalized in the site Decision Document.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a final engineering report that certifies that

cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the site.

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the site, it will approve the final engineering report. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the site after it receives a COC.

Site Management

The purpose of site management is to ensure the safe reuse of the property if contamination will remain in place. Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An *institutional control* is a non-physical restriction on use of the site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An *engineering control* is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that pumps and treats groundwater. Site management continues until NYSDEC determines that it is no longer needed.

Appendix A -
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site's investigation and cleanup program, the public may contact any of the following project staff:

New York State Department of Environmental Conservation (NYSDEC):

Rafi Alam
Project Manager
NYSDEC
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, NY 12233-7016
518-402-9799
Rafi.Alam@dec.ny.gov

Thomas V. Panzone, MPA
Public Participation Specialist
NYSDEC
Division of Communications, Education and Engagement
47-40 21st Street
Long Island City, NY 11101
(718) 482-4953
Thomas.panzone@dec.ny.gov

New York State Department of Health (NYSDOH):

Christine Vooris
Bureau Director
NYSDOH
Empire State Plaza
Corning Tower Rm 1787
Albany, NY 12237
(518) 402-0445
beei@health.ny.gov

Michele Dolan
Project Manager
NYSDOH
Empire State Plaza
Corning Tower Rm 1787
Albany, NY 12237
(518) 402-7867
Michele.Dolan@health.ny.gov

Locations of Reports and Information

The facilities identified below are being used to provide the public with convenient access to important project documents

Brooklyn Community Board 9
890 Nostrand Avenue
Brooklyn, NY 11225
Attn: Dante Arnwine – District Manager
Phone: 718-778-9279
Email: bk09-1@cb.nyc.gov

Brooklyn Public Library – Pacific Library
25 Fourth Avenue at Pacific Street
Brooklyn, NY 11217
Attn: Candace Vasquez
Phone: 718-638-1531
Email: cvasquez@bklynlibrary.org

Appendix B - Site Contact List

Chief Executive Officer
NYC Mayor
Hon. Eric Adams
City Hall
New York, NY 10007

Hon. Brad Lander
NYC Comptroller
1 Centre Street
New York, NY 10007

Hon. Jumaane Williams
Public Advocate
1 Centre Street
New York, NY 10007

New York City Planning
Winston Von Engel -
Commissioner, NYC Dept. of City Planning

NYC Dept. of City Planning
120 Broadway, 31st Floor
New York, NY 10271

Public Water Supplier
Rohit Aggarwala
Commissioner, NYC Dept. of Environmental Protection
59-17 Junction Boulevard
Flushing, NY 11373

Brooklyn Borough
President
Hon. Antonio Reynoso
209 Joralemon Street
Brooklyn, NY 11201

NYC Department of Planning and Development
Brooklyn Borough Office - Department of City Planning
Winston Von Engel- Director
120 Broadway
31st FloorNew York, NY 10271

Mayor's Office of Environmental Remediation
Mark McIntyre, Esq, Acting Director/General Counsel
100 Gold Street, 2nd Floor
New York, NY 10038

Hon Charles Schumer
U.S. Senator
780 Third Avenue, Suite 2301
New York, NY 10017

Hon. Kirsten Gillibrand
U.S. Senator
780 Third Avenue, Suite 2601
New York, NY 10017

Hon. Crystal Hudson
NYC Councilmember
55 Hanson Place – Suite
778Brooklyn, NY 11217

Hon. Zellnor Myrie
NYS Senator
1077 Nostrand
Avenue Ground Floor
Brooklyn, NY 11225

Hon. Phara Souffrant Forrest
NYS Assemblymember
55 Hanson Place
Brooklyn, NY 11217

Hon. Yvette D. Clark
U.S. House of Representatives
222 Lenox Road, Suites 1 & 2
Brooklyn, NY 11226

Hon. Nancy T. Sunshine
Kings County Clerk
360 Adams Street – Room 189
Brooklyn, NY 11201

Residents, owners, and occupants of the site and properties adjacent to the site

There are no residents or occupants at the site.

Adjacent Properties:

RESIDENT/BUSINESS OWNER
215 3rd Avenue
Brooklyn, NY 11217

RESIDENT/BUSINESS OWNER
585 Union Street
Brooklyn, NY 11217

RESIDENT/BUSINESS OWNER
251 3rd Avenue
Brooklyn, NY 11215

RESIDENT/BUSINESS OWNER
570 Union Street
Brooklyn, NY 11215

RESIDENT/BUSINESS OWNER
572 Union Street
Brooklyn, NY 11215

RESIDENT/BUSINESS OWNER
576 Union Street
Brooklyn, NY 11215

RESIDENT/BUSINESS OWNER
578 Union Street
Brooklyn, NY 11215

RESIDENT/BUSINESS OWNER
625 Union Street
Brooklyn, NY 11217

Local News Media:

The Brooklyn Eagle
195 Montague Street,
Suite 1414
Brooklyn, New York 11201

New York Post
1211 Avenue of the Americas
New York, NY 10036

Spectrum NY 1 News
75 9th Avenue
New York, NY 10011

New York Daily News
PO Box 7180 New
York, NY 10008

The Brooklyn Papers
1 Metrotech Center
Brooklyn, NY 11201

Courier-Life Publications
1 Metrotech Center #10T
Brooklyn, NY 1120

Schools and Daycare Facilities

PS 372 The Children's School
President/Executive Director/Principal
512 Carroll Street
Brooklyn, NY 11215
https://www.ps372pta.org/

Brooklyn Secondary School for Collaborative Studies
President/Executive Director/Principal
610 Henry Street
Brooklyn, NY 11231
(718) 923-4700
https://www.bcs448.org/

PS 32 Samuel Mills Sprole School
President/Executive Director/Principal
317 Hoyt Street
Brooklyn, NY 11231
(718) 222-6400
www.ps32.org

The Al Noor School
President/Executive Director/Principal
675 4th Avenue
Brooklyn, NY 11232
alnoornyc.org

Beansprouts Nursery School
President/Executive Director/Principal
453 6th Avenue
Brooklyn, NY 11215
(718) 965-8573
https://www.beansproutsnurseryschool.com

Rivendell School
President/Executive Director/Principal
277 3rd Avenue
Brooklyn, NY 11215
(718) 499-5667
www.rivendellnyc.org

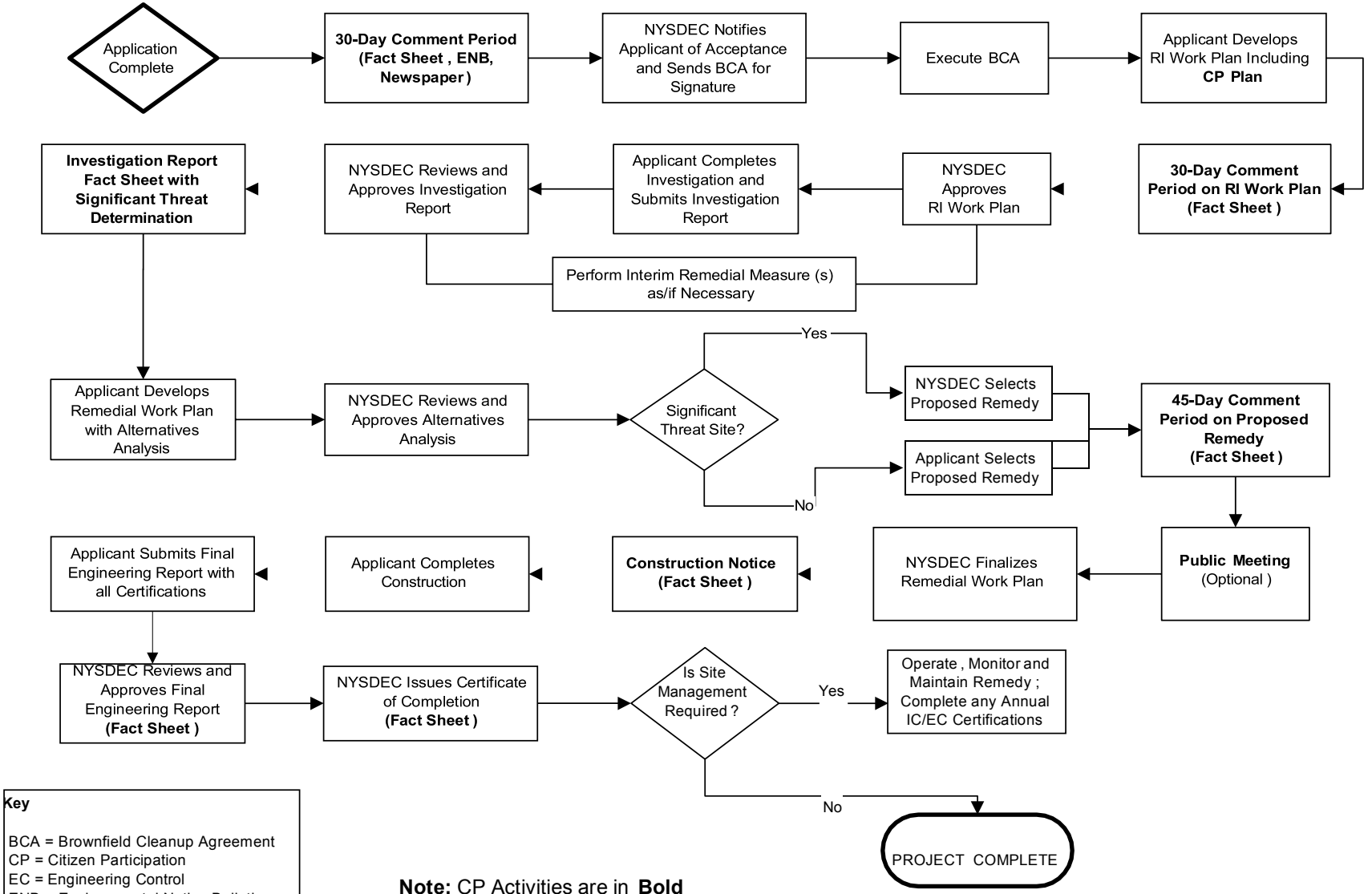
Appendix C – Site Location Map

Street Map
601-607 Union Street
Brooklyn, NY



Legend:
Site Property Boundary

Appendix D– Brownfield Cleanup Program Process



Note: CP Activities are in **Bold**

APPENDIX F

RESUMES OF KEY PERSONNEL

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (516) 417-8588

ARIEL CZEMERINSKI, P.E.
Email: Ariel@AMC-Engineering.com

SUMMARY:

New York State Professional Engineer. Chemical and Environmental Engineer, with 29 years of experience in the chemical and environmental areas. Areas of expertise include inspections and sign off on Large Scale Vapor Barrier Installations at Various NYC schools, Design and inspections of Sub Slab Depressurization Systems, wastewater treatment systems, Large scale dewatering system design for construction, process control and automation, process optimization, productivity improvement, quality systems, environmental compliance, Phase I Environmental Site Assessments, Phase II Environmental Investigations, Phase III: Remedial Activities, process and plant safety, and management of a production facility. Special Inspector with New York City Department of Buildings. Registered PE in NY.

Professional Experience:

AMC: 18 Years
Prior: 6 years

Education

Master of Science in Chemical Engineering, Columbia University, New York, NY, Feb. 1990.
Bachelor of Science in Chemical Engineering, University Of Buenos Aires, Buenos Aires, Argentina, May 1987

Areas of Expertise

- Vapor Intrusion - Barrier and Sub Slab Venting System Design
- Environmental Assessment Statements under CEQR, ULURP
- Remedial Program Design and Management
- Environmental Compliance, Clean Water Act, Clean Air Act, Hazardous Materials
- Dewatering & Treatment System Design
- SWPPP design and implementation. Preparation and Submittal of NOIs.
- NYCDEP Sewer Discharge Permitting
- Transfer Station Permitting and Compliance
- Wastewater Treatment Systems and Permitting, SPDES, LI Well permit, Water Withdrawal Permit.
- Air Permits and Registration
- Zoning Regulations and Permitting
- Safety and Environmental Training
- Waste Management Plans
- Professional Certifications
- OSHA 40-hr HAZWOPER
- OSHA 10-hr Construction Safety and Health

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (516) 417-8588

Project Experience

Project: Bergen Basin Sewer - CS-JA-BBS -Queens, NY
Project Description: NYC infrastructure (sewer, water) upgrade, drainage channel installation. Dewatering Design. Permits with NYCDEP and NYSDEC. Soil contaminated with petroleum requiring excavation, soil management and disposal under a Materials Handling Plan, Construction Health and Safety Plan. SWPPP design and implementation.
Client: JR Cruz - NYCDDC
Regulatory Authority: NYSDEC, NYCDEP
Role: Mr. Czemerinski served as the Environmental Consultant for the project.

Project: SER002326- Storm and Sanitary Sewers in Wardwell Avenue, Staten Island, New York
Project Description: NYC infrastructure (sewer, water) upgrade.
Dewatering Design. Permits with NYCDEP and NYSDEC. SWPPP design and implementation.
Client: E.E. Cruz - NYCDDC
Regulatory Authority: NYSDEC, NYCDEP
Role: Mr. Czemerinski served as the Environmental Consultant for the project.

Project: HED568-Installation of New 20" Subaqueous water main extension, and new 12" sub-aqueous high pressure gas main from the Bronx to Randall's Island, New York
Project Description: NYC infrastructure (gas, water) upgrade.
Soil contaminated with petroleum requiring excavation, soil management and disposal under a Materials Handling Plan, Construction Health and Safety Plan. Dewatering Design. Permits with NYCDEP and NYSDEC.
Client: E.E. Cruz - NYCDDC
Regulatory Authority: NYSDEC, NYCDEP
Role: Mr. Czemerinski served as the Environmental Consultant for the project.

Project: Domsey Fiber Corp. - 431 Kent Avenue, Brooklyn NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: Express Builders
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: SE-807 –Construction of Storm and Sanitary Sewers and Water Main in 20th Ave between 126th St and US Bulkhead Line Area, College Point, Queens, NY
Project Description: NYC Residential infrastructure (sewer, water) upgrade, outfall reconstruction, Soil characterization, soil management and disposal under a Materials Handling Plan, Construction Health and Safety Plan and Community Air Monitoring Plan. SWPPP design and implementation, Public Participation Plan, Marine HASP, Dewatering Design and permit application.

Client: EIC Associates
Regulatory Authority: NYCDDC
Role: Mr. Czemerinski served as the Environmental Consultant for the project.

Project: Springfield Gardens Residential Area BMP - Springfield Gardens, Queens, NY
Project Description: NYC Residential infrastructure (sewer, gas, water) upgrade, drainage channel installation and pond restoration. Soil contaminated with, petroleum and heavy metals requiring excavation, soil management and disposal under a Materials Handling Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: EIC Associates - NYCEDC
Regulatory Authority: NYSDEC, NYCParks
Role: Mr. Czemerinski served as the Environmental Consultant for the project.

Project: Former Domino Sugar Site - Kent Avenue, Brooklyn NY
Project Description: NYC E-Designation. Soil contaminated with semi-volatile organic compounds and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: Two Trees Management
Regulatory Authority: NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former Uniforms For Industry Site - Jamaica Avenue, Queens NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum, mop oil and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: The Arker Companies
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project

Project: Former Sunbelt Equipment Site – 25 Kent Avenue, Brooklyn, NY
Project Description: NYS Brownfield cleanup project. Soil contaminated with petroleum, and heavy metals and coal tar, requiring deep excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan, Dewatering Design and implementation, SWPPP design and implementation
Client: 19 Kent Acquisition LLC
Regulatory Authority: NYSDEC
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

AMC Engineering PLLC
18-36 42nd Street
Astoria, NY 11105
Phone: (516) 417-8588

Project Experience

Project: Former Charles Pfizer & Co. Site - 407 Marcy Avenue, Brooklyn, NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: The Rabsky Group
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former East Coast Industrial Uniforms Site - 39 Skillman Street, Brooklyn, NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with chlorinated solvents, petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: Riverside Builders
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former BP Amoco Service Station Site - 1800 Southern Boulevard, Bronx, NY
Project Description: NYS Brownfield cleanup project / NYC E-Designation. Soil contaminated with petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: SoBro, Joy Construction
Regulatory Authority: NYSDEC, NYCOER
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Project: Former Dico G Auto & Truck Repair Site - 3035 White Plains Road, Bronx, NY
Project Description: NYS Brownfield cleanup project. Soil contaminated with petroleum, and heavy metals requiring excavation, soil management and disposal under a Remedial Action Work Plan, Soil / Materials Management Plan, Construction Health and Safety Plan and Community Air Monitoring Plan
Client: The Arker Companies
Regulatory Authority: NYSDEC
Role: Mr. Czemerinski served as the Remedial Engineer for the project.

Alex Keenan

Project Manager

Contact

347.871.0750
akeenan@vektorconsultants.com

Alex Keenan is a Project Manager with Vektor Consultants. Alex is responsible for managing construction activities, drilling teams, excavations, tank removals, and waste disposals at multiple sites concurrently, as well as preparation of Remedial Action Work Plans, Remedial Investigation Reports, Remedial Action Reports, Final Engineering Reports, Noise Sampling Reports, Soil Vapor/Air Sampling Work Plans, Construction Health and Safety Plans, Summary Reports, Brownfield Cleanup Program Applications, Volunteer Cleanup Program Applications, Disposal Facility Applications, Petroleum Bulk Storage Applications, Underground Storage Tank Closure Reports, Phase I and Phase II Environmental Site Assessment Reports.

Education

B.S. Geology
Virginia Polytechnic and State University

Professional Registration

OSHA 30-hour Construction
OSHA 40-hour HAZWOPER and 8-hour HAZWOPER Refresher
10-Hour Site Safety Training

Affiliations

New York City Brownfield Partnership

Select Projects & Prior Experience

Gowanus Redevelopment Projects, Brooklyn, New York:
Prior to joining Vektor, Alex was responsible for implementation and oversight of field investigations and delineation of MGP Coal tar at Significant Threat Sites, oversight of In-Situ Stabilization applications, preparation of Remedial Investigation Reports, Remedial Action Work Plans, Source Removal Work Plans, Remedial Action Reports, Final Engineering Reports, various NYSDEC technical submittals and daily reports for multiple sites in the Gowanus Redevelopment area, as well as project coordination and oversight of drilling, excavation, and waste disposal and ensuring compliance with EPA hazardous waste reporting requirements.
251 Douglass Street, Brooklyn, New York – Brownfield Redevelopment
318 Nevins Street, Brooklyn, New York – Brownfield Redevelopment
585 Union Street, Brooklyn, New York – Brownfield Redevelopment

Ben Neumann

Assistant Project Manager

Contact

347.871.0750
bneumann@vektorconsultants.com

Ben Neumann is an Assistant Project Manager with Vektor Consultants. He is responsible for conducting and overseeing field investigations and site assessments. In addition, Ben authors Phase I and Phase II Environmental Site Assessments, Remedial Investigation Workplans, Remedial Investigation Reports, Remedial Action Workplans, Remedial Action Reports, and Installation Reports. His responsibilities include providing environmental oversight at construction project sites in the New York City Metropolitan area, performing site visits, conducting subsurface investigations and waste characterization sampling. Ben's experience and education in environmental remediation and project management provides valuable knowledge and insight for navigating projects through different regulatory programs.

Education

B.S. Environmental Science
Environmental Engineering & Technology Focus
Union College, Schenectady, NY

Professional Registration

Project Management Professional (PMP)

OSHA 30-hour Construction

OSHA 40-hour HAZWOPER

10-Hour Site Safety Training (SST)

Affiliations

The New York City Brownfield Partnership

Select Projects & Prior Experience

1533-1541 60th Street – Voluntary Cleanup Program
1547-1555 60th Street – Voluntary Cleanup Program
601 Union Street – Brownfield Cleanup Program

Prior to joining Vektor, Ben assisted Licensed Site Remediation Professionals (LSRPs) and carried out project management duties on over 100 projects within the New Jersey Department of Environmental Protection's (NJDEP) Site Remediation Program (SRP). Ben performed and oversaw Site Investigation, Remedial Investigation, and Remedial Action activities to achieve site remediation goals and obtain project closure via the issuance of Response Action Outcome (RAO) and No Further Action (NFA) Letters.

David B. Klein

Project Manager

Contact

347.871.0750
dklein@vektorconsultants.com

David B. Klein is a project manager with Vektor Consultants. David authored Remedial Action Work Plans, Remedial Investigation Reports, Remedial Action Reports, Final Engineering Reports, Noise Sampling Reports, Soil Vapor/Air Sampling Work Plans, Construction Health and Safety Plans, Interim Remedial Measures Summary Reports, Brownfield Cleanup Program Applications, Volunteer Cleanup Program Applications, Disposal Facility Applications, Underground Storage Tank Closure Reports, Phase I and Phase II Environmental Site Assessment Reports. David manages construction activities, drilling teams, excavations, tank removals, and waste disposals at multiple sites concurrently.

Education

B.S. Environmental Science &
Minor in Geology
University at Albany

Professional Registration

OSHA 10-hour Construction
OSHA 40-hour HAZWOPER and 8-hour HAZWOPER Refresher
10-Hour Site Safety Training
SWPPP Certification

Affiliations

New York City Brownfield Partnership

Select Projects

Far Rockaway Project Phases I, II, III, IV, and V, Queens, New York
Responsible for oversight and preparation of the Remedial Action Work Plan, Remedial Action Report, Final Engineering Report, Interim Remedial Measures Summary Report, NYSDEC Letter reports, and daily reports. Managed construction, drilling, excavation, waste disposal oversight of multiple phases concurrently.

Cropsey Avenue LLC, Brooklyn, New York
Authored Indoor Air Sampling Work Plan, Construction Health and Safety Plan, Interim Remedial Measures Summary Report and managed pilot tests for sub-slab depressurization system design and provided oversight during the installation of the engineering controls.

1815 West Farms Road, Bronx, New York – Voluntary Cleanup Program
315 Grand Concourse, Bronx, New York – Brownfield Redevelopment
261 Grand Concourse, Bronx, New York – Brownfield Redevelopment
960 Franklin Avenue, Brooklyn, New York – Brownfield Redevelopment

Ezgi Karayel

Principal

Contact

347.871.0750
ezgi@vektorconsultants.com

Ezgi Karayel is an environmental engineer with extensive experience in brownfield redevelopment. She is the founder and Principal of Vektor Consultants and serves as Operations Officer of the firm. Ms. Karayel guides firm's clients through their due diligence processes. She manages all aspects of the firm strongly focusing on brownfield redevelopment and E-Designation projects across New York Metropolitan area. She has worked with major real estate developers and shareholders by developing strategic approaches to the environmental challenges of complex real estate transactions and brownfield redevelopment. Her experience also includes a broad range of environmental services including regulatory compliance, due diligence assessments, acquisition support, design and implementation of engineering controls and remediation systems, excavation support and soil disposal plans, and facility decommissioning.
She is the chair of the Partnership's Scholarship Program and works closely with committee members to support the education and training of students who are pursuing environmental careers.

Education

B.S. Environmental Engineering
University at Buffalo

Professional Registration

OSHA 10-hour Construction and 40-hour General Industry
OSHA 40-hour HAZWOPER and 8-hour HAZWOPER Refresher
Certified Environmental Manager and Certified Environmental Inspector

Affiliations

New York City Brownfield Partnership, President

Brownfield Coalition of the Northeast, Advisory Board Member

Select Projects

Linden Boulevard, Queens, New York – Site Investigation and Remediation of a 7-acre former landfill with a Restrictive Declaration. The scope of work for the project included preparation of a Remedial Investigation Work Plan for review and approval by the NYCOER, NYSDEC and NYCDOH, implementation of Remedial Investigation, preparation of Remedial Investigation Report, Remedial Action Work Plan, preparation and implementation of a waste characterization plan for soils for proper disposal, supervision of site remediation activities, coordination with remediation engineer to design a methane mitigation system as well as vapor barrier system and managing field staff during remediation.

Ezgi Karayel, Principal

Former Tunnel Diner, Jersey City, New Jersey – Remedial Investigation (RI) of a 1⁄2-acre property in accordance with the New Jersey Technical Requirements for Site Remediation. Ms. Karayel worked closely with the Licensed Site Remediation Professional (LSRP) of the project. Followed by the approval of the RAWP prepared by her, Ms. Karayel directed remediation activities at the site and managed field staff on a daily basis. Upon completion of remediation, she has prepared Remedial Action Outcome for review and certification of the LSRP.

249 North 7th Street, Brooklyn, New York – As a Project Director for a Remedial Investigation of a former auto repair shop with an active spill, Ms. Karayel was responsible for remediation of the property under the direct supervision of NYCOER and NYSDEC. Her responsibilities consisted of preparing the required reports and supervision of remediation including excavation, and installation of engineering controls. By successful coordination with NYCOER, she has managed to enroll the project in City's Clean Soil Bank program and saving the client over $160,000 for soil disposal.

9029 Flatlands Avenue, Brooklyn, New York – E-Designation for HazMat. She conducted a Phase I ESA prior to development, followed by remedial investigation and preparation of Remedial Investigation Report and Remedial Action Work Plan for the remediation. Remediation for the project included design and implementation of an active sub-slab depressurization system. For the engineering controls design and implementation, Ms. Karayel worked closely with the Professional Engineer for the project and performed all required pilot tests, initial start-up and inspections.

37-23 33rd Street, Queens, New York – Removal of "P" Designation. Ms. Karayel managed to prevent the property from becoming a Class II site by performing a thorough due-diligence and disproving the prior consultant's findings and recommendations. Furthermore, her due-diligence study and evaluation saved the client over $1,000,000 clean-up costs, regulatory and legal fees.

261 Grand Concourse, Bronx, New York – Brownfield Redevelopment
1-9 Wythe Avenue, Brooklyn, New York – Brownfield Redevelopment
42 Reeve Place, Brooklyn, New York – Spill Closure
21-01 21st Street, Queens, New York – Former Gasoline Station Decommissioning and Storage Tank Removal
260-262 Van Brunt Street, Brooklyn, New York – Brownfield Cleanup
299 East 161st Street, Bronx, New York – Voluntary Cleanup Program
122 East 32nd Street, New York, New York – Community Center, Remediation under Voluntary Cleanup Program
346 Metropolitan Avenue, Brooklyn, New York – Voluntary Cleanup Program
574 Broome Street, New York, New York – Voluntary Cleanup Program
173-175 McGuinness Boulevard, Brooklyn, New York – Voluntary Cleanup Program
4790 Broadway, New York, New York – Voluntary Cleanup Program

APPENDIX G

REQUEST TO IMPORT/REUSE FILL FORM

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e) and 6NYCRR Part 360.13. Use of this form is not a substitute for reading the applicable regulations and Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that passes a size 100 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

_____ _____

Signature Date

_____

Print Name

_____

Firm

Revised April 2023

APPENDIX H

PRELIMINARY DEWATERING PLAN

TO DISCHARGE LOCATION
PER DEP PERMITS

DUPLEX 2-BAG FILTER SKID

TRANSFER PUMP SKID

5,000- GALLON
SETTLING TANK

B-1DW
SAND EL 2 TO EL -5
PEAT EL -5 TO EL -10

B-3
SAND EL 2 TO EL -3
CLAY EL -3 TO EL -11
PEAT EL -11 TO EL -16
SAND EL -16 TO EL -26

B-4D

B-2
CLAY EL 8 TO EL 2
SILT EL 2 TO EL -11
PEAT EL-11 TO EL -16
SILT EL -16 TO EL -28

PROPOSED SHEET-PILES TO PROVIDE
HORIZONTAL TRANSMISSIVITY CUT-OFF (TYP.)

ELEVATOR PILE-CAP TO EL -3
PIT TO EL -5

B-6

628 SACKETT STREET
ADJ. 8-STORY CONCRETE BUILDING
FILED UNDER SEPARATE APPLICATION NO:
B00000000000-I1

(21) SUMP WELLS
(4) IN SHEET-PILE EXCAVATION
(17) ACROSS THE SITE

B-5
SAND EL 6 TO EL -6
SILT EL -6 TO EL -11
PEAT EL-11 TO EL -16
SILT/CLAY EL -16 TO
EL -26

GENERAL EXCAVATION EL 4
PILE CAPS TO EL 2

B-7D
SAND EL 9 TO EL -6
PEAT EL-6 TO EL -16
CLAY EL -16 TO EL -31

ELEVATOR PILE-CAP TO EL -3
PIT TO EL -5

B-8DW
SILT EL 5 TO EL -1
SAND EL -1 TO EL -6
SILT EL -6 TO EL -11
SAND EL -11 TO EL -81

B-9
SAND EL 5 TO EL-1
PEAT EL -1 TO EL -16
CLAY EL -16 TO EL -26
SAND EL -26 TO EL -36

B-11
SAND EL 9 TO EL 4
SILT EL 4 TO EL -1
CLAY -1 TO EL -16
SAND EL -26 TO EL -36

B-12
SAND EL 9 TO EL 4
SILT EL 4 TO EL -1
CLAY -1 TO EL -16
PEAT EL -16 TO EL-26
CLAY EL -26 TO EL-36

B-10W
SILT EL 14 EL -6
SAND EL -6 TO EL -11
PEAT EL -11 TO EL -16
SAND EL-11 TO EL-36

12'-7" SIDEWALK
14'-9" SIDEWALK
11'-11" SIDEWALK
20'-2" SIDEWALK
3RD AVENUE
UNION STREET
625 UNION STREET
ADJ. 8-STORY BUILDING
LOT: 16

FOUNDATION PLAN
1/8" = 1'-0"

NOTES:

1. TOP OF SLAB ELEVATION = 6.59' (NAVD88). SEE PLAN FOR OTHER ELEVATIONS
2. DENOTES TOP OF EXIST. GRADE/ SIDEWALK ELEVATION WITH RESPECT TO NAVD 88.
3. BOTTOM OF PILE CAP ELEVATION NOTED THUS (.....)
4. ALL PILE CAPS SHALL BE SUPPORTED ON PILES WITH A MINIMUM BEARING CAPACITY OF 100 TONS, U.O.N. ON PLAN, BASED ON SOIL BORINGS/ GEOTECHNICAL REPORT PREPARED BY SET, P.C., DATED FEBRUARY 13, 2025.
5. SLAB SHALL BE AN 8" THICK CONCRETE PRESSURE SLAB REINFORCED WITH #5 @ 12" T&B E.W.
6. PRIOR TO CONSTRUCTION, IT IS REQUIRED THAT OWNER CONDUCT A PRE-CONDITION SURVEY AND ADJACENT BUILDINGS EVALUATION (ABE) REPORT OF ALL ADJACENT PROPERTIES INCLUDING DATED PHOTOGRAPHS, IN ORDER TO DOCUMENT PRE-EXISTING CONDITIONS SUCH AS CRACKS, WALL BULGING, DETERIORATIONS, ETC. IF ABE REPORT RECOMMENDS ANY TEMPORARY BRACING, SHORING, REPAIRS, ETC. OF ADJACENT BUILDINGS OR PROPERTIES, THEN OWNER, CONTRACTOR, AND ENGINEER TO COORDINATE AND IMPLEMENT SAID TEMPORARY WORK PRIOR TO START OF ANY SUPPORT OF EXCAVATION WORK. IF ANY CRACKS EXIST ON THE ADJACENT PROPERTIES, IT IS REQUIRED THAT CRACK MONITORS BE INSTALLED AT LOCATIONS DICTATED BY ENGINEER OR CRACK MONITORING COMPANY, AND BE MONITORED AT LEAST ONCE A WEEK DURING CONSTRUCTION (BY ENGINEER OR CRACK MONITORING COMPANY). SEE ALSO MONITORING PLAN FOR ADDITIONAL REQUIREMENTS.
7. PRIOR TO CONSTRUCTION, NEW YORK STATE LICENSED LAND SURVEYOR TO ESTABLISH VERTICAL WALL PLANES ALONG PROPERTY LINES, IN ORDER TO LOCATE ANY LINE INCURSIONS BY ADJACENT BUILDINGS ON TO THIS SITE. IF SUCH INCURSIONS OCCUR (I.E. TOP OF ADJACENT BUILDING "LEANS" INTO THIS SITE, ETC.) CONTRACTOR MUST ADJUST NEW BUILDING WALL LINE ACCORDINGLY.
8. OWNER/ CONTRACTOR TO OBTAIN WRITTEN PERMISSION/CONSENT FROM ADJACENT PROPERTY OWNER TO PLACE SOLDIER PILES, LAGGINGS, AND UNDERPINNING WITHIN THEIR PROPERTY, AND WRITTEN PERMISSION TO RESTORE SAME PROPERTY TO ORIGINAL CONDITIONS.
9. PRIOR TO CONSTRUCTION, IT IS REQUIRED THAT A MONITORING PLAN BE ESTABLISHED BY OWNER, ENGINEER AND CONTRACTOR FOR MONITORING VIBRATION, OPTICAL MOVEMENT, ETC. DURING EXCAVATION, UNDERPINNING, SHEETING, AND LAGGING OPERATIONS, AND FOR DRILLING/DRIVING OF PILES (IF PROJECT REQUIRES PILES).
10. FOR FOUNDATION DETAILS AND SECTIONS, SEE FO-200 SERIES DRAWINGS ON FOUNDATION DRAWINGS.
11. FOR COLUMN AND SHEAR WALL INFORMATION, SEE S-300 SERIES DRAWINGS ON STRUCTURAL DRAWINGS.

STRAP BEAM SCHEDULE

MARKS	WIDTH	DEPTH	TOP REINF.	BOT. REINF.	TIES	REMARKS
ST-1	2'-0"	2'-0"	4 #9	4 #8	#3 @10" O.C.	
ST-2	2'-0"	2'-6"	5 #10	5 #9	#3 @10" O.C.	
ST-3	3'-0"	2'-6"	8 #11	7 #10	#3 @10" O.C.	
ST-4	3'-6"	3'-0"	10 #11	8 #11	#4 @12" O.C.	

FOUNDATION NOTE:
STRAP BEAM TOP AND BOTT. REINFORCEMENT SHALL ALWAYS EXTEND TO FAR END OF ECCENTRIC FOOTING

American Dewatering Grouting

GWT AT EL 3.5 (LOGGING), EL 5.5 (GEO REPORT)

DEWATERING SCHEMATIC
AMERICAN DEWATERING & GROUTING
NOVEMBER 3, 2025

GOWANUS
South Building

613 Union Street
Brooklyn, NY 11215

MA ma.com

REV NO	DATE	ISSUE
1	08/29/2025	FILING SET

OWNER/CLIENT:
Avdoo & Partners
221 West 37th St
5th Floor
New York, NY 10018
Phone: (212) 570-7020
avdoo.com

LANDSCAPE:
TBD
Address
Address
City, ST 00000
Phone: (000) 000-0000
url.com

ARCHITECT:
Morris Adjmi Architects
60 Broad St
32nd Floor
New York, NY 10004
Phone: (212) 982-2020
ma.com

INFORMATION TECH:
Signitel
100a Broadway
Suite 560
Brooklyn, NY 11249
Phone: (212) 663-1000
Ext: 105
www.signitel.com

MEP/FP:
Ventrop
369 W. 34th St
2nd Floor
New York, NY 10001
Phone: (212) 244-5060
ventrop.com

LIGHTING:
Ledpax
750 N Dixie Hwy
Suite D
Hollywood, FL 33020
Phone: (346) 414-2934
www.ledpax.com

STRUCTURAL / GEOTECH:
SET
4012 28th St
Suite #200
Long Island City, NY 11101
Phone: (718) 706-7196
set-ny.com

FACADE:
Socotech
151 W. 42nd St
24th Floor
New York, NY 10036
socotech.us

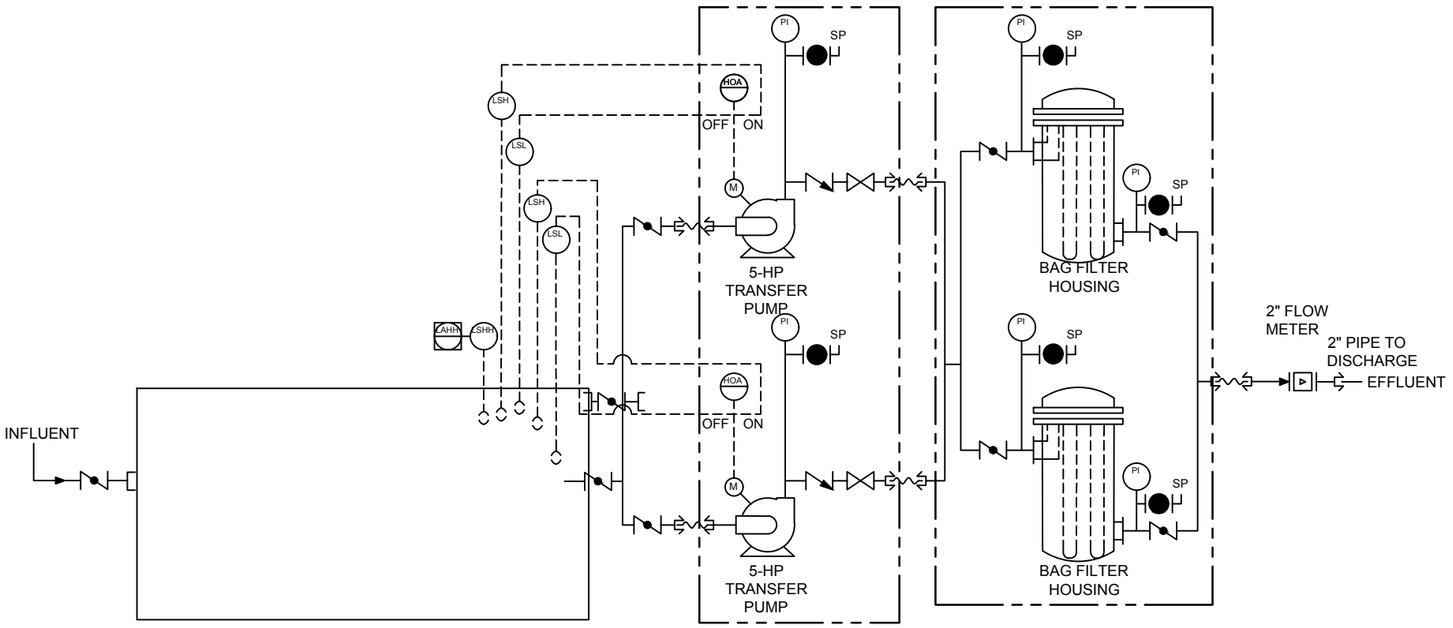
SCALE:
8' 4' 0 4' 8' 16'

FOUNDATION PLAN

FO-101.00

MA PROJ. #: 2430 SHEET 4 of 888

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5,000-GALLON FRAC TANK

DUPLEX PUMP SKID
50 GPM @ 65' TDH
460V, 3 PHASE

DUPLEX TWO-BAG
FILTERS PER SKID

25-KW OPERATE GENERATOR AND DOUBLE THROW FOR TREATMENT SYSTEM PUMPS
LOCATION TBD BY GENERAL CONTRACTOR

25-KW BACKUP GENERATOR FOR TREATMENT SYSTEM PUMPS
LOCATION TBD BY GENERAL CONTRACTOR

LEGEND

- PROCESS PIPING
- FLEXIBLE HOSE
- FLOW DIRECTION
- PIPE CROSSOVER
- BALL VALVE (NORMALLY CLOSE)
- BUTTERFLY VALVE
- CHECK VALVE
- GATE VALVE (OPEN)
- SP — SAMPLE PORT
- CAM LOCK COUPLING
- PI — PRESSURE GAUGE
- LEVEL FLOAT
- M — MOTOR
- FLOW METER
- WYE
- LAHH — LEVEL ALARM HIGH HIGH
- LSH — LEVEL SWITCH HIGH
- LSHH — LEVEL SWITCH HIGH HIGH
- LSL — LEVEL SWITCH LOW
- HS — HAND OPERATED SWITCH

NOTES:
1. MAXIMUM FLOWRATE = 50 GPM
2. SYSTEM FOOTPRINT APPROX. 8'X60'
3. NOT ALL VALVES, INSTRUMENTATION AND PIPING, ETC. SHOWN FOR CLARITY

PIPING & INSTRUMENT DIAGRAM FOR
50 GPM WATER TREATMENT SYSTEM

613 UNION STREET AND 628 SACKETT STREET
BROOKLYN, NY 11215

American Dewatering Grouting

AMERICAN DEWATERING & GROUTING

No:	Revision:	Date:
01	SCHEMATIC DESIGN	11/3/25

SCALE: AS NOTED

DRAWING TITLE: WATER TREATMENT SCHEMATIC

DATE: 11/3/2025

DRAWN BY: KC

DWG. No: WT-101

APPENDIX I

GREEN AND SUSTAINABLE REMEDIATION SHEETS

Environmental Footprint Summary

Core Element	Metric		Unit of Measure	Footprint		
				Excavation	Post-Construction	Total
Materials & Waste	M&W-1	Refined materials used on-site	Tons	896.5	887.5	1,784.0
	M&W-2	% of refined materials from recycled or reused material	%	1.0%	0.0%	0.5%
	M&W-3	Unrefined materials used on-site	Tons	24.150	24.150	48.3
	M&W-4	% of unrefined materials from recycled or reused material	%	0.0%	0.0%	0.0%
	M&W-5	On-site hazardous waste disposed of off-site	Tons	4,500.0	0.0	4,500.0
	M&W-6	On-site non-hazardous waste disposed of off-site	Tons	26,798.0	50,000.0	76,798.0
	M&W-7	Recycled or reused waste	Tons	0.0	0.0	0.0
	M&W-8	% of total potential waste recycled or reused	%	0.0%	0.0%	0.0%
Water (used on-site)	W-1	Public water use	MG	10.0	0.1	10.1
	W-2	Groundwater use	MG	0.0	0.0	0.0
	W-3	Surface water use	MG	0.0	0.0	0.0
	W-4	Reclaimed water use	MG	0.0	0.0	0.0
	W-5	Storm water use	MG	0.0	0.0	0.0
	W-6	User-defined water resource #1	MG	0.0	0.0	0.0
	W-7	User-defined water resource #2	MG	0.0	0.0	0.0
	W-8	Wastewater generated	MG	0.0	0.0	0.0
Energy	E-1	Total energy used (on-site and off-site)	MMBtu	11,208.7	11,561.2	22,769.9
	E-2	Energy voluntarily derived from renewable resources				
	E-2A	On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	0.0	0.0	0.0
	E-2B	Voluntary purchase of renewable electricity	MWh	0.0	0.0	0.0
	E-3	Voluntary purchase of RECs	MWh	0.0	0.0	0.0
	E-4	On-site grid electricity use	MWh	0.000	0.000	0.0
Air	A-1	On-site NOx, SOx, and PM emissions	Pounds	5,652.0	0.0	5,652.0
	A-2	On-site HAP emissions	Pounds	0.2	0.0	0.2
	A-3	Total NOx, SOx, and PM emissions	Pounds	26,848.8	34,810.0	61,658.8
	A-3A	Total NOx emissions	Pounds	10,439.9	10,357.5	20,797.4
	A-3B	Total SOx emissions	Pounds	3,230.1	4,259.4	7,489.5
	A-3C	Total PM emissions	Pounds	13,178.8	20,193.1	33,371.9
	A-4	Total HAP emissions	Pounds	115.3	101.9	217.3
	A-5	Total greenhouse gas emissions	Tons CO2e*	942.9	948.3	1,891.2
Land & Ecosystems	Qualitative Description					

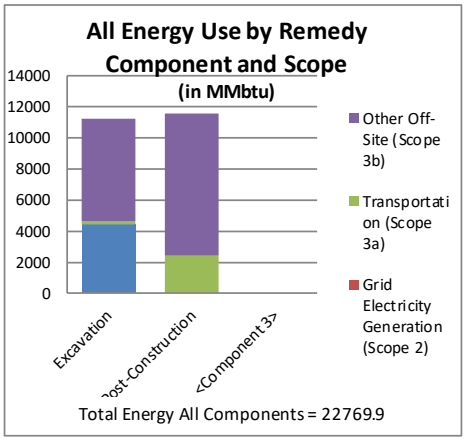
** Total greenhouse gases emissions (in CO2e) include consideration of CO2, CH4, and N2O (Nitrous oxide) emissions.*
"MMBtu" = millions of Btus
"MG" = millions of gallons
"CO2e" = carbon dioxide equivalents of global warming potential
"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions of Watt-hours)
"Tons" = short tons (2,000 pounds)

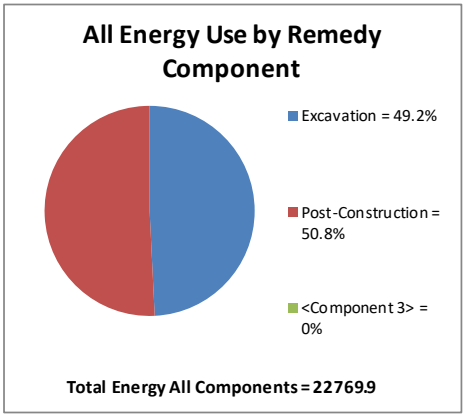
EPA's Methodology for Understanding and Reducing a Project's

Notes:

Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY

ets for Environmental Footprint Analysis (SEFA) Version 3.0, Novem
P C224392 601-607 Union Street Site - RAWP - Alternative 2 - Trac





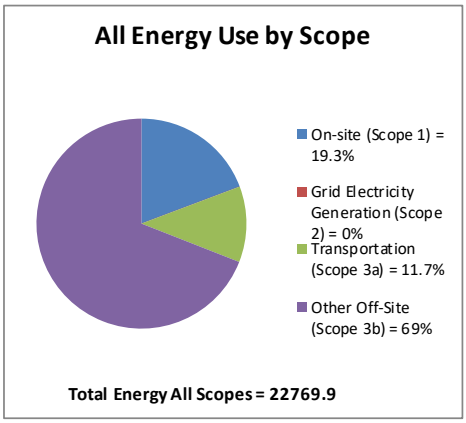


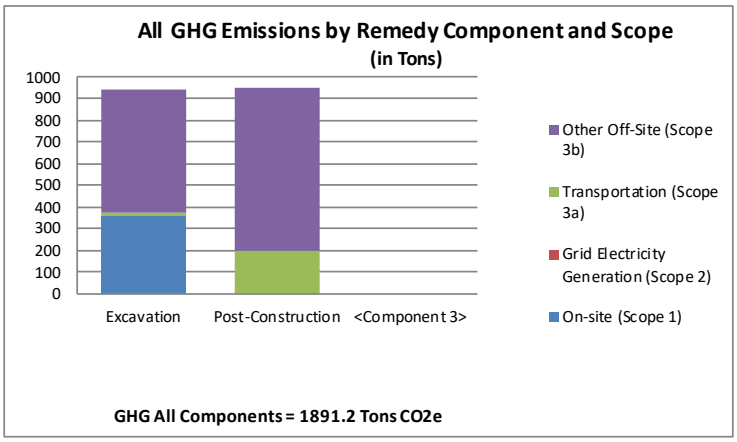
Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY

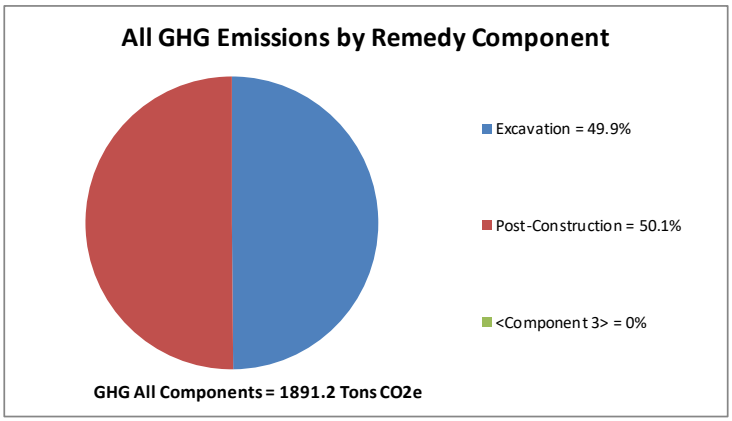
Total Energy
MMbtus

	Excavation	Post-Const	<Compone	< Compone
On-site (Scope 1)	4,387.3	0.0	0.0	0.0
ty Generation (Scope 2)	0.0	0.0	0.0	0.0
nsportation (Scope 3a)	210.3	2,450.7	0.0	0.0
ther Off-Site (Scope 3b)	6,611.0	9,110.6	0.0	0.0
Total	11,208.7	11,561.2	0.0	0.0

Excavation = 49.2%
Post-Construction = 50.8%
<Component 3> = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

Total Energy All Components = 22769.9 MMbtu
Total Energy All Scopes = 22769.9 MMbtus


All GHG Emissions by Remedy Component and Scope
(in Tons)
1000
900
800
700
600
500
400
300
200
100
0
Excavation
Post-Construction
<Component 3>
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
GHG All Components = 1891.2 Tons CO2e


All GHG Emissions by Remedy Component
Excavation = 49.9%
Post-Construction = 50.1%
<Component 3> = 0%
GHG All Components = 1891.2 Tons CO2e

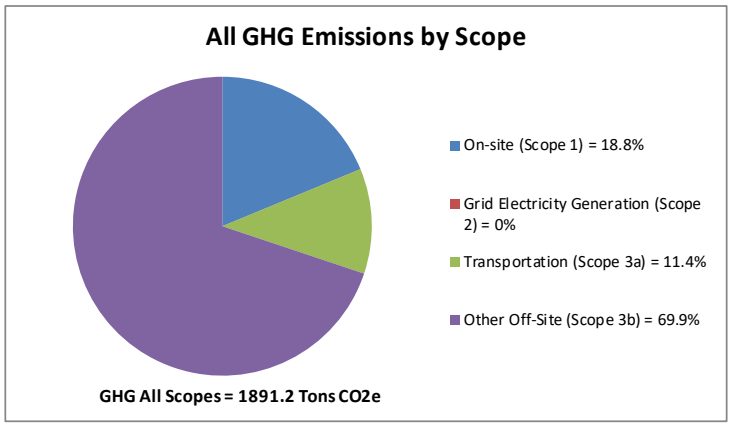

All GHG Emissions by Scope
On-site (Scope 1) = 18.8%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 11.4%
Other Off-Site (Scope 3b) = 69.9%
GHG All Scopes = 1891.2 Tons CO2e

Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY

GHG Tons CO2e							
nt 4 >	Excavation	Post-Const	<Compone	< Compone	< Compone	< Compone	Total
On-site (Scope 1)	354.8	0.0	0.0	0.0	0.0	0.0	354.8
:y Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0 rid Electricit
ınsportation (Scope 3a)	16.8	198.3	0.0	0.0	0.0	0.0	215.1 Tra
ther Off-Site (Scope 3b)	571.3	749.9	0.0	0.0	0.0	0.0	1,321.2 O
Total	942.9	948.3	0.0	0.0	0.0	0.0	1,891.2

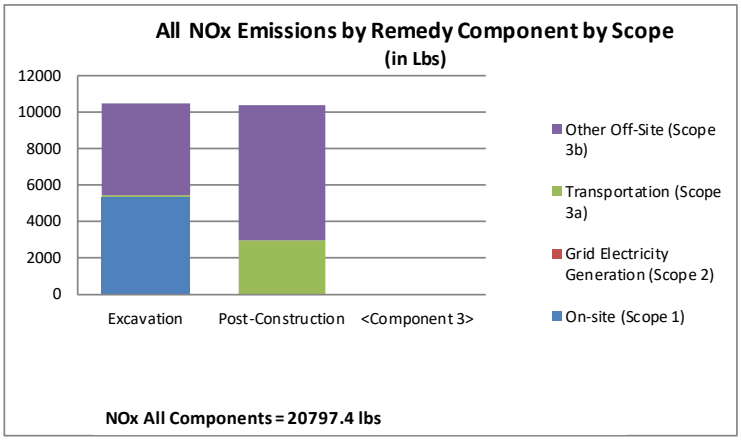
Excavation = 49.9%
Post-Construction = 50.1%
<Component 3> = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

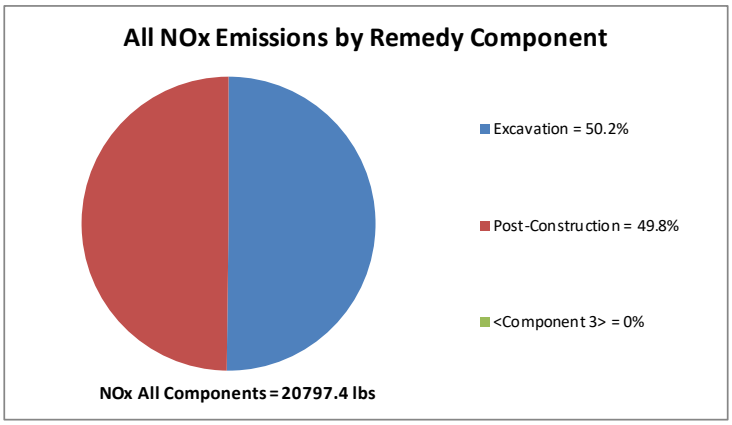
On-site (Scope 1) = 18.8%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 11.4%
Other Off-Site (Scope 3b) = 69.9%

ıs

GHG All Components = 1891.2 Tons CO2e
GHG All Scopes = 1891.2 Tons CO2e

Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY





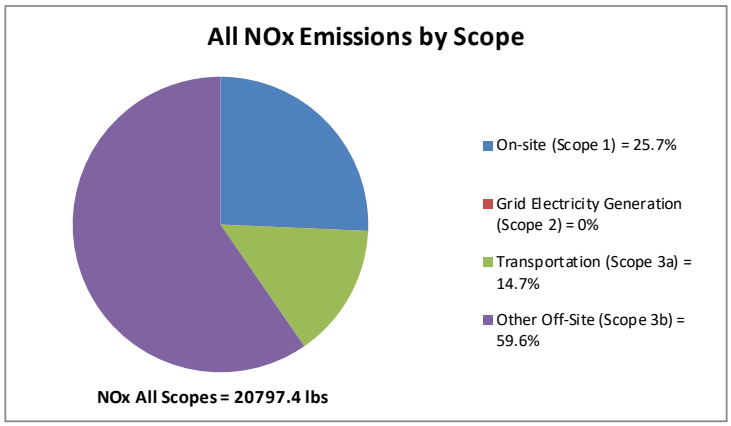


Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY

NOx
lbs

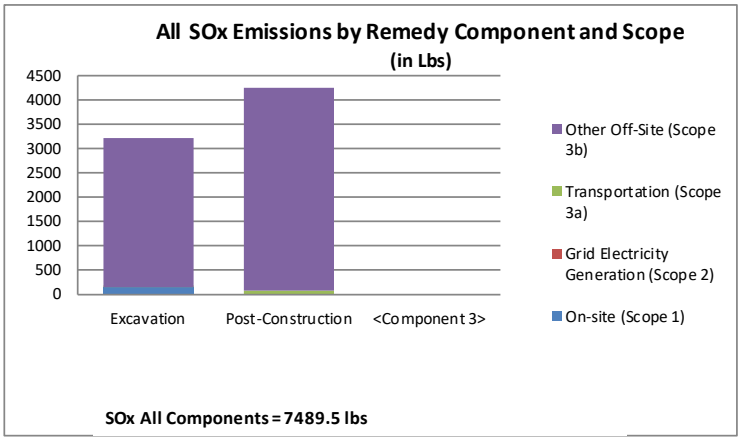
	Excavation	Post-Const	<Compone	< Compone	< Compone	< Compone	Total	
On-site (Scope 1)	5,343.2	0.0	0.0	0.0	0.0	0.0	5,343.2	
:y Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	rid Electricit
ınsportation (Scope 3a)	64.8	2,993.2	0.0	0.0	0.0	0.0	3,058.0	Tra
ther Off-Site (Scope 3b)	5,031.9	7,364.3	0.0	0.0	0.0	0.0	12,396.2	O
Total	10,439.9	10,357.5	0.0	0.0	0.0	0.0	20,797.4	

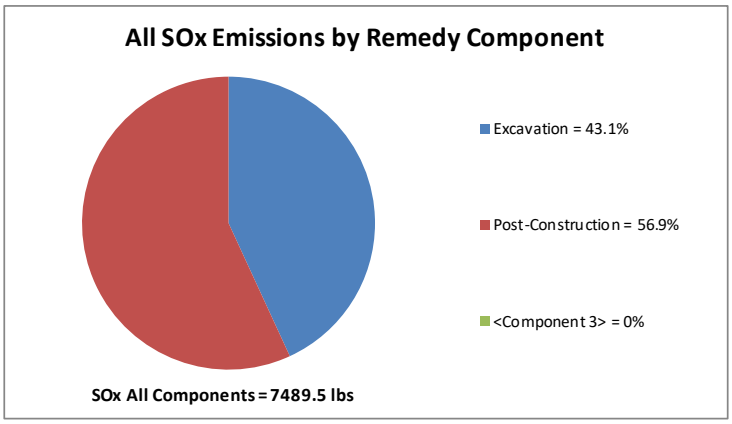
Excavation = 50.2%
Post-Construction = 49.8%
<Component 3> = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 25.7%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 14.7%
Other Off-Site (Scope 3b) = 59.6%

NOx All Components = 20797.4 lbs
NOx All Scopes = 20797.4 lbs

Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY





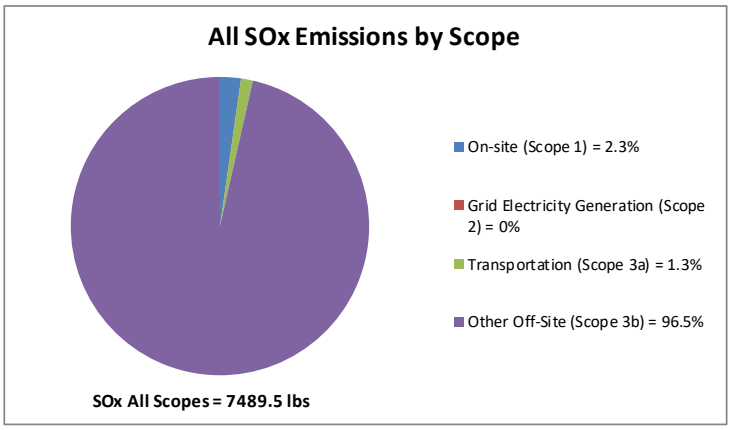


Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY

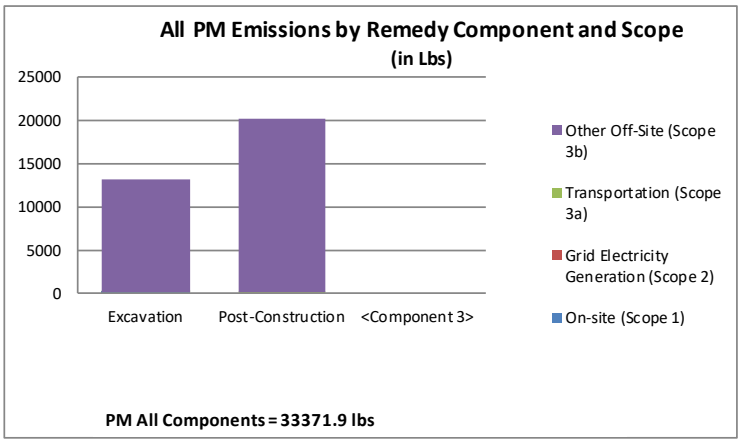
SOx lbs	Excavation	Post-Const	<Compone	< Compone	< Compone	< Compone	Total	
On-site (Scope 1)	169.5	0.0	0.0	0.0	0.0	0.0	169.5	
:y Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	rid Electricit
ınsportation (Scope 3a)	1.2	95.1	0.0	0.0	0.0	0.0	96.2	Tra
ther Off-Site (Scope 3b)	3,059.4	4,164.4	0.0	0.0	0.0	0.0	7,223.7	O
Total	3,230.1	4,259.4	0.0	0.0	0.0	0.0	7,489.5	

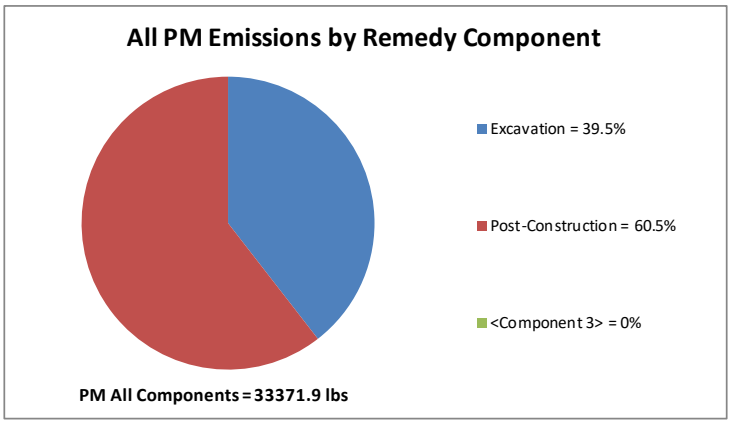
Excavation = 43.1%
Post-Construction = 56.9%
<Component 3> = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 2.3%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 1.3%
Other Off-Site (Scope 3b) = 96.5%

SOx All Components = 7489.5 lbs
SOx All Scopes = 7489.5 lbs

Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY





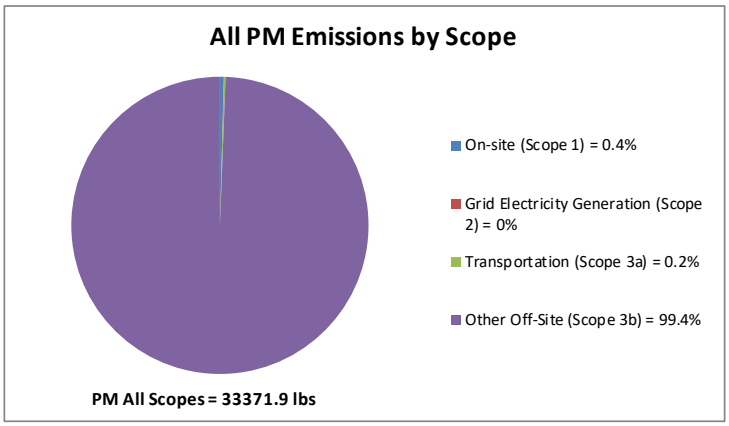


Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY

PM
lbs

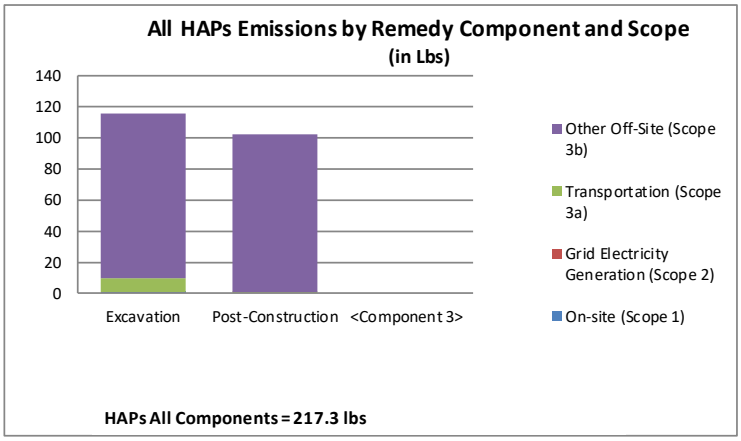
	Excavation	Post-Const	<Compone	< Compone	< Compone	< Compone	Total	
On-site (Scope 1)	139.3	0.0	0.0	0.0	0.0	0.0	139.3	
:y Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	rid Electricit
ınsportation (Scope 3a)	5.4	59.9	0.0	0.0	0.0	0.0	65.3	Tra
ther Off-Site (Scope 3b)	13,034.1	20,133.1	0.0	0.0	0.0	0.0	33,167.2	O
Total	13,178.8	20,193.1	0.0	0.0	0.0	0.0	33,371.9	

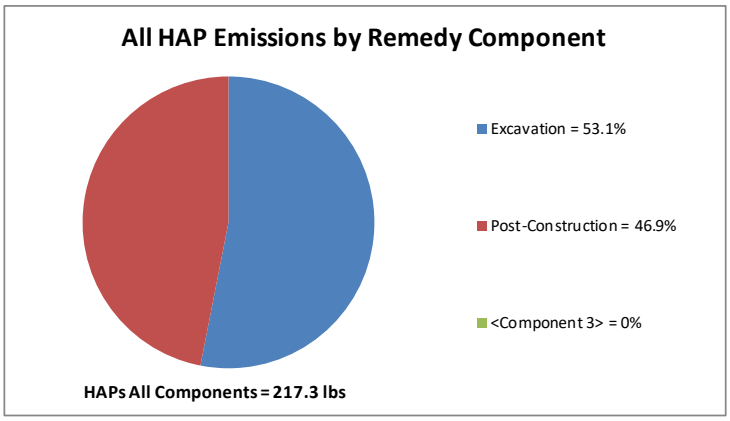
Excavation = 39.5%
Post-Construction = 60.5%
<Component 3> = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 0.4%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 0.2%
Other Off-Site (Scope 3b) = 99.4%

PM All Components = 33371.9 lbs
PM All Scopes = 33371.9 lbs

Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY





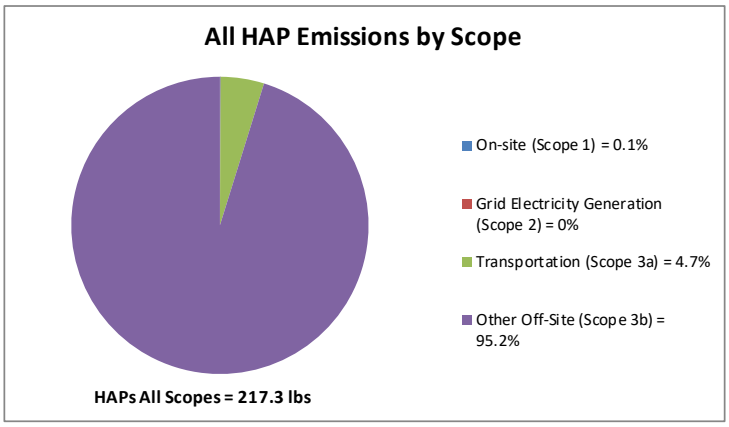


Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY

HAPs
lbs

	Excavation	Post-Const	<Compone	< Compone	< Compone	< Compone	Total
On-site (Scope 1)	0.2	0.0	0.0	0.0	0.0	0.0	0.2
:y Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ınsportation (Scope 3a)	9.9	0.3	0.0	0.0	0.0	0.0	10.2
ther Off-Site (Scope 3b)	105.2	101.6	0.0	0.0	0.0	0.0	206.9
Total	115.3	101.9	0.0	0.0	0.0	0.0	217.3

Excavation = 53.1%
Post-Construction = 46.9%
<Component 3> = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 0.1%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 4.7%
Other Off-Site (Scope 3b) = 95.2%

HAPs All Components = 217.3 lbs
HAPs All Scopes = 217.3 lbs

Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY

Excavation - Energy & Air Compiled Results

Category	Total Energy	GHG	NOx	SOx	PM
	MMbtus	lbs CO2e	lbs	lbs	lbs
On-site (Scope 1)	4,387	709,669	5,343	170	139
Grid Electricity Generation (Scope 2)	0.000	0	0	0	0
Transportation (Scope 3a)	210	33,609	65	1	5
Other Off-Site (Scope 3b)	6,611	1,142,531	5,032	3,059	13,034
Remedy Totals	11,209	1,885,809	10,440	3,230	13,179

Values that are forwarded to the "Summary" tab are indicated in orange.

Voluntary Renewable Energy Use	Unit
On-site renewable energy generation or use	MMBtu
On-site biodiesel use	MMBtu
Biodiesel and other renewable resource use for transportation	MMBtu
On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu
Voluntary purchase of renewable electricity	MWh
Voluntary purchase of RECs	MWh

This worksheet is not intended for user input. Values on this worksheet are obtained from the following file: SEFA_calculations_(71525)-Track 2.xlsx

Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY

Post-Construction - Energy & Air Compiled Results

Category	Total Energy	GHG	NOx	SOx	PM
	MMbtus	lbs CO2e	lbs	lbs	lbs
On-site (Scope 1)	0	0	0	0	0
Grid Electricity Generation (Scope 2)	0	0	0	0	0
Transportation (Scope 3a)	2,451	396,682	2,993	95	60
Other Off-Site (Scope 3b)	9,111	1,499,888	7,364	4,164	20,133
Remedy Totals	11,561	1,896,570	10,358	4,259	20,193

Values that are forwarded to the "Summary" tab are indicated in orange.

Voluntary Renewable Energy Use	Unit
On-site renewable energy generation or use	MMBtu
On-site biodiesel use	MMBtu
Biodiesel and other renewable resource use for transportation	MMBtu
On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu
Voluntary purchase of renewable electricity	MWh
Voluntary purchase of RECs	MWh

This worksheet is not intended for user input. Values on this worksheet are obtained from the following file: SEFA_calculations_(71525)-Track 2.xlsx

Table 11
GSR Summary, Alternative 2
601-607 Union Street, Brooklyn, NY

All - Energy & Air Compiled Results

Category	Total Energy	GHG	NOx	SOx	PM
	MMbtus	lbs CO2e	lbs	lbs	lbs
On-site (Scope 1)	**4,387**	**709,669**	**5,343**	**170**	**139**
Grid Electricity Generation (Scope 2)	**0.000**	**0**	**0**	**0**	**0**
Transportation (Scope 3a)	**2,661**	**430,291**	**3,058**	**96**	**65**
Other Off-Site (Scope 3b)	**15,722**	**2,642,419**	**12,396**	**7,224**	**33,167**
Remedy Totals	**22,770**	**3,782,379**	**20,797**	**7,490**	**33,372**

Values that are forwarded to the "Summary" tab are indicated in orange.

Voluntary Renewable Energy Use	Unit
On-site renewable energy generation or use	MMBtu
On-site biodiesel use	MMBtu
Biodiesel and other renewable resource use for transportation	MMBtu
On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu
Voluntary purchase of renewable electricity	MWh
Voluntary purchase of RECs	MWh

This worksheet is not intended for user input. Values on this worksheet are obtained from the following file: SEFA_calculations_(71525)-Track 2.xlsx