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REMEDIAL SITE OPTIMIZATION
WORK PLAN

Site Name: 450 Union Street

Site Address: 450 Union Street
Brooklyn, New York 11231

BCP Site Number: C224219

Report Date: April 2023

Prepared For:

2201 Union LLC
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CERTIFICATION

I, Hilmi U. Aydin, certify that I am currently a Qualified Environmental Professional as defined in 6 New York Codes, Rules, and Regulations (NYCRR) Part 375 and that this Remedial Site Optimization Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10).

Hilmi U. Aydin, P.E., QEP

1.0 INTRODUCTION

This revised Remedial Site Optimization Work Plan (RSOWP) was prepared on behalf of 2201 Union LLC (the Applicant) for the property located at 450 Union Street in the Gowanus section of Kings County, New York (the Site). The Site is enrolled in the New York State (NYS) Brownfield Cleanup Program (BCP) Site No. C224219, which is administered by the New York State Department of Environmental Conservation (NYSDEC). 450 Union LLC c/o Pilot Real Estate Group (the Volunteer) executed a Brownfield Cleanup Agreement (BCA) on September 1, 2015 with the NYSDEC to investigate and remediate the site. 450 Union Developer LLC was added to the BCA as an additional Volunteer on March 13, 2020, and 2201 Union LLC was added to the BCA upon purchase of the property. A notice of transfer of Certificate of Completion (COC) and Change of Use Notification for the new entity was submitted to the NYSDEC on October 24, 2022.

According to the Site Management Plan (SMP) dated December 18, 2020, dense non-aqueous phase liquid (DNAPL) recovery is a required engineering control (EC) at the Site. This EC is part of the selected remedy and is necessary to ensure the remedy remains protective of public health and the environment. Monthly DNAPL gauging and recovery events have been conducted by GeoEnvironmental, Inc. (GZA) at the Site since April 2022 as per the NYSDEC-approved SMP and Remediation and Access Agreement between the Applicant and National Grid NY dated December 8, 2021. During the monthly recovery events between April and December 2022, a total of approximately 756 gallons of DNAPL/water mixture have been removed from two recovery wells (RW-1 and RW-2). Based on their review of the Monthly Reports, the NYSDEC determined that the DNAPL recovery rates are substantial enough to warrant a Remedial Site Optimization (RSO) study. The purpose of this study is to delineate the extent of on-site grossly contaminated material (GCM) at depth. This work plan was prepared in accordance with the regulations and guidance applicable to the BCP and DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010.

2.0 SITE BACKGROUND

2.1 Site Location and Description

The Site is located on the southeast corner of Union Street and Bond Street intersection to the west of Gowanus Canal within the Gowanus section of Kings County, New York. The legal description of the Site is Tax Block 438 and Lot 7. A site location map is provided in Figure 1.

The Site consists of an irregular-shaped lot that is approximately 28,500 square feet and is improved with a 9,880-square feet one-story building in the northern portion. The building is currently vacant and was most recently occupied by a multi-use catering/event hosting space ("Green Building") and a restaurant ("Pig Beach"). Two adjacent permanent ancillary structures are located in the center of the eastern portion, and temporary structures supporting the former outdoor restaurant operations are located in the southern and eastern portions. The detached ancillary structures were utilized as storage, event space, and additional restaurant kitchen space. The remainder of the Site consists of asphalt-paved open space and parking.

The Site is located within a primarily mixed residential, commercial, and industrial area of Kings County. The Site was rezoned on October 24, 2022, as a result of the Gowanus Neighborhood Rezoning and Related Actions, and the new zoning (M1-4/R7-2) allows for residential uses with mandatory inclusionary housing (MIH), community facilities, commercial and manufacturing uses.

2.2 Surrounding Property Land Use

North	A four-story mixed residential and commercial use building (305 Bond Street, 487-493 Union Street), a one-story commercial/office building (497-499 Union Street), and a partially vacant land with a one-story commercial or industrial building (510 Sackett Street)
Northwest	A four-story residential building across Bond Street and Union Street intersection (485 Union Street)
South	A parking lot with a one-story building (313-319 Bond Street, 419-441 President Street)
West	Two four-story residential buildings (316 Bond Street and 318 Bond Street), a three-story residential building (320 Bond Street), and a five-story residential building (322 Bond Street)

East	Gowanus Canal

The properties adjacent to the north of the Site across Union Street consist of a four-story mixed residential and commercial use building, a one-story commercial/office building, and a partially vacant land with a one-story commercial or industrial building; the adjacent property to the northwest consists of a four-story residential building; adjacent to the east is the Gowanus Canal; the property adjacent to the south is a parking lot with a one-story building; and the properties adjacent to the west across Bond Street consist of two four-story residential buildings, a three-story residential building, and a five-story residential building. A Site plan showing surrounding land use is provided in Figure 2.

The nearest ecological receptor is the Gowanus Canal which borders the eastern perimeter of the Site. Other sensitive receptors, as defined in DER-10, within 1,000-feet of the Site include:

- P.S. 032 Samuel Mills Sprole School at 420 Union Street
- St. Lydia's at 304 Bond Street

2.3 Site Topography, Geology, and Hydrogeology

According to the United States Geological Survey (USGS) Topographic Quadrangle for "Brooklyn, New York" dated 2019, the Site is located at approximately 10 feet above mean sea level (MSL). The contour lines in the subject property area indicate the area is sloping gently toward the east-southeast.

Groundwater flow direction may be impacted by several factors, including surface topography, hydrology, hydrogeology, characteristics of soil, and nearby wells. According to topographic map interpretation, the inferred groundwater flow direction in the vicinity of the Site is east towards the Gowanus Canal, located adjacent to the east of the subject property.

According to a previous remedial investigation performed by others in 2017 at the Site, the depth and direction of groundwater are inferred to be approximately 8 feet below ground surface (bgs) toward the south.

According to the United States Geological Survey (USGS), the Site is located within the Atlantic Coastal Plain physiographic province, which represents the end or terminal moraines of a glacier and the associated outwash aprons beyond the moraine.

During previous environmental and geotechnical investigations conducted at the Site, historic fill was encountered between the ground surface and a maximum depth of 15 feet bgs, underlain by brown, reddish-brown to grey fine- to coarse-grained sand and silt with

varying amounts of silt and gravel with intermittent clay lenses. Bedrock was not encountered in borings advanced to approximately 100 feet below site grade at the Site during geotechnical investigations.

2.4 Site History

According to the available records, the Site was historically occupied by a lumber yard in 1886, a coal and wood yard between 1886 and 1928, a granite works in 1915, a die casting/electroplating facility in 1922, a fuel company, and auto repair in 1931, and a foundry between 1930 and 2007.

Tenants on the Site included a coal and wood yard between 1886 and 1928; a granite works in 1915; a die casting/electroplating facility in 1922; a garage between 1918 and 1930; a fuel company, auto repair, and office in 1931; Thos Paulson & Son Inc Brass Foundry between 1940 and 1973; Bronco Bronze Corp between 1940 and 1949; Ernest Aron Metls between 1960 and 1973; private tenants in 1973 and 1994; Regency Service Carts Incorporated in 1999; Chimu Bistro between 2009 and 2014, the Green Building and 450 Union LLC in 2014. The Site is currently vacant.

2.5 Redevelopment Plans

The proposed project is still in planning stage. Current plans include a 20-story mixed residential and commercial use building with a partial cellar. The partial cellar will be utilized for parking. First and second floors will be utilized as commercial with residential apartments on upper floors. Remediation of the Site will occur prior to or concurrently with the proposed redevelopment. All existing structures will be demolished prior to the construction of the new building. A change of use notification form for the demolition was submitted to the NYSDEC on December 1, 2022, and acknowledged by the NYSDEC on March 16, 2023.

2.6 Summary of Previous Investigations

The following reports were provided to Vektor for review during this assessment:

Executed Brownfield Cleanup Agreement by the New York State Department of Environmental Conservation, dated September 1, 2015

- 450 Union LLC c/o Pilot Real Estate Group LLC was accepted into the NYC Brownfield Cleanup Program (BCP) as a Volunteer as defined in the Environmental Conservation Law (ECL) Article 27, Title 14 (27-1405(1)(b)).
- The site subject to the Brownfield Cleanup Agreement (BCA) consisted of Tax Parcel 438-7.

Remedial Investigation Work Plan (RIWP) by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.PC., dated January 26, 2016

- Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) prepared this RIWP on behalf of 450 Union LLC c/o Pilot Estate Group (the Volunteer) to investigate and characterize the nature and extent of environmental impacts on the subject property and to provide sufficient information to evaluate remedial alternatives, as required.
- The 2016 RIWP included a summary of the following prior reports:

    - *Phase I ESA Report by New York Petroleum & Drilling, dated October 2001*
      The 2001 Phase I ESA identified the historical use of the subject property as a metalworking and refining facility and the historical use of the north adjacent property as a fuel oil depot as recognized environmental conditions (RECs).
    - *Phase II Subsurface Investigation Report by New York Petroleum & Drilling, dated June and July 2001*
      Based on their Phase I ESA findings, New York Petroleum & Drilling performed a Phase II Subsurface Investigation (SI) at the subject property. The SI consisted of a collection of four on-site and three off-site soil samples. The soil samples were analyzed for semi-volatile organic compounds (SVOCs). SVOCs were reportedly detected in soil at concentrations exceeding the Technical and Administrative Guidance Memorandum (TAGM) Soil Cleanup Objectives (SCOs) in two of the four on-site borings and two of the off-site borings installed to the north of the subject property.
    - *Due Diligence Review by AKRF, Inc., dated February 2002*
      AKRF, Inc. (AKRF) conducted a records search of state and federal regulatory databases and historical Sanborn maps and a site reconnaissance. Based on their review, the subject property was identified in the NYSDEC Spills database in 2001. However, the spill described appeared to be associated with an apartment building west of the subject property on Bond Street. It should be noted that this spill case was identified during Vektor's review of the database records and further described in Section 5.2. AKRF's review further identified the subject property as a Toxic Release Inventory Site, an Air Discharge Facility, and a Large Quantity Generator (LQG). A gasoline tank was identified on the Sanborn maps between 1950 to 2001; however, they were not able to locate and confirm the presence of a tank during their site reconnaissance. Finally, AKRF's review identified an off-site north adjacent property occupied by Bayside Fuel Oil Company as a Petroleum Bulk Storage (PBS) facility with multiple USTs and a Major Oil Storage Facility with several large tanks in conjunction with a Spill database listing.

- *Phase II Site Investigation Report by AKRF, dated May 2002*
  The subsurface investigation consisted of a UST and magnetic pipe locator survey, installation of five soil borings and collection of fourteen soil samples, and two groundwater samples. Soil and groundwater samples were analyzed for volatile organic compounds (VOCs), SVOCs, pesticides, polychlorinated biphenyls (PCBs), and total and dissolved metals. As a result of their survey, AKRF identified magnetic anomalies indicative of a 550-gallon UST in the southeastern portion of the subject property. As a result of their investigation, AKRF identified presence of historic fill consisting of brown to dark gray coarse to fine sand with varying amounts of silt, gravel, brick, coal, and wood in borings to depths ranging between 8 and 12 feet bgs. The results from the three borings advanced in the vicinity of the suspect UST showed concentrations of polyaromatic hydrocarbons (PAHs) above Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs) and/or Restricted Residential Use SCOs (RRUSCOs). It was concluded that the elevated concentrations of PAHs were indicative of a petroleum release. PAHs, metals, and pesticides were detected in the other on-site soil samples at concentrations above UUSCOs and/or RRUSCOs. No compounds were detected above the Technical and Operational Guidance Series (TOGS) Class GA Standards and Guidance Values (SGVs) in the groundwater samples.
- *Phase I ESA by Langan, dated May 29, 2014*
  Langan prepared this report on behalf of 450 Union Street LLC in accordance with the ASTM E1527-13. At the time of the 2014 Langan Phase I ESA, the subject property consisted of a one-story commercial building and two storage sheds. The exterior portion of the property included an enclosed area for social events, a parking lot, a driveway, and storage areas. The 2014 Langan Phase I included a review of the prior environmental reports and identified six RECs associated with the subject property. These RECs included the presence of petroleum-impacted soil at the suspected UST area, which was identified during the aforementioned 2002 AKRF investigation, presence of an underground vault located in the metalworking area in the eastern portion of the site building, which might have been used to store hazardous materials, the historical use of the subject property as a garage, foundry, and a fuel company in addition to its listing as a RCRA LQG, and NYSDEC PBS site, the historical uses and current uses at the time of the assessment of the surrounding properties for industrial operations, presence of three spill incidents on adjoining properties, and the east adjacent Gowanus Canal as a Superfund Site.
- *Phase II Environmental Site Investigation by Langan, dated June 5, 2014*

The Phase II ESA consisted of a geophysical survey, installation of nine soil borings and collection of seventeen soil samples, installation of seven temporary monitoring wells and collection of seven groundwater samples, installation of three soil vapor points, and collection of three soil vapor samples. As a result of the geophysical survey, Langan did not identify a UST or other suspect buried structures; however, they've noted that the southeastern portion of the subject property was not accessible at the time of the survey. The boring installation revealed presence of historic fill consisting of sand, silt, and clay with varying amounts of gravel, brick, coal, wood, and concrete fragments to a depth of about 15 feet bgs. The results of the investigation identified presence of SVOCs, metals, and pesticides above UUSCOs and/or RRUSCOs in soil samples. Additionally, a hazardous lead hotspot in soil was identified as a result of a Toxicity Characteristic Leaching Procedure (TCLP) analysis. Groundwater was encountered at depths between 7.2 and 10.8 feet bgs throughout the subject property, and the groundwater flow direction was determined towards the Gowanus Canal. Groundwater samples did not show any light non-aqueous phase liquid (LNAPL), sheen, or odors, but VOCs, SVOCs, and dissolved metals were identified at concentrations above TOGS Class GA SGCs. Furthermore, multiple VOCs were identified in the soil vapor samples.

- *Phase I ESA Report by Hillmann Consulting (Hillmann), dated June 25, 2014*
  Hilmann prepared this report on behalf of Cogswell Realty LLC in accordance with the ASTM E1527-13. The only new finding reported in the 2014 Hillman Phase I ESA was the presence of a 55-gallon drum on the east side of the subject property. The drum reportedly contained non-hazardous drill cuttings from a prior environmental investigation.

- *Subsurface Investigation Summary Letter by Hillmann, dated July 25, 2014*
  The SI consisted of a geophysical survey, installation of seven soil borings and collection of seven soil samples, installation of four temporary monitoring wells, and collection of four groundwater samples. The soil and groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. The geophysical survey identified a 550-gallon UST and reported the tank was filled in place. Groundwater was encountered at approximately 14 feet bgs. Soil results showed presence of VOCs, SVOCs, metals, and a pesticide at concentrations above UUSCOs and/or RRUSCOs. Groundwater results showed presence of PAHs and total metals at concentrations above TOGS Class GA SGVs.

- Based on the results of the aforementioned prior environmental assessments, five Areas of Concern (AOCs) were identified as follows: AOC-1: Historic Fill, AOC-2: UST and Petroleum Impacts, AOC-3: Undocumented Vault, AOC-4: Copper and Hazardous Lead in Soil, and AOC-5: Impacts Related to Gowanus Canal Superfund Site.
- The proposed remedial investigation included performance of a geophysical survey, installation of eight soil borings and collection of twenty-four soil samples, plus Quality Assurance/Quality Control (QA/QC) samples, delineation of the hotspot by installing nine soil borings and collecting a total of thirty-seven soil samples, plus QA/QC samples, and installation of two soil borings in the eastern portion to collect soil samples if impacted materials were observed, installation and sampling of four groundwater monitoring wells, plus QA/QC samples, and installation of three sub-slab vapor points, two soil vapor points and collection of five vapor samples and one ambient air sample as well as one indoor air sample from within the "Green Building" in order to investigate the AOCs and determine the nature and extent of contamination within the boundaries of the subject property.

Interim Remedial Measures Work Plan (IRMWP) by Langan, dated February 16, 2017

- Langan prepared this IRWWP on behalf of 450 Union LLC c/o Pilot Estate Group LLC (the Volunteer) to propose interim remedial measures and construction related excavations within the existing building and in the asphalt-paved exterior of the subject property.
- The contaminants of concern were identified as historic fill, petroleum-impacted materials, and coal tar-contaminated materials during the previous investigations.
- The scope of the IRMWP applied to about the western three-quarters of the subject property and included the following:
    - Decommission the UST located at the southeast corner of the site building in accordance with local, state, and federal regulations. Excavation of gross petroleum-impacted soil associated with the UST to about 12 feet bgs (the extent to which impacts were noted in the remediation investigation in this area) with localized dewatering as needed,
    - Excavation of the hazardous lead soil hotspot near the central part of the subject property to about 4 feet bgs; the hotspot was horizontally and vertically delineated during the 2016 RI,
    - Limited trench excavations within the site building and in the asphalt-paved exterior for subsurface utilities, footings for a lean-to structure, and landscaping, and
    - Restoration of the site cover system (i.e., building slab, asphalt, or concrete) where compromised or placement of a demarcation barrier and 2-foot clean soil cover in nonpaved, landscaped areas.

- This IRMWP did not address contamination in the eastern one-quarter of the subject property. Any residual contamination not addressed in this plan was planned to be addressed in a forthcoming Remedial Action Work Plan (RAWP).
- As required by the NYSDEC, a remedial alternative analysis was completed as part of the IRMWP. The remedial alternatives included Alternative I: Track 1 Unrestricted Use SCOs Cleanup and Alternative II: Track 4 Site-Specific SCOs Cleanup. Based on the evaluation, Alternative II was recommended as the remedial alternative for the subject property.

Remedial Investigation Report by Langan, dated May 5, 2017

- Langan prepared this report on behalf of 450 Union LLC c/o Pilot Estate Group LLC (the Volunteer), summarizing the results of their RI, which was conducted in accordance with the January 26, 2016 RIWP and a May 5, 2016 Vault Inspection Work Plan. The RI was performed between February and March 2016 including a geotechnical and environmental bulkhead/coal tar investigation and a vault inspection and closure.
- At the time of the RI, the subject property was utilized as a private event space, art gallery, and seasonal outdoor restaurant. The subject property was improved with a one-story building (the "Green Building") and two storage sheds. A 12-foot-high bulkhead separated the subject property from the Gowanus Canal.
- The RI consisted of performance of a geophysical survey, installation of nine soil borings to depths ranging between 12 to 16 feet bgs and collection of thirty-two soil samples to investigate AOCs 1, 2, and 3 outlined in the 2016 RIWP, installation of nine soil borings and collection of thirty-seven soil samples, plus QA/QC samples to investigate AOC-4, and installation of four soil borings and collection of three soil samples to investigate AOC-5, installation and sampling of six permanent monitoring wells, installation and development of one recovery well, installation of three sub-slab and two soil-vapor points and collection of five vapor, one ambient air, and one indoor air samples, inspection and sampling of an undocumented vault, removal of sediment from within the vault, closure-in-place of the vault after collection of an endpoint sample.
- Langan identified the following as a result of the RI:
    - Presence of a UST,
    - Historic Fill: Historic fill was identified up to 14 feet bgs with a native soil horizon beneath the fill across the subject property. SVOCs, pesticides, metals, and localized PCBs attributed to the fill were detected at concentrations above 6 NYCRR Part 375 UUSCOs and/or RRUSCOs. Hazardous concentrations of lead were detected in soil samples at depths ranging from surface grade to approximately 4 feet bgs in the central portion of the subject property.

- Petroleum-Impacted Soil, Groundwater, and Soil Vapor: Evidence of petroleum-impacted soil, groundwater, and soil vapor above 6 NYCRR Part 375 UUSCOs and/or RRUSCOs was identified through qualitative data and laboratory analytical results. The presence of these compounds was likely attributed to a release from the UST.
- Undocumented Vault: An undocumented vault was inspected and closed-in-place by backfilling with a slurry mix to about 8 inches below the building slab grade.
- Coal Tar-Impacted Soil and DNAPL: Coal tar impacts were identified along the eastern perimeter of the Site and west of the bulkhead wall at depths ranging from 23 to 54 feet bgs. VOCs and SVOCs were detected at concentrations above Part 375 UUSCOs and/or RRUSCOs in this area. Additionally, coal tar DNAPL was observed in a recovery well during gauging.
- Regional Groundwater Quality: Concentrations of one or more metals typical to the regional groundwater quality were detected at concentrations exceeding TOGS Class GA SGVs in thirteen filtered groundwater samples.
- Indoor Air Quality: While elevated levels of carbon tetrachloride were detected in an indoor air sample, it was not detected in the corresponding sub-slab vapor sample, thus concluding that its presence was likely interference from stored or applied chemicals used around the building.

- It was determined that sufficient analytical data were collected during the RI along with the prior environmental studies to establish site-specific SCOs and to develop a remedy for the property, except for coal-tar related impacts.

Phase I Environmental Investigation by Langan dated December 3, 2019

- Langan prepared this report on behalf of 450 Union LLC c/o Pilot Real Estate Group LLC in accordance with ASTM E1527-13.
- Langan's Phase I ESA included a review of the following prior reports:

  - Phase I ESA Report by New York Petroleum & Drilling, dated October 2001
  - Phase II Subsurface Investigation Report by New York Petroleum & Drilling, dated June and July 2001
  - Due Diligence Review by AKRF, Inc. (AKRF), dated February 2002
  - Phase II Site Investigation Report by AKRF, dated May 2002
  - Phase I ESA by Langan, dated May 29, 2014
  - Phase II Environmental Site Investigation by Langan, dated June 5, 2014
  - Phase I ESA Report by Hillmann Consulting (Hillmann), dated June 25, 2014
  - Subsurface Investigation Summary Letter by Hillmann, dated July 25, 2014
  - Brownfield Cleanup Program Application by Langan, dated May 7, 2015

- Waterfront Geotechnical Engineering Report by Langan, dated October 26, 2016
- Remedial Investigation Report by Langan, dated May 5, 2017
- Interim Remedial Measures Work Plan by Langan, dated February 16, 2017
- Draft Construction Completion Report by Langan, dated March 26, 2019
- Draft Remediation Action Work Plan by Langan, dated April 5, 2019

According to the 2019 Langan Phase I ESA, the previous investigations conducted between 2001 and 2016 identified the presence of coal tar impacts to native soil between 23 and 54 feet below grade surface (bgs) and accumulation of coal tar DNAPL within an on-site recovery well. A potential underground storage tank (UST) and petroleum impacts associated with this potential UST were identified in its immediate vicinity up to 12 feet bgs. Additionally, a hazardous lead hotspot in soil near the center of the subject property, as well as the presence of historic fill, were identified. Langan further indicated that the Interim Remedial Measure (IRM), which was implemented between February 20 and May 3, 2017, addressed a portion of the remediation. The 2017 IRM consisted of excavation and off-site disposal of the hazardous lead hotspot, decommissioning and off-site disposal of a 550-gallon UST, localized excavations into the existing site cover for the installation of footings, planter beds, and tree pits and off-site disposal of excavated materials, collection and analysis of confirmation endpoint soil samples, and finally the restoration of the site cover system. As a result of the 2017 IRM, shallow soil impacts were remediated; however, the presence of coal tar impacts in deeper soils and in a recovery well still remained. Therefore, the presence of coal tar impacts was considered a REC, and the presence of historic fill was considered a business environmental risk (BER) at the time.

- Langan also identified the potential presence of ACM, LBP, and PCB-containing materials at the subject property as a BER.
- An Environmental Lien search was ordered during the 2019 Phase I ESA, and no Environmental Liens or other Activity and Use Limitations (AULs) were identified for the subject property.

Interim Remedial Measures Work Plan (IRMWP) by Langan dated January 21, 2020

- Langan prepared this IRMWP on behalf of 450 Union LLC c/o Pilot Estate Group LLC (the Volunteer) to propose one IRM as follows:
  - Installation of a new steel bulkhead/containment barrier with a hydrophilic water-stop installed at un-welded interlocking seams to serve as a subsurface containment/cut-off wall for coal tar-related dense non-aqueous phase liquid

(DNAPL) migration onto the property from or into the Gowanus Canal/adjacent ecological receptor,
  - Excavation and off-site disposal of excess soil/fill generated during the construction of the new bulkhead/containment barrier,
  - Documentation soil sampling and analysis, collected from the base and (where available) sidewalls of bulkhead/containment barrier excavations, to document residual soil/fill exceeding Part 375 RRUSCOs,
  - Backfill above the high-level relieving platform to the original grade using certified-clean fill meeting the lower of Part 375 RRUSCOs and Protection of Groundwater SCOs, or with virgin, native crushed stone, in accordance with DER-10,
  - Restoration of the site cover consisting of asphalt, concrete pavement, and/or a minimum 2-foot-thick, clean soil cover meeting the lower of Part 375 RRUSCOs and Protection of Groundwater SCOs above a demarcation barrier,
  - Survey of excavations and the top of the site cover by a New York State Professional Land Surveyor, and
  - Development and execution of a Construction Health and Safety Plan (CHASP), Community Air Monitoring Program (CAMP), and Soil and Sediment Erosion (SSE) plan for the protection of on-site workers and the nearby community during remediation and construction activities.
- Residual coal tar recovery not addressed in this plan was planned to be addressed in a forthcoming RAWP.

Brownfield Cleanup Program (BCP) Application to Amend Brownfield Cleanup Agreement and Amendment dated January 29, 2020

- BCA amendment to add 450 Union Developer LLC as a Volunteer to be able to undertake the redevelopment activities at the subject property.

Remedial Action Work Plan by Langan, dated October 14, 2020

- Langan prepared this report on behalf of 450 Union LLC and 450 Union Developer LLC c/o Pilot Estate Group LLC (the Volunteer) to provide a remedial alternative analysis and summarize the nature and extent of remaining contamination at the subject property.
- The RAWP included a summary of the ongoing 2020 IRM at the time as proposed in the 2020 IRMWP. The IRM included construction of the bulkhead/contaminant barrier between the eastern part of the subject property and the Gowanus Canal and a high-level relieving platform on the inland area. The IRM further included waste characterization, excavation, and off-site disposal of approximately 920 cubic yards

of non-hazardous historic fill from grade to about 12.5 feet bgs within the high-level relieving platform area, collection of documentation soil samples from the base of the excavation, installation of a watertight steel sheet pile bulkhead/contaminant barrier between the eastern part of the subject property and the Gowanus Canal, construction of a reinforced concrete platform above the excavated area to serve as the new floor, backfilling above the high-level relieving platform with imported materials, and restoration of the site cover with an impervious surface (i.e., asphalt or concrete).

- The RAWP evaluated two remedial alternatives as Alternative I: Track 1 Unrestricted Use SCOs Cleanup and Alternative II: Track 4 Restricted Residential SCOs Cleanup and DNAPL Recovery. Based on the evaluation, Alternative II was recommended as the remedial Alternative for the subject property. Based on the evaluation factors described in detail in the RAWP, Alternative II was recommended as the remedial alternative for the subject property.
- The proposed remedial actions included:
    - Implementation of a manual DNAPL recovery program, including recovery from the existing well and installation of a new DNAPL recovery well, and a bulkhead monitoring program,
    - Maintenance of the site cover system consisting of asphalt pavement for the site exterior, the existing concrete building slabs, and 2 feet of clean fill in any landscaped areas to prevent human exposure to residual contaminated soil/fill remaining under the subject property,
    - Surveying the new recovery wells by a New York State Professional Land Surveyor,
    - Recording of an environmental easement as an Institutional Control,
    - Publication of an SMP for long-term management of remaining contamination at the subject property.

Remedial Action Work Plan Approval and Decision Document by Division of Environmental Remediation NYSDEC dated October 23, 2020

- Langan's RAWP dated October 14, 2020, was approved by the NYSDEC and the New York State Department of Health (NYSDOH), and a Decision Document was issued on October 23, 2020.
- The remedial action objectives (RAOs) were established for soil, groundwater, and soil vapor. The elements of the selected remedy were as follows:
    - Remedial Design: A remedial design program to be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program.

- Cover System: The maintenance of the existing site cover to allow for restricted residential, commercial, or industrial use of the subject property.
- Coal Tar Recovery: Installation and operation of two coal tar recovery wells along the eastern edge of the subject property bordering the Gowanus Canal, and coal tar to be collected periodically from each well.
- Institutional Control: Implementing an institutional control in the form of an environmental easement.
- Site Management Plan: Preparation of a Site Management Plan (SMP) for long term management and maintenance of Institutional and Engineering Controls.

Final Engineering Report by Langan, dated December 18, 2020

- Langan prepared this report on behalf of 450 Union LLC and 450 Union Developer LLC c/o Pilot Real Estate Group LLC (the Volunteer) to summarize and certify the remediation conducted in accordance with the aforementioned NYSDEC and NYSDOH approved 2020 RAWP.
- The RAWP was implemented between November and December 2020 and consisted of the following:
  - Implementation of a manual DNAPL recovery program utilizing two extraction wells and a bulkhead monitoring program. The recovery was planned to be completed manually, and the need for an active recovery was to be determined, pending on observed DNAPL recovery rates. DNAPL recovery was planned to be performed in conjunction with the new bulkhead monitoring for potential evidence of coal tar seepage at the seam between the bulkhead fence and Canal cap installed under the USEPA Superfund Program for the Gowanus Canal. The recovery program was designed to continue until the target completion goals as approved by the NYSDEC.
  - Maintenance of the existing site cover system consisting of asphalt pavement for the site exterior, the existing concrete building slabs, and 2 feet of clean fill in any landscaped areas to prevent human and environmental exposure to residual contamination remaining at the subject property.
  - Surveying the new recovery wells by a New York State Professional Land Surveyor.
  - Development and execution of a CHAP, CAMP, and SSE during remediation.
  - Recording of an environmental easement as an Institutional Control.
  - Publication of an SMP for long-term management of remaining contamination at the subject property as required by the Environmental Easement.

- Based on the completed remediation, a Track 4 Restricted Residential cleanup was achieved.

Site Management Plan by Langan, dated December 18, 2020

- A Site Management Plan (SMP) was prepared by Langan for long-term management and maintenance of the Institutional Controls (ICs) and Engineering Controls (ECs) that were established for the subject property in accordance with the requirements of NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 3, 2010, and the guidelines provided by the NYSDEC.
- According to the SMP, after the completion of remediation at the subject property, some contamination was left behind. Therefore, ICs and ECs were incorporated into the site remedy to control exposure to the contamination that was left behind for the protection of public health and the environment.
- An Environmental Easement was recorded with the NYC Office of the City Register on September 10, 2020.
- The ICs for the subject property include the following:
    - The property may be used for restricted-residential, commercial, and industrial uses (land use is subject to local zoning laws),
    - All ECs must be operated and maintained as specified in the SMP,
    - All ECs must be inspected at a frequency and in a manner defined in the SMP,
    - The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department,
    - DNAPL Recovery and other environmental or public health monitoring must be performed as defined in the SMP,
    - Data and information pertinent to site management must be reported at the frequency and in a manner as defined in the SMP,
    - All future activities that will disturb the remaining contaminated material must be conducted in accordance with the SMP,
    - Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP,
    - Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in the SMP,
    - Access to the subject property must be provided to agents, employees, or other representatives of the State of New York with reasonable prior notice to the property owner to ensure compliance with the restrictions identified by the Environmental Easement,

  - The potential for vapor intrusion must be evaluated for any new buildings developed within the boundaries defined in the Environmental Easement, and any potential impacts that are identified must be monitored or mitigated, and
  - Vegetable gardens and farming on the subject property are prohibited.
- The ECs for the subject property include the following:
  - A site cover system consisting of concrete building slabs, asphalt paved areas, and landscaped areas.
  - Bulkhead/Contaminant Barrier to prevent potential migration of DNAPL between the east adjoining Gowanus Canal and the subject property,
  - A manual DNAPL recovery program to be performed using two on-site recovery wells.
- The SMP requires site-wide inspections to be performed annually, as well as after all severe weather conditions that may affect ECs or monitoring devices. The SMP also requires annual inspections of the site cover and bulkhead.
- The SMP requires a manual DNAPL recovery to be performed at monthly intervals, and findings will be reported to the NYSDEC on a quarterly basis. The need for active recovery will be evaluated depending on the results.
- A Periodic Review Report (PRR) needs to be submitted to the NYSDEC beginning 16 months after the COC is issued. After the initial PRR, the next PRR needs to be submitted annually or at a frequency required by the NYSDEC.
- The SMP further requires submission of a Corrective Measures Work Plan to the NYSDEC if there is evidence that a component of the remedy is compromised or failed.

NYSDEC Brownfield Cleanup Program Certificate of Completion dated December 29, 2020

- Certificate of Completion (COC) acknowledging the remedial program for 450 Union Street has achieved a Track 4 Restricted Residential cleanup, including the following categories of uses: restricted-residential, commercial, and industrial uses.
- Tax credit provisions were determined for the site preparation and on-site groundwater remediation, and tangible property credit.

Change of Use Notification and Notice of Transfer of COC dated October 24, 2022

- A Change of Use Notification was submitted to the NYSEC transfer of COC to notify the Department of the new property owner as 2201 Union LLC.
- A notice of transfer of Certificate of Completion (COC) to the new entity 2201 Union LLC was submitted to the NYSDEC on October 24, 2022.

Soil Vapor Intrusion Investigation Work Plan by Vektor dated January 9, 2023

- Vektor prepared this Soil Vapor Investigation Work Plan (SVIWP) on behalf of 2201 Union LLC to evaluate the potential for a soil vapor intrusion as per the NYSDEC-approved SMP.
- The scope of the SVIWP included a geophysical survey to locate and identify utilities in the vicinity of the proposed boring locations, installation of eight soil vapor points, and collection of eight soil vapor samples and one ambient air sample as Quality Assurance/Quality Control (QA/QC).
- The NYSDEC, in consultation with the NYSDOH, approved the SVIWP on January 30, 2023.
- The SVIWP was implemented on February 14, 2023, and the results of that investigation will be summarized in a separate Soil Vapor Investigation Report.

The NYSDEC and NYSDOH currently have copies of these prior reports.

3.0 ON-SITE CONTAMINANT DELINEATION

On-site contaminant delineation proposed herein will supplement the prior assessments to characterize the nature and extent of contamination at the Site prior to redevelopment.

The on-site contaminant delineation will consist of the following scope of work:

- Geophysical survey to locate and identify utilities in the vicinity of the proposed boring locations,
- Installation of five soil borings (DB-1 through DB-5),
- Installation of additional borings to delineate the extent of the impacts if GCM/NAPL is identified in any of the new soil borings,
- Installation of monitoring wells downgradient of borings with GCM/NAPL, if deemed necessary as a result of the delineation soil borings,
- Installation of monitoring wells at the impacted locations, if deemed necessary, as a result of the delineation soil borings.

Table 1 provides a summary of the sampling protocol and rationale.

If modifications to the scope of work are required due to site conditions, the NYSDEC and NYSDOH project managers will be notified. All deviations will be reported in a Remedial Site Optimization Report.

3.1 Geophysical Survey

A Ground Penetrating Radar (GPR) Survey will be conducted by a licensed geophysical surveyor to identify existing utilities and to clear out the boring locations prior to drilling. A grid of north-south traverses will be established across the Site at five-foot intervals. The data will be processed on-site and used to create a contour map.

3.2 Delineation of Grossly Contaminated Material

Five soil borings (DB-1 through DB-5) will be installed to further delineate potential GCM/NAPL utilizing a sonic drill rig. If GCM/NAPL is identified in any of the soil borings, additional investigation will be conducted to delineate the full extent of GCM. To ensure vertical delineation of GCM/NAPL, the soil borings will be advanced to a minimum depth of 70 feet bgs where GCM/NAPL was observed in borings performed in prior investigations. Although evidence of coal tar was identified in prior soil borings SB-18 and SB-19 at the Site, two recovery wells, RGB-1/RW-1 and RGB-2/RW-2, are located approximately 10 to 20 feet west of these former borings. The proposed borings, DB-1 through DB-5, are intended to further delineate the extent of GCM/NAPL impacts observed closer to the bulkhead.

DB-1, DB-4, and DB-5 are located approximately 30 feet west of the Gowanus Canal due to the presence of bulkhead construction and piles within approximately 26 feet west of the Gowanus Canal.

Final soil boring depths will be determined in the field based on observations of GCM/NAPL using the Field Descriptions of Samples for Former Manufactured Gas Plant (MGP) Sites. A copy of the guidance document is provided in Appendix A. If GCM/NAPL is not observed in the bottom 10 feet of the soil boring and the minimum required depth is achieved, no further advancement of the boring is required. If GCM/NAPL is observed in accordance with the Field Descriptions of Samples for Former Manufactured Gas Plant (MGP) Sites, the boring will be advanced until vertical delineation of GCM/NAPL has been completed, which is a minimum of 10 feet of material without evidence of GCM/NAPL. Final vertical delineation can only be determined if soil borings have a minimum recovery of 50%. If GCM is observed, but the presence of NAPL is not readily determined, a jar shake test will be performed.

Soil samples will be retrieved using a 1.5-inch diameter, 5-foot-long core sampler with disposable acetate liners. A Geologist will be on-site to log the soils, visually characterize them, and field screen them with a photo ionization detector (PID) for the presence of contamination. For soil borings where GCM/NAPL is observed, grab soil samples will be collected at and immediately below each distinct interval of GCM/NAPL and will be analyzed for the full suite Target Compound List (TCL) VOCs, SVOCs, PCBs, Pesticides, Herbicides, Target Analyte List (TAL) Metals, plus cyanide via methods described below.

If GCM/NAPL is identified in soil borings DB-1, DB-2, DB-3, DB-4, or DB-5, additional soil borings will be advanced to delineate the full extent of GCM/NAPL as follows:

Potential Impacted Boring	Delineation Borings
DB-1	20 feet west and north of DB-1
DB-2	20 feet west, south, and north of DB-2
DB-3	20 feet west, south, and north of DB-3
DB-4	20 feet west of DB-4
DB-5	20 feet west of DB-5

To ensure vertical delineation of GCM/NAPL, the new borings will be advanced to a minimum depth of where GCM/NAPL was observed in the parent boring (DB-1, DB-2, DB-3, DB-4, and/or DB-5). Final soil boring depths will be determined based on field observations of GCM/NAPL using the attached Field Descriptions of Samples for Former Manufactured

Gas Plant (MGP) Sites. If GCM/NAPL is not observed in the final 10 feet of the soil boring and the minimum required depth is achieved, no further advancement of the boring is required. If GCM/NAPL is observed, the boring will be advanced until vertical delineation of GCM/NAPL has been determined, which is a minimum of 10 feet of material without evidence of GCM/NAPL.

For soil borings where GCM/NAPL has been observed, soil samples will be collected at and immediately below each distinct interval of GCM/NAPL. Representative soil samples will immediately be containerized in pre-cleaned laboratory-supplied glassware, stored in a chilled cooler (4°C), and submitted to York Analytical Laboratories, a New York State Department of Health certified laboratory. The soil samples will be analyzed for the following:

- TCL VOCs via EPA Method 8260C
- TCL SVOCs via EPA Method 8270D
- TCL PCB via EPA Method 8082A
- TCL Pesticides via EPA Method 8081B
- TCL Herbicides via EPA Method 8151A
- TAL metals via EPA Method 6010D/7473
- Cyanide, total via EPA Method 9014/9010C

All preliminary analytical results and draft soil boring logs will be submitted to NYSDEC to facilitate the review of delineation. Delineation will only be deemed completed upon receipt of NYSDEC concurrence and approval.

Table 1 provides a sampling matrix, and Figure 3 shows the proposed soil boring locations.

3.3 Delineation of Contamination in Groundwater

To delineate groundwater contamination associated with GCM/NAPL, monitoring wells will be installed at soil boring locations directly downgradient of where GCM/NAPL is observed. At each location, one monitoring well will be installed and screened at the groundwater interface, and a second monitoring well will be installed and screened below the deepest observation of GCM/NAPL. Monitoring wells will be installed in accordance with the NYSDEC Guidelines on Installation of Overburden Wells (Monitoring Wells) for Environmental Investigations. Any observations of sheen, blebs, free-phase product/tar, staining or coating of the sampling equipment, odor, etc., made during the sampling of groundwater are to be included in the groundwater sample collection log. If NAPL is observed in the well at the time of sampling, NAPL thickness will be documented in sampling logs, and a sample of the NAPL will be collected for TCL VOCs and TCL SVOCs. NAPL will then be removed prior to

groundwater sample collection. Groundwater samples will be collected for full suite TCL/TAL, plus cyanide.

A synoptic groundwater elevation gauging event will be performed following the installation and development of groundwater monitoring wells. Monitoring well locations will be surveyed by a licensed surveyor and tied into the NAVD88 datum. Elevations of the top of the casings will be surveyed to the nearest 0.01 foot. Monitoring well construction data, groundwater elevation, and surveyed locations in NAVD88 will be submitted electronically to the NYSDEC EQuIS database.

All preliminary analytical results and draft groundwater sampling logs will be submitted to NYSDEC as soon as they are available to facilitate a timely review of delineation. Delineation will only be deemed completed upon receipt of NYSDEC approval.

3.4 Non-Aqueous Phase Liquid (NAPL) Mobility Assessment

If NAPL is identified in a soil boring by the presence of saturated material or free phase product, NAPL mobility will be assessed. To assess NAPL mobility, 2" PVC wells will be installed and screened over the impacted interval. The screen must be slotted 0.02-inches. Wells will have a minimum annular space of two inches around the entire monitoring well circumference, have a sand pack a minimum of two feet above the top of the monitoring well screen, and have a bentonite seal a minimum of two feet thick. A minimum of a five-foot sump will be installed below the screened interval. Wells will be monitored no sooner than seven days post development for NAPL. Any observations of sheen, blebs, free-phase product, staining or coating of the sampling equipment, odor, etc., that are made during the sampling of groundwater will be included in a log.

Monitoring well locations will be surveyed by a licensed surveyor and tied into the NAVD88 datum. Monitoring well construction data and surveyed locations in NAVD88 will be submitted to the NYSDEC EQuIS database. NAPL mobility observations will be submitted to NYSDEC in a draft to facilitate review of the assessment. In areas where significant amounts of fill will be placed to raise the grade and/or building construction may result in significant loading and/or vibration to the subsurface, NAPL monitoring (and provisions for NAPL collection and removal) must be implemented throughout and beyond development to ensure NAPL isn't mobilized, nor migrates off-site. The mobility assessment will only be deemed completed upon receipt of NYSDEC concurrence and approval.

3.5 Management of Investigation Derived Waste

As per the DER-10, soil cuttings and other soil generated on-site during this investigation will be returned to the borehole unless:

- Free product, NAPL, or grossly contaminated soil, are present in the cuttings,
- The boreholes will be used for installation of a monitoring well,
- The borehole has an aquitard or other confining later,
- Backfilling the borehole with cuttings will create a significant path for vertical movement of contaminant,
- Soil cannot fit into the borehole.

Those soil cuttings needing to be managed on-site will be containerized in properly labeled Department of Transportation (DOT) approved 55-gallon drums for future off-site disposal at a permitted facility. All boreholes which require soil cuttings disposal would ultimately be filled with hydrated bentonite chips and asphalt/concrete capping.

Decontamination fluids, as well as groundwater purged from the monitoring wells during development and sampling, will be placed into DOT-approved 55-gallon drums for future off-site disposal.

All drums will be properly labeled, sealed, and characterized as necessary for off-site disposal.

4.0 STANDARDS, CRITERIA, AND GUIDANCE (SCGS)

The results of the soil samples will be compared to 6 NYCRR Part 375 Unrestricted Use SCOs and Restricted Residential Use SCOs based on the anticipated residential use of the Site.

The results of the groundwater samples will be compared to the NYSDEC Class GA Ambient Water Quality Standards (AWQS), or Guidance Values (GVs) as specified in the Technical Operation and Guidance Series (TOGS 1.1.1) Ambient Water Quality Standards and Guidance Values.

5.0 QUALITY CONTROL/QUALITY ASSURANCE (QA/QC)

The QA/QC samples for soil and groundwater will include one matrix spike/matrix spike duplicate (MS/MSD) and one blind duplicate sample at a frequency of at least one sample per 20 field samples per media. One trip blank per cooler and one field blank per day per matrix collected will also be included. The field blank, blind duplicate, and MS/MSD samples will be analyzed for:

- TCL VOCs via EPA Method 8260C
- TCL SVOCs via EPA Method 8270D
- TCL PCB via EPA Method 8082A
- TCL Pesticides via EPA Method 8081B
- TCL Herbicides via EPA Method 8151A
- TAL metals via EPA Method 6010D/7473
- Cyanide, total via EPA Method 9014/9010C

Laboratory-prepared trip blanks will be submitted for analysis of VOCs via EPA Method 8260.

All soil samples will be collected using a dedicated disposal sampling apparatus. Non-disposable drilling and sampling apparatus will be decontaminated between locations with Alconox® and water.

Table 1 provides a sampling matrix with estimated QA/QC samples. A Quality Assurance Project Plan that describes how QA/QC procedures will be implemented during this investigation is provided in Appendix B.

5.1 Data Submittal

Analytical results will be provided by York Analytical Laboratories, a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory. Data will be supplied in Analytical Services Protocol (ASP) Category B Data Packages, and all results will be provided in accordance with the NYSDEC Environmental Information Management System (EIMS) electronic data deliverable (EDD) format (EQuIS).

5.2 Data Validation

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 Alpha Geoscience, a third-party contractor, 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.

6.0 HEALTH AND SAFETY PLAN (HASP)

A site-specific Health and Safety Plan (HASP) is prepared for this project. All field personnel involved in investigation activities will participate in training required under 29 CFR 1910.120, such as 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records. The Site Safety Coordinator will be David Klein. An emergency contact sheet is included in the site-specific HASP.

All investigative work performed under this work plan will comply with all applicable health and safety laws and regulations, including OSHA worker safety requirements and HAZWOPER requirements. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Subcontractors may choose to utilize their own site-specific HASP or adopt this HASP.

A copy of the site-specific Health and Safety Plan is provided in Appendix C.

7.0 COMMUNITY AIR MONITORING PLAN (CAMP)

Community air monitoring will be performed during this investigation as required by the DER-10 (Appendix 1A, NYSDOH, Generic CAMP). Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels will be performed during intrusive activities such as soil boring and monitoring well installation. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media.

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.

- 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/m3, work activities will be suspended until controls are implemented and are successful in reducing the total particulate concentration to150 mcg/m3 or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions will be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work with Co-Located Residences or Facilities

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

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. 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:

Meghan Medwid, EIT
Project Manager
NYSDEC Division of Remediation, Bureau B, Section D
meghan.medwid@dec.ny.gov

Angela Martin
Project Manager
NYSDOH
angela.martin@health.ny.gov

A detailed Community Air Monitoring Plan is provided in Appendix D.

8.0 REPORTING

Daily Field Reports will be prepared and submitted to the NYSDEC and NYSDOH Project Managers by noon the following business day of any fieldwork. This field report will include the following:

- Work Summary
- Photos
- Community Air Monitoring Program (CAMP) data
- Site Figure showing work locations and staged materials
- Plans for the future

Upon receipt of the analytical results, Vektor will prepare a Remedial Site Optimization (RSO) Report in accordance with DER-10. The report will include the following sections:

- Introduction,
- Summary of site history,
- Summary of previous environmental investigation,
- Field methods and observations,
- Laboratory results section,
- Conclusions and recommendations, where necessary.

The report will also include scaled sampling plans showing all sample locations and exceedances, field logs, soil borings logs, monitoring well construction logs, CAMP data and descriptions of any CAMP exceedances, summary tables with comparison to respective standards, and laboratory analytical reports as appendices. All results will be provided in accordance with the NYSDEC EIMS EDD format (EQuIS).

9.0 SCHEDULE

The investigation will be implemented upon approval of this work plan by the NYSDEC. The table below shows the anticipated schedule for completing the scope of work:

Task	Weeks					
	1	2	3	4	5	6
Mobilization, Geophysical Survey, DNAPL Delineation Fieldwork						
Collection of Groundwater Samples and Well Survey, if necessary,						
Receipt of Laboratory Deliverables (Results and ASP B Packages)						
Data Validation/EQuIS Submission						
RSO Report						

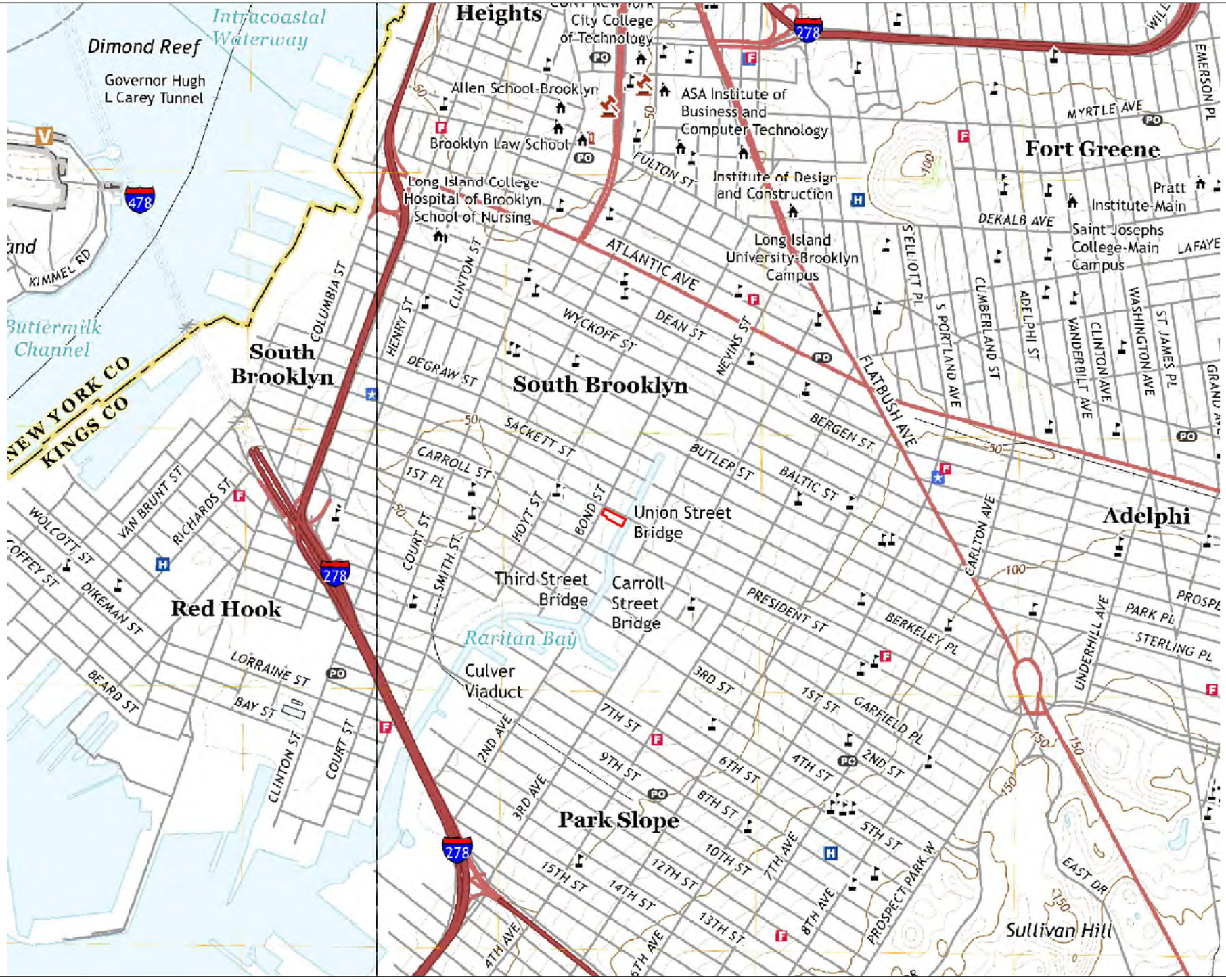
TABLES

Table 1
Sampling Rationale and Summary
450 Union Street, Brooklyn, New York

Sample Matrix	Sample Location	Boring Installation Depth	Sample Interval	Rationale	Analysis
SOIL	DB-1	70 feet or deeper based on field observations of GCM	At and immediately below each distinct interval of GCM/NAPL	To assess the extent of DNAPL and grossly contaminated material(GCM) at the site	TCL VOCs, SVOCs, Pesticides, PCBs, Herbicides, TAL Metals, Cyanide total
	DB-2	70 feet or deeper based on field observations of GCM	At and immediately below each distinct interval of GCM/NAPL		
	DB-3	70 feet or deeper based on field observations of GCM	At and immediately below each distinct interval of GCM/NAPL		
	DB-4	70 feet or deeper based on field observations of GCM	At and immediately below each distinct interval of GCM/NAPL		
	DB-5	70 feet or deeper based on field observations of GCM	At and immediately below each distinct interval of GCM/NAPL		
	DB-1 N, W delineation borings	Based on deepest GCM observed in DB-1	At and immediately below each distinct interval of GCM/NAPL		
	DB-2 N, W, S delineation borings	Based on deepest GCM observed in DB-2	At and immediately below each distinct interval of GCM/NAPL		
	DB-3 N, W, S delineation borings	Based on deepest GCM observed in DB-3	At and immediately below each distinct interval of GCM/NAPL		
	DB-4 W delineation borings	Based on deepest GCM observed in DB-4	At and immediately below each distinct interval of GCM/NAPL		
	DB-5 W delineation boring	Based on deepest GCM observed in DB-5	At and immediately below each distinct interval of GCM/NAPL		
	DB-DUP-1 (Depth)	Field Determined	Blind Duplicate: One per 20 soil samples	QA/QC	
	DB-MS/MSD (Depth)	Field Determined	One per 20 soil samples		
	FB-1	N/A	Field Blank: 1 per day		
	TB-1	N/A	Trip Blank: 1 per cooler per day (Lab-prepared)		TCL VOCs
GROUNDWATER	23MW-1S	Screen at groundwater interface	To be determined in the field based on groundwater depth and the deepest observation of GCM/NAPL	To assess GCM/NAPL conditions beneath the site	TCL VOCs, SVOCs, Pesticides, PCBs, Herbicides, TAL Metals (filtered and unfiltered), Cyanide total
	23MW-1D	Screen below deepest GCM/NAPL			
	23MW-2S	Screen at groundwater interface			
	23MW-2D	Screen below deepest GCM/NAPL			
	23MW-3S	Screen at groundwater interface			
	23MW-3D	Screen below deepest GCM/NAPL			
	23MW-5S	Screen at groundwater interface			
	23MW-5D	Screen below deepest GCM/NAPL			
	MW-DUP-1	Field Determined	Blind Duplicate: One per 20 groundwater samples	QA/QC	
	MW-MS/MSD	Field Determined	One per 20 groundwater samples	QA/QC	
	FB-2	N/A	Field Blank: 1 per day	QA/QC	
	TB-2	N/A	Trip Blank: 1 per cooler per day (Lab-prepared)	QA/QC	TCL VOCs

* Additional soil samples may be collected based on field conditions of DNAPL and GCM (i.e: elevated PID readings, odor, sheen, etc.)

FIGURE 1
SITE LOCATION MAP



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Legend:

- Approximate BCP Site Boundary

Notes:

1. All feature locations are approximate
2. Base Map - 2019 Topography

Scale: AS SHOWN

Figure No. 1

Figure Name: Site Location Plan

Report: RSO Work Plan

Date: 2/26/22

Drawn By: EK

Site Address: 450 Union Street
Brooklyn, New York
BCP# C224219

FIGURE 2

SITE PLAN

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Legend:

Approximate BCP Site Boundary

Notes:

1. All feature locations are approximate
2. Base Map is provided by Google

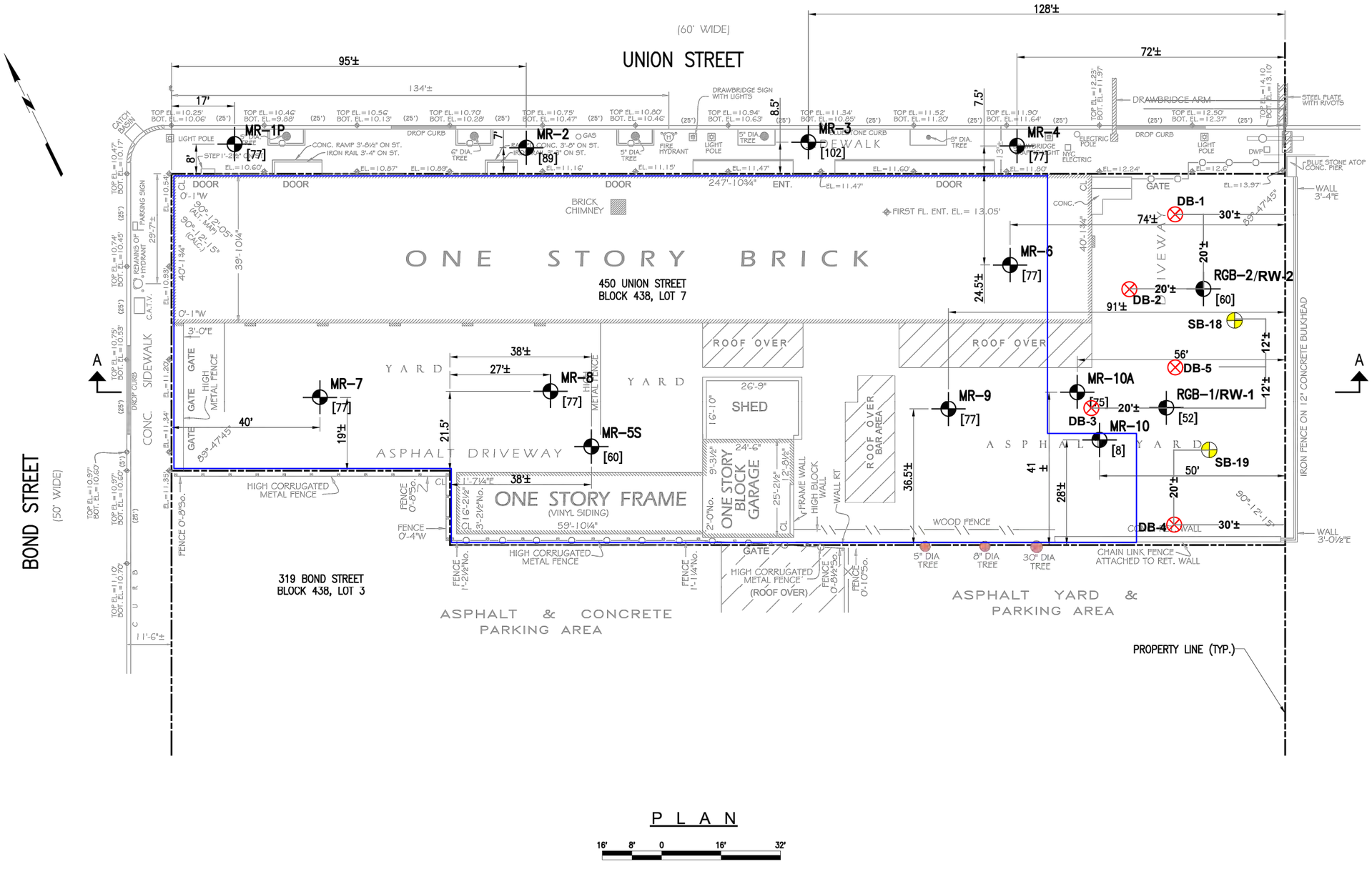
Scale:

Not to Scale

Figure No.	2
Figure Name:	Site Plan
Report:	RSO Work Plan
Date:	2/26/22
Drawn By:	EK
Site Address:	450 Union Street Brooklyn, New York BCP# C224219

FIGURE 3

PROPOSED SAMPLING PLAN



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Legend:

- Site Boundary
- Proposed New Building Footprint
- MR-X — Prior Geotechnical Boring and ID
- RGB-X/RW-X — Existing Recovery Well and ID
- SB-X — RI Soil Boring Location and ID (Feb. 2016)
- DB-X — Proposed Delination Boring and ID

Notes:

1. All feature locations are approximate
2. Base Plan is provided by Mueser Rutledge Engineers PLLC, Drawing No. B-1

Scale: AS SHOWN

Figure No.	3
Figure Name:	Proposed Delineation Borings
Report:	Remedial Optimization Work Plan
Date:	3/27/2023
Drawn By:	EK
Site Address:	450 Union Street Brooklyn, New York

APPENDICES

APPENDIX A

FIELD DESCRIPTION GUIDANCE FOR FORMER MANUFACTURED GAS PLANTS

Field Descriptions of Samples for Former Manufactured Gas Plant (MGP) Sites

SOIL SAMPLE DESCRIPTIONS

It is important that descriptive qualifiers are consistently used to characterize degree and nature of contaminant impacts and visual-manual soil classification. The following presents some examples of descriptive qualifiers.

SOIL LOGGING

• All soils are to be logged using the **Unified Soil Classification** (ASTM D 2488 field descriptions)

• **PID or FID** used to screen all soil samples (Jar Headspace method) – maximum readings should be recorded and included on the logs. The PID/FID should be calibrated daily at a minimum

• **Moisture terms** are: Dry, Moist, and Wet

• **Color terms** - use geotechnical color charts - colors may be combined: e.g. red-brown. Color terms should be used to describe the "natural color" of the sample as opposed to staining caused by contamination (see below)

• **Log of each sample interval** should be prepared as follows:

[Coarse Grained Example] NARROWLY GRADED SAND (SP); mostly fine sand; <5% fines; red-brown, moist, environmental/depositional/geologic descriptions.

[Fine Grained Example] SANDY SILT (ML); heterogeneous till structure, nonplastic, ~30% fine to coarse, subangular sand; ~10% subangular fine gravel, max. size ~ 10 mm; brown; environmental/depositional/geologic descriptions.

• **Representativeness** – Soil logs should include particular notes if the field representative believes that there is a possibility that the soil sample being described is not representative of the interval sampled.

• **Intervals for Description** – if using a 2' (split spoon) or 4' (Macro-core) long sampler – the field description should not necessarily be for the entire sample interval. It is important to look for, identify, and describe small-scale units and changes within each sample interval.

DESCRIPTION OF CONTAMINANTS

Visible Contamination Descriptors

• **Sheen** - iridescent petroleum-like sheen. Not to be used to describe a "bacterial sheen", which can be distinguished by its tendency to break up on the water surface at angles, whereas a petroleum sheen will be continuous and will not break up. A field test for sheen is to put a soil sample in a jar of water and shake the sample (jar shake test) , then observe the presence/absence of sheen on the surface of the water in the jar.

• **Stained** - used w/ color (i.e. black or brown stained) to indicate that the soil matrix is stained a color other than the natural (unimpacted) color of the soil.

• **Coated** - soil grains are coated with tar/free product – there is not sufficient free-phase material present to saturate the pore spaces. The degree of coating should be described as light, moderate, or heavy.

• **Blebs** - observed discrete sphericals of tar/free product - but for the most part the soil matrix was not visibly contaminated or saturated. Typically this is residual product. The estimated size and number of blebs should be reported.

• **Saturated** - the entirety of the pore space for a sample is saturated with the tar/free product. Care should be taken to ensure that you're not observing water saturating the pore spaces if you use this term. Depending on viscosity, tar/free-phase saturated materials may freely drain from a soil sample.

• **Oil** - Used to characterize free and/or residual product that exhibits a distinct fuel oil or diesel fuel like odor; distinctly different from MGP-related odors/impacts.

• **Tar** - Used to describe free and/or residual product that exhibits a distinct "coal tar" type odor (e.g. naphthalene-like odor). Colors of product can be brown, black, reddish-brown, or gold.

• **Solid Tar** - Used to describe product that is solid or semi-solid phase. The magnitude of the observed solid tar should be described (e.g. discrete granules or a solid layer).

• **Purifier Material** - Purifier material is commonly brown/rust or blue/green wood chips or granular material. It is typically associated with a distinctive sulfur-like odor. Other colors may be present.

Olfactory Descriptors

• Use terms such as " tar-like odor" or "naphthalene-like odor" or "fuel oil-like odor" that provide a qualitative description (opinion) as to the possible source of the odor.

• Use modifiers such as strong, moderate, faint to indicate intensity of the observed odor.

DNAPL/LNAPL

- A jar shake test should be performed to identify and determine whether observed tar/free phase product is either denser or lighter than water. In addition, MGP residues can include both light and dense phases - this test can help determine if both light and dense phase materials are present at a particular location.

Viscosity of Free-Phase Product – If free-phase product/tar is present a qualitative description of viscosity should be made. Use descriptors such as:

- Highly viscous (e.g. taffy-like)
- Viscous (e.g. No. 6 fuel oil or bunker crude like)
- Low viscosity (e.g. No. 2 fuel oil like)

GROUNDWATER SAMPLING OBSERVATIONS

- Any observations of sheen, blebs, free-phase product/tar, staining or coating of the sampling equipment, odor, etc. that made during sampling of groundwater are to be included in the groundwater sample collection log.

Standard Colors for Reporting MGP Impacts

	RGB Color	Auto Cad Index
TAR SATURATED	255,0,0	10
COATED MATERIAL, LENSES	255,0,255	210
HARDENED TAR	129,64,0	34
BLEBS, GLOBS, SHEEN	255,191,0	40
STAINING, ODOR	255,255,0	50
PETROLEUM IMPACTS SATURATION & SHEENS	0,191,255	140
PETROLEUM IMPACTS STAINING & ODORS	170,234,255	141
PURIFIER WASTE AND ODOR	0,0,255	170
NO OBSERVED IMPACTS	0,165,0	92

APPENDIX B
QUALITY ASSURANCE PROJECT PLAN (QAPP)

vEKtor consultants

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QUALITY ASSURANCE PROJECT PLAN

Prepared For: 2201 Union LLC

Project Name: 450 Union Street

BCP Site No: C224219

Project Location: 450 Union Street, Brooklyn, New York 11231

Date: March 2023

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 2201 Union LLC (the Applicant) for the implementation of a Remedial Site Optimization (RSO) Work Plan by Vektor Consultants, LLC (Vektor) and its subcontractors at the property located at 450 Union Street, Brooklyn, New York (the Site). The Site is identified by the City of New York as Borough of Bronx, Tax Block 438 and Lot 7.

The Applicant was accepted into the Brownfield Cleanup Program (BCP) as a Volunteer on September 1, 2015 with the NYSDEC to investigate and remediate the site. 450 Union Developer LLC was added to the BCA as an additional Volunteer on March 13, 2020, and 2201 Union LLC was added to the BCA upon purchase of the property. A notice of transfer of Certificate of Completion (COC) and Change of Use Notification for the new entity was submitted to the NYSDEC on October 24, 2022.

The investigation will be conducted in accordance with a New York State Department of Environmental Conservation (NYSDEC) approved RSO Work Plan. This QAPP describes the protocols and procedures to be followed during the implementation of the NYSDEC approved RSO Work Plan. 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 Purpose

This QAPP is intended to improve the quality in both the scope and application of the environmental data collected during the implementation of the RSO Work Plan. Soil and groundwater samples will be collected to delineate extent of grossly contaminated material (GCM) beneath the Site.

1.2 Scope of Work

The scope of work covered under this QAPP include any sampling that will occur during the implementation of approved RSO Work Plan.

The proposed investigation will consist of the following scope of work:

- Geophysical survey to locate and identify utilities in the vicinity of the proposed boring locations,
- Installation of five soil borings (DB-1 through DB-5) between approximately 30 and 55 feet inland of the Gowanus Canal (i.e., ~20 feet from known GCM/NAPL borings)
- Installation of additional borings to delineate the extent of the impacts if GCM/NAPL is identified in any of the new soil borings,
- Installation of monitoring wells downgradient of borings with GCM/NAPL, if deemed necessary as a result of the delineation soil borings,

- Installation of monitoring wells at the impacted locations, if deemed necessary, as a result of the delineation soil borings.

Table 1 provides a sample matrix and rationale for potential proposed samples.

2.0 PROJECT TEAM

Vektor's team of trained and experienced environmental scientists, geologists, and engineers along with Vektor's licensed subcontractors will perform the below-listed tasks in a manner consistent with DER-10 Technical Guidance for Site Investigation and Remediation (DER-10).

Principal Engineer, P.E.	Hilmi U. Aydin	Vektor Consultants
Project Director, QEP	Ezgi Karayel	Vektor Consultants
Project Manager	David Klein	Vektor Consultants
Field Leader	David Klein Peter Rathsack	Vektor Consultants
Laboratory QA/QC Officer	Benjamin Gulizia	York Analytical Laboratories, Inc.
Third-party Data Validator	Don Anne	Alpha Geoscience

2.1 Principal Engineer

Hilmi U. Aydin, Professional Engineer, will act as the Principal Engineer and will oversee the successful completion of this project. He will have the direct responsibility of preparation and certification of the RSO Report.

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 completion of the soil vapor investigation.

2.3 Project Manager

Saranda Alka of Vektor will act as the Project Manager. She will oversee the field activities and coordinate for all elements of the RSO Work Plan. She will be responsible for coordinating with the field leader and other field crew as necessary.

2.4 Field Leader

David Klein of Vektor will lead the field activities and ensure implementation of Health and Safety Plan (HASP) during all field work. They have the authority to stop all work if unsafe conditions are observed. They will be responsible for coordinating with all subcontractors. They will oversee the subcontractors in the field and collect samples outlined in the RSO Work Plan and in this QAPP.

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). Kriston Simmons is the Client Manager who will ensure that all summa canisters 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.

2.7 Other Subcontractors

Coastal Environmental Solutions (Coastal) of Bohemia, New York will conduct a geophysical survey and will perform the soil boring and well installation.

3.0 QUALITY OBJECTIVES

The methods and procedures described in this QAPP are intended to minimize both the magnitude and frequency of sources of variability from either the field sampling or measurement process and support the scientifically validity of project environmental data.

3.1 Data Quality Objectives

In order to support project decisions, data generated must be of known and acceptable quality. To define acceptable data quality for this project, data quality indicators, including precision, accuracy/bias (as related to % recovery and contamination), representativeness, comparability, completeness, and sensitivity, are identified for each analytical parameter.

Some data quality indicators will be assessed quantitatively, while others will be assessed qualitatively. For quantitative assessments, example calculations have been provided and the QC samples (to assess each indicator) have been identified.

Measurement variability: This project will require QC standards, blanks, and duplicate samples be analyzed in the laboratory environment. QC sample results will be evaluated against established precision and accuracy criteria established in approved analytical methods to assess the reliability of the analytical measurements.

Field and overall project variability: This project will follow the sampling design and sample collection techniques as outlined in Section 4.0. To evaluate the effectiveness of project quality controls variability will be assessed through the following indicators followed below.

3.1.1 Precision

Precision provides information about the consistency of the application of project methods by measuring the same characteristic over repeated measurements. It is expressed in terms of the relative percent difference (RPD) between two measurements (A and B), and is computed as follows:

$$\text{RPD} = \frac{A-B}{(A+B)/2} X100$$

A = first sample value
B = second sample value (duplicate)

3.1.2 Bias/Accuracy

Bias/Accuracy is a measure of confidence that describes how close a measurement is to its “true” value. Accuracy includes both precision and recovery and is expressed as percent recovery (% REC). Analytical laboratory accuracy is determined by the percent recovery of the target analyte in spiked samples and by recoveries of the surrogates in all samples

and QC samples. For soil and groundwater samples, accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set.

3.1.3 Representativeness

Representativeness is how well collected samples reflect the characteristics in both composition and concentration of the environmental condition. Representativeness will be assessed both quantitatively and qualitatively by depending on appropriate sample design and determining frequency and type of sampling.

3.1.4 Completeness

Completeness is the comparison of the amount of useable data collected against the amount of data required to meet project objectives. Completeness is defined as the percentage of all results that are not affected by failing QC qualifiers and should be between 70 and 100% of all analyses performed.

3.1.5 Comparability

Comparability is the degree to which data can be correlated with other sets of data. Comparability will be achieved by adhering to the standardized sample collection methods detailed in this QAPP and using EPA approved analytical methods analyzed by a NYSDOH ELAP certified laboratory.

3.1.6 Sensitivity

Sensitivity is the ability of a method to detect and quantify a parameter. The sensitivity objectives for this plan require that data generated by the analytical laboratory achieve quantification levels low enough to meet the required detection limits specified by NYSDEC ASP and to meet all site-specific standards, criteria, and guidance values (SGCs) established for this project.

3.2 Sample Handling and Custody

Sample preservation will be performed immediately upon collection. All samples will immediately be containerized in pre-cleaned, laboratory supplied glassware, stored in a chilled cooler (4°C). Each sample will be labeled with sample ID number, sample depth (if applicable), and sampling date and time. Labels will be attached to the glassware before placing into the chilled cooler. The number, type of sample, and sample identification will be entered into the field logbook. A chain-of-custody form will be completed before the samples are submitted to the laboratory and will include project number, site address, sampler's name and signature, sampling date, analytical parameters, reporting methods, shipping date and time and receiver's name and signature, receipt date and time.

Table 2 provides laboratory analytical methods, glassware, and holding times for each analysis.

4.0 FIELD INVESTIGATION

4.1 Soil Sampling

For soil borings where GCM/NAPL has been observed, soil samples will be collected at and immediately below each distinct interval of GCM/NAPL. Representative soil samples will immediately be containerized in pre-cleaned laboratory-supplied glassware, stored in a chilled cooler (4°C), and submitted to York Analytical Laboratories, a New York State Department of Health certified laboratory. The soil samples will be analyzed for the following:

- TCL VOCs via EPA Method 8260C
- TCL SVOCs via EPA Method 8270D
- TCL PCB via EPA Method 8082A
- TCL Pesticides via EPA Method 8081B
- TCL Herbicides via EPA Method 8151A
- TAL Metals via EPA Method 6010D/7473
- Cyanide, total via EPA Method 9014/9010C

Table 1 provides a sampling matrix.

4.2 Groundwater Sampling

To delineate groundwater contamination associated with GCM/NAPL, monitoring wells will be installed at soil boring locations directly downgradient of where GCM/NAPL is observed. At each location, one monitoring well will be installed and screened at the groundwater interface, and a second monitoring well will be installed and screened below the deepest observation of GCM/NAPL. Monitoring wells will be installed in accordance with the NYSDEC Guidelines on Installation of Overburden Wells (Monitoring Wells) for Environmental Investigations. Any observations of sheen, blebs, free-phase product/tar, staining or coating of the sampling equipment, odor, etc., made during the sampling of groundwater are to be included in the groundwater sample collection log. If NAPL is observed in the well at the time of sampling, NAPL thickness will be documented in sampling logs, and a sample of the NAPL will be collected for TCL VOCs and TCL SVOCs. NAPL will then be removed prior to groundwater sample collection. Groundwater samples will be collected for full suite TCL/TAL, plus cyanide.

Groundwater and NAPL samples will be containerized in pre-cleaned laboratory-supplied glassware, stored in a chilled cooler (4°C), and submitted to a New York State Department of Health certified laboratory.

The groundwater samples will be analyzed for:

- TCL VOCs via EPA Method 8260C

- TCL SVOCs via EPA Method 8270D
- TCL PCB via EPA Method 8082A
- TCL Pesticides via EPA Method 8081B
- TCL Herbicides via EPA Method 8151A
- TAL Metals (filtered and unfiltered) via EPA Method 6010D/7473
- Cyanide, total via EPA Method 9014/9010C

4.3 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. The QA/QC samples for soil and groundwater will include one matrix spike/matrix spike duplicate (MS/MSD), and one blind duplicate sample at a frequency of at least one sample per 20 field samples per media. One trip blank per cooler and one field blank per day per matrix collected will also be included. The field blank, blind duplicate, and MS/MSD samples will be analyzed for:

- TCL VOCs via EPA Method 8260C
- TCL SVOCs via EPA Method 8270D
- TCL PCB via EPA Method 8082A
- TCL Pesticides via EPA Method 8081B
- TCL Herbicides via EPA Method 8151A
- TAL Metals via EPA Method 6010D/7473
- Cyanide, total via EPA Method 9014/9010C

Laboratory prepared trip blanks will be submitted for analysis of VOCs via EPA Method 8260.

Table 2 provides laboratory analytical methods, glassware, and holding times for each analysis.

4.4 Field Instrumentation

Before each sampling event, all field equipment will be inspected prior to use. All equipment will be clean and in good working order before it is used for monitoring or sampling. The field instruments to be used during the investigation will be calibrated at the beginning of each day as per the manufacturers' specifications. Calibration records will be recorded in the field book.

5.0 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

Drilling equipment will be decontaminated between sample locations.

5.1 Investigation Derived Waste

All investigation derived waste (IDW), including but not limited to, soil cuttings, purged groundwater, personal protective equipment (PPE), gloves, and tubing will be containerized in properly labeled Department of Transportation (DOT) approved 55-gallon drums for future off-site disposal at a permitted facility.

As per the DER-10, soil cuttings and other soil generated on-site during remedial investigation will be returned to the borehole, unless:

- Free product, NAPL, or grossly contaminated soil, are present in the cuttings,
- The boreholes will be used for installation of a monitoring well,
- The borehole has an aquitard, or other confining later,
- Backfilling the borehole with cuttings will create a significant path for vertical movement of contaminant
- Soil cannot fit into the borehole

Those soil cuttings needing to be managed on-site will be containerized in properly labeled Department of Transportation (DOT) approved 55-gallon drums for future off-site disposal at a permitted facility. All boreholes which require soil cuttings disposal would ultimately be filled with hydrated bentonite chips and asphalt/concrete capping.

Groundwater purged from the monitoring wells during development and sampling will be placed into DOT approved 55-gallon drums for future off-site disposal.

TABLES

Table 1
Sampling Rationale and Summary
450 Union Street, Brooklyn, New York

Sample Matrix	Sample Location	Boring Installation Depth	Sample Interval	Rationale	Analysis
SOIL	DB-1	70 feet or deeper based on field observations of GCM	At and immediately below each distinct interval of GCM/NAPL	To assess the extent of DNAPL and grossly contaminated material(GCM) at the site	TCL VOCs, SVOCs, Pesticides, PCBs, Herbicides, TAL Metals, Cyanide total
	DB-2	70 feet or deeper based on field observations of GCM	At and immediately below each distinct interval of GCM/NAPL		
	DB-3	70 feet or deeper based on field observations of GCM	At and immediately below each distinct interval of GCM/NAPL		
	DB-4	70 feet or deeper based on field observations of GCM	At and immediately below each distinct interval of GCM/NAPL		
	DB-5	70 feet or deeper based on field observations of GCM	At and immediately below each distinct interval of GCM/NAPL		
	DB-1 N, W delineation borings	Based on deepest GCM observed in DB-1	At and immediately below each distinct interval of GCM/NAPL		
	DB-2 N, W, S delineation borings	Based on deepest GCM observed in DB-2	At and immediately below each distinct interval of GCM/NAPL		
	DB-3 N, W, S delineation borings	Based on deepest GCM observed in DB-3	At and immediately below each distinct interval of GCM/NAPL		
	DB-4 W delineation borings	Based on deepest GCM observed in DB-4	At and immediately below each distinct interval of GCM/NAPL		
	DB-5 W delineation boring	Based on deepest GCM observed in DB-5	At and immediately below each distinct interval of GCM/NAPL		
	DB-DUP-1 (Depth)	Field Determined	Blind Duplicate: One per 20 soil samples	QA/QC	
	DB-MS/MSD (Depth)	Field Determined	One per 20 soil samples		
	FB-1	N/A	Field Blank: 1 per day		
	TB-1	N/A	Trip Blank: 1 per cooler per day (Lab-prepared)		TCL VOCs
GROUNDWATER	23MW-1S	Screen at groundwater interface	To be determined in the field based on groundwater depth and the deepest observation of GCM/NAPL	To assess GCM/NAPL conditions beneath the site	TCL VOCs, SVOCs, Pesticides, PCBs, Herbicides, TAL Metals (filtered and unfiltered), Cyanide total
	23MW-1D	Screen below deepest GCM/NAPL			
	23MW-2S	Screen at groundwater interface			
	23MW-2D	Screen below deepest GCM/NAPL			
	23MW-3S	Screen at groundwater interface			
	23MW-3D	Screen below deepest GCM/NAPL			
	23MW-5S	Screen at groundwater interface			
	23MW-5D	Screen below deepest GCM/NAPL			
	MW-DUP-1	Field Determined	Blind Duplicate: One per 20 groundwater samples	QA/QC	
	MW-MS/MSD	Field Determined	One per 20 groundwater samples	QA/QC	
	FB-2	N/A	Field Blank: 1 per day	QA/QC	
	TB-2	N/A	Trip Blank: 1 per cooler per day (Lab-prepared)	QA/QC	TCL VOCs

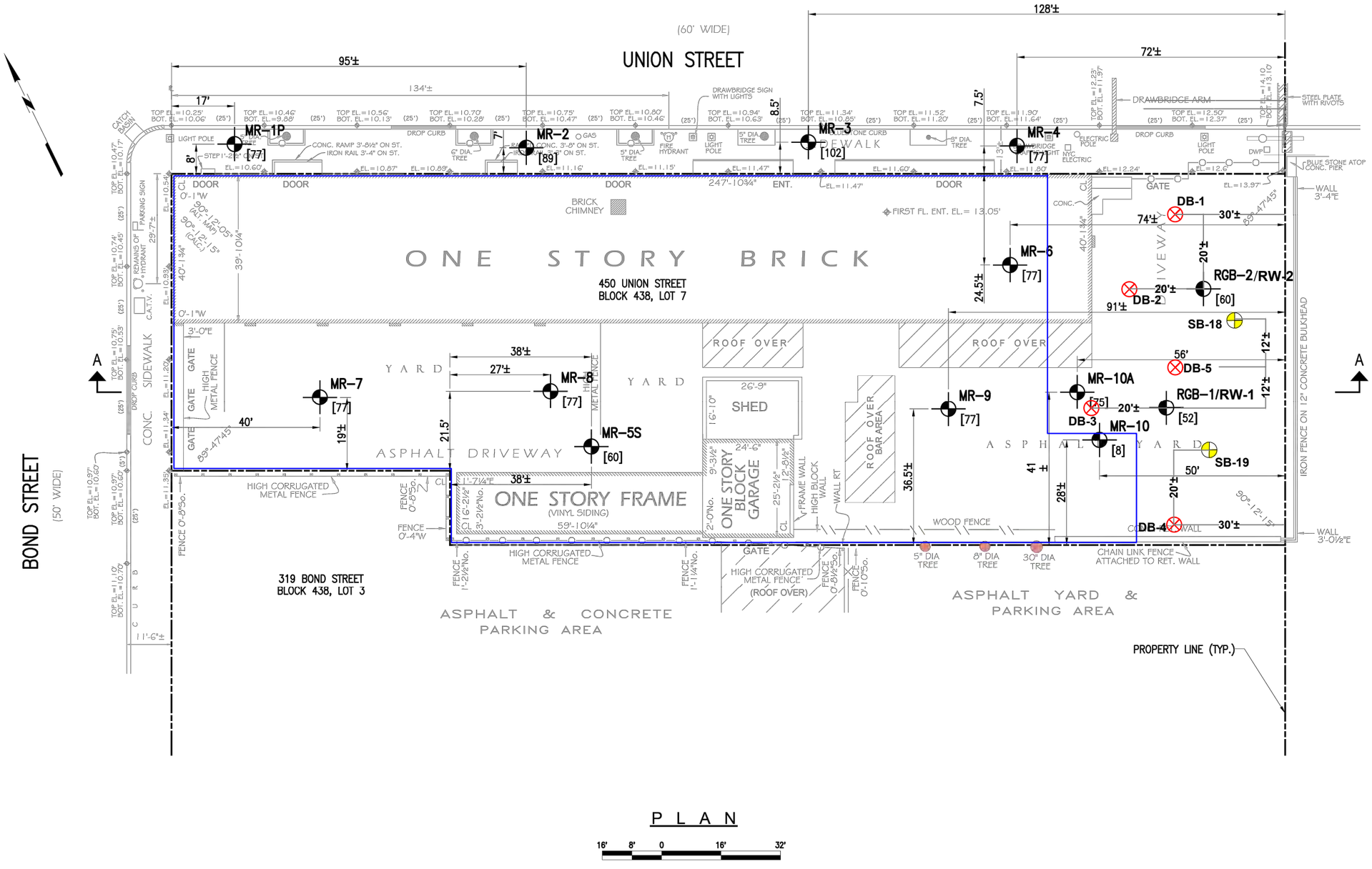
* Additional soil samples may be collected based on field conditions of DNAPL and GCM (i.e: elevated PID readings, odor, sheen, etc.)

Table 2
Preservation and Holding Times
450 Union Street, Brooklyn, NY

Sample Matrix	Analysis	Container	Preservation	Holding Time
Soil and Soil QA/QC Samples	VOCs	Glass, Four 40-ml vials with teflon-lined cap: 2 VOA vials with 5-ml H_2O, 1 VOA vial with MeOH, and 1 blank vial or 5-g Encore samplers	Cool, 4°C	14 days
	SVOCs	Glass, 8-oz teflon-line cap	Cool, 4°C	14 days to extract, 40 days after extraction to analyze
	PCBs & Pesticides	Glass, 100-g tefloned-lined cap	Cool, 4°C	14 days to extract, 40 days after extraction to analyze
	Herbicides	Glass, 100-g tefloned-lined cap	Cool, 4°C	14 days to extract, 40 days after extraction to analyze
	Metals	Glass, 2-oz teflon-lined cap	Cool, 4°C	6 months (except for mercury 28 days)
	Cyanide	Plastic, 250-ml	NaOH to ph<12 plus 0.6 grams of Ascorbic Acid, Cool, 4°C	14 days
Groundwater and Groundwater QA/QC Samples	VOCs	Glass, three 40-mil vials with teflon-lined septum cap	HCl pH<2, no headspace, Cool, 4°C	14 days
	SVOCs	Glass, 1 liter with teflon-lined cap	Cool, 4°C	7 days to extract, 40 days after extraction to analyze
	PCBs & Pesticides	Glass, 1 liter with teflon-lined cap	Cool, 4°C	7 days to extract, 40 days after extraction to analyze
	Herbicides	Glass, 500-ml	Cool, 4°C	7 days to extract, 40 days after extraction to analyze
	Metals	Plastic, 250-ml	HNO_3 to pH<2, Cool, 4°C	6 months (except for mercury 28 days)
	Cyanide	Plastic, 250-ml	NaOH to ph<12 plus 0.6 grams of Ascorbic Acid, Cool, 4°C	14 days

FIGURE 1

PROPOSED SAMPLING PLAN



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Legend:

- Site Boundary
- Proposed New Building Footprint
- MR-X — Prior Geotechnical Boring and ID
- RGB-X/RW-X — Existing Recovery Well and ID
- SB-X — RI Soil Boring Location and ID (Feb. 2016)
- DB-X — Proposed Delination Boring and ID

Notes:

1. All feature locations are approximate
2. Base Plan is provided by Mueser Rutledge Engineers PLLC, Drawing No. B-1

Scale: AS SHOWN

Figure No.	1
Figure Name:	Proposed Delineation Borings
Report:	QAPP
Date:	3/27/2023
Drawn By:	EK
Site Address:	450 Union Street Brooklyn, New York

ATTACHMENTS

ATTACHMENT 1
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	CT RCP	Standard Excel EDD
QA Report	CT RCP DQA/DUE	EQuIS (Standard)
NY ASP A Package	NJDEP Reduced Deliverables	NYSDEC EQuIS
NY ASP B Package		NJDEP SRP HazSite
	NJDKQP	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 2
RESUMES

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

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
261 Grand Concourse, Bronx, New York – Brownfield Redevelopment

Peter Rathsack

Environmental Scientist

Contact

347.871.0750
prathsack@vektorconsultants.com

Peter Rathsack is an environmental scientist with Vektor Consultants, and he is responsible for conducting field investigations and site assessments. His responsibilities include providing environmental oversight at construction project sites in New York City Metropolitan area, performing site visits and preparing Phase I Environmental Site Assessments, as well as, performing Phase II Environmental Site Assessments, Remedial Investigations, waste characterization sampling, and preparing associated reports. His experience and education with sampling processes and urban development provides knowledge and insight for navigating projects through different regulatory programs.

Education

B.A. Environmental Studies
Concentration Urban Planning
University of Toledo

Professional Registration

OSHA 30-hour Construction

OSHA 40-hour HAZWOPER

10-Hour Site Safety Training (SST)

Affiliations

Brownfield Coalition of the Northeast

Select Projects

Prior to joining Vektor, Peter oversaw water quality sampling program to maintain excellent watershed health. Collected and organized data for 50 years of water quality information. Carried out sampling of multiple sites throughout watershed and coordinated with team members for efficient sampling processes. Communicated with University of New Hampshire for further sampling including cyanobacteria monitoring. Partnered with stakeholders through education and outreach.

447 Euclid Avenue, Brooklyn, New York – Voluntary Cleanup Program
261 Grand Concourse, Bronx, New York – Brownfield Cleanup Program
260-262 Van Brunt Street, Brooklyn, New York – Brownfield Cleanup Program
1-9 Wythe Avenue, Brooklyn, New York – Brownfield Cleanup Program

APPENDIX C
HEALTH AND SAFETY PLAN (HASP)

vEKtor consultants

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HEALTH AND SAFETY PLAN

Prepared For: 2201 Union LLC

Project Name: 450 Union Street

BCP Site No: C224219

Project Location: 450 Union Street, Brooklyn, NY 11231

Date: February 2023

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

Table of Contents

Emergency Contacts			
Position	**Name**	**Organization**	**Phone**
Project Director	Ezgi Karayel	Vektor Consultants	(347) 871-0750
Project Manager	David Klein	Vektor Consultants	(347) 871-0750
Field Representative	Saranda Alka	Vektor Consultants	(347) 871-0750
Site Health and Safety Supervisor	Saranda Alka	Vektor Consultants	(347) 871-0750
Client Contact	Robert Doster	2201 Union LLC	(718) 222-1028
DEC Project Manager	Meghan Medwid	NYSDEC	(518) 402-8610
DOH Project Manager	Angela Martin	NYSDOH	angela.martin@health.ny.gov
Emergency Response		FDNY	911
Spill Hotline		NYSDEC	(800) 457-7362

Emergency Medical Facility	
Primary	***Alternate***
The Brooklyn Hospital Center 121 DeKalb Ave, Brooklyn, NY 11201 Tel: (718) 250-8000 Open 24 Hours	New York-Presbyterian Brooklyn Methodist Hospital 506 6th St, Brooklyn, NY 11215 Tel: (718) 780-3000 Open 24 Hours
Route to emergency medical facility map attached to 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 2201 Union LLC for the implementation of a Remedial Site Optimization (RSO) Work Plan by Vektor Consultants (Vektor) and its subcontractors at the property located at 450 Union Street in Brooklyn, New York (the Site). The Site is identified by the City of New York as Borough of Brooklyn, Tax Block 438 and Lot 7.

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 field personnel will implement this HASP during the implementation of RSO Work Plan.

1.1 Site Location and Description

The Site is located on the southeast corner of Union Street and Bond Street intersection to the west of Gowanus Canal within the Gowanus section of Kings County, New York. The Site is approximately 28,500-square feet and is improved with a 9,880 square feet one-story main building in the northern portion. The legal description of the subject is Block 438 and Lot 7. A site location map is provided as Figure 1.

1.2 Summary of Previous Investigations

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

Executed Brownfield Cleanup Agreement by the New York State Department of Environmental Conservation, dated September 1, 2015

- 450 Union LLC c/o Pilot Real Estate Group LLC was accepted into the NYC Brownfield Cleanup Program (BCP) as a Volunteer as defined in the Environmental Conservation Law (ECL) Article 27, Title 14 (27-1405(1)(b)).
- The site subject to the Brownfield Cleanup Agreement (BCA) consisted of Tax Parcel 438-7.

Remedial Investigation Work Plan (RIWP) by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.PC., dated January 26, 2016

- Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) prepared this RIWP on behalf of 450 Union LLC c/o Pilot Estate Group (the Volunteer) to investigate and characterize the nature and extent of environmental impacts on the subject property and to provide sufficient information to evaluate remedial alternatives, as required.
- The 2016 RIWP included a summary of the following prior reports:

- *Phase I ESA Report by New York Petroleum & Drilling, dated October 2001*
  The 2001 Phase I ESA identified the historical use of the subject property as a metalworking and refining facility and the historical use of the north adjacent property as a fuel oil depot as recognized environmental conditions (RECs).
- *Phase II Subsurface Investigation Report by New York Petroleum & Drilling, dated June and July 2001*
  Based on their Phase I ESA findings, New York Petroleum & Drilling then performed a Phase II Subsurface Investigation (SI) at the subject property. The SI consisted of a collection of four on-site and three off-site soil samples. The soil samples were analyzed for semi-volatile organic compounds (SVOCs). SVOCs were reportedly detected in soil at concentrations exceeding the Technical and Administrative Guidance Memorandum (TAGM) Soil Cleanup Objectives (SCOs) in two of the four on-site borings and two of the off-site borings installed to the north of the subject property.
- *Due Diligence Review by AKRF, Inc., dated February 2002*
  AKRF, Inc. (AKRF) conducted a records search of state and federal regulatory databases and historical Sanborn maps, and a site reconnaissance. Based on their review, the subject property was identified in the NYSDEC Spills database in 2001. However, the spill described appeared to be associated with an apartment building west of the subject property on Bond Street. It should be noted that this spill case was identified during Vektor's review of the database records and further described in Section 5.2. AKRF's review further identified the subject property as a Toxic Release Inventory Site, an Air Discharge Facility, and a Large Quantity Generator (LQG). A gasoline tank was identified on the Sanborn maps between 1950 to 2001; however, they were not able to locate and confirm the presence of a tank during their site reconnaissance. Finally, AKRF's review identified an off-site north adjacent property occupied by Bayside Fuel Oil Company as a Petroleum Bulk Storage (PBS) facility with multiple USTs and a Major Oil Storage Facility with several large tanks in conjunction with a Spill database listing.
- *Phase II Site Investigation Report by AKRF, dated May 2002*
  The subsurface investigation consisted of a UST and magnetic pipe locator survey, installation of five soil borings and collection of fourteen soil samples, and two groundwater samples. Soil and groundwater samples were analyzed for volatile organic compounds (VOCs), SVOCs, pesticides, polychlorinated biphenyls (PCBs), and total and dissolved metals. As a result of their survey, AKRF identified magnetic anomalies indicative of a 550-gallon UST in the southeastern portion of the subject property. As a result of their investigation, AKRF identified presence of historic fill consisting of brown to dark gray coarse to fine sand with varying amounts of silt, gravel, brick, coal, and wood

in borings to depths ranging between 8 and 12 feet bgs. The results from the three borings advanced in the vicinity of the suspect UST showed concentrations of polyaromatic hydrocarbons (PAHs) above Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs) and/or Restricted Residential Use SCOs (RRUSCOs). It was concluded that the elevated concentrations of PAHs were indicative of a petroleum release. PAHs, metals, and pesticides were detected in the other on-site soil samples at concentrations above UUSCOs and/or RRUSCOs. No compounds were detected above the Technical and Operational Guidance Series (TOGS) Class GA Standards and Guidance Values (SGVs) in the groundwater samples.

- *Phase I ESA by Langan, dated May 29, 2014*
  Langan prepared this report on behalf of 450 Union Street LLC in accordance with the ASTM E1527-13. At the time of the 2014 Langan Phase I ESA, the subject property consisted of a one-story commercial building and two storage sheds. The exterior portion of the property included an enclosed area for social events, a parking lot, a driveway, and storage areas. The 2014 Langan Phase I included a review of the prior environmental reports and identified six RECs associated with the subject property. These RECs included the presence of petroleum-impacted soil at the suspected UST area, which was identified during the aforementioned 2002 AKRF investigation, presence of an underground vault located in the metalworking area in the eastern portion of the site building, which might have been used to store hazardous materials, the historical use of the subject property as a garage, foundry, and a fuel company in addition to its listing as a RCRA LQG, and NYSDEC PBS site, the historical uses and current uses at the time of the assessment of the surrounding properties for industrial operations, presence of three spill incidents on adjoining properties, and the east adjacent Gowanus Canal as a Superfund Site.
- *Phase II Environmental Site Investigation by Langan, dated June 5, 2014*
  The Phase II ESA consisted of a geophysical survey, installation of nine soil borings and collection of seventeen soil samples, installation of seven temporary monitoring wells and collection of seven groundwater samples, installation of three soil vapor points, and collection of three soil vapor samples. As a result of the geophysical survey, Langan did not identify a UST or other suspect buried structures; however, they've noted that the southeastern portion of the subject property was not accessible at the time of the survey. The boring installation revealed presence of historic fill consisting of sand, silt, and clay with varying amounts of gravel, brick, coal, wood, and concrete fragments to a depth of about 15 feet bgs. The results of the investigation identified presence of SVOCs, metals, and pesticides above

UUSCOs and/or RRUSCOs in soil samples. Additionally, a hazardous lead hotspot in soil was identified as a result of a Toxicity Characteristic Leaching Procedure (TCLP) analysis. Groundwater was encountered at depths between 7.2 and 10.8 feet bgs throughout the subject property, and the groundwater flow direction was determined towards the Gowanus Canal. Groundwater samples did not show any light non-aqueous phase liquid (LNAPL), sheen, or odors, but VOCs, SVOCs, and dissolved metals were identified at concentrations above TOGS Class GA SGCs. Furthermore, multiple VOCs were identified in the soil vapor samples.

- *Phase I ESA Report by Hillmann Consulting (Hillmann), dated June 25, 2014*
  Hilmann prepared this report on behalf of Cogswell Realty LLC in accordance with the ASTM E1527-13. The only new finding reported in the 2014 Hillman Phase I ESA was the presence of a 55-gallon drum on the east side of the subject property. The drum reportedly contained non-hazardous drill cuttings from a prior environmental investigation.
- *Subsurface Investigation Summary Letter by Hillmann, dated July 25, 2014*
  The SI consisted of a geophysical survey, installation of seven soil borings and collection of seven soil samples, installation of four temporary monitoring wells, and collection of four groundwater samples. The soil and groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, and metals. The geophysical survey identified a 550-gallon UST and reported the tank was filled in place. Groundwater was encountered at approximately 14 feet bgs. Soil results showed presence of VOCs, SVOCs, metals, and a pesticide at concentrations above UUSCOs and/or RRUSCOs. Groundwater results showed presence of PAHs and total metals at concentrations above TOGS Class GA SGVs.

- Based on the results of the aforementioned prior environmental assessments, five Areas of Concern (AOCs) were identified as follows: AOC-1: Historic Fill, AOC-2: UST and Petroleum Impacts, AOC-3: Undocumented Vault, AOC-4: Copper and Hazardous Lead in Soil, and AOC-5: Impacts Related to Gowanus Canal Superfund Site.
- The proposed remedial investigation included performance of a geophysical survey, installation of eight soil borings and collection of twenty-four soil samples, plus Quality Assurance/Quality Control (QA/QC) samples, delineation of the hotspot by installing nine soil borings and collecting a total of thirty-seven soil samples, plus QA/QC samples, and installation of two soil borings in the eastern portion to collect soil samples if impacted materials were observed, installation and sampling of four groundwater monitoring wells, plus QA/QC samples, and installation of three sub-slab vapor points, two soil vapor points and collection of five vapor samples and one ambient air sample as well as one indoor air sample from within the “Green Building”

in order to investigate the AOCs and determine the nature and extent of contamination within the boundaries of the subject property.

Interim Remedial Measures Work Plan (IRMWP) by Langan, dated February 16, 2017

- Langan prepared this IRWWP on behalf of 450 Union LLC c/o Pilot Estate Group LLC (the Volunteer) to propose interim remedial measures and construction related excavations within the existing building and in the asphalt-paved exterior of the subject property.
- The contaminants of concern were identified as historic fill, petroleum-impacted materials, and coal tar-contaminated materials during the previous investigations.
- The scope of the IRMWP applied to about the western three-quarters of the subject property and included the following:
    - Decommission the UST located at the southeast corner of the site building in accordance with local, state, and federal regulations. Excavation of gross petroleum-impacted soil associated with the UST to about 12 feet bgs (the extent to which impacts were noted in the remediation investigation in this area) with localized dewatering as needed,
    - Excavation of the hazardous lead soil hotspot near the central part of the subject property to about 4 feet bgs; the hotspot was horizontally and vertically delineated during the 2016 RI,
    - Limited trench excavations within the site building and in the asphalt-paved exterior for subsurface utilities, footings for a lean-to structure, and landscaping, and
    - Restoration of the site cover system (i.e., building slab, asphalt, or concrete) where compromised or placement of a demarcation barrier and 2-foot clean soil cover in nonpaved, landscaped areas.
- This IRMWP did not address contamination in the eastern one-quarter of the subject property. Any residual contamination not addressed in this plan was planned to be addressed in a forthcoming Remedial Action Work Plan (RAWP).
- As required by the NYSDEC, a remedial alternative analysis was completed as part of the IRMWP. The remedial alternatives included Alternative I: Track 1 Unrestricted Use SCOs Cleanup and Alternative II: Track 4 Site-Specific SCOs Cleanup. Based on the evaluation, Alternative II was recommended as the remedial Alternative for the subject property.

Remedial Investigation Report by Langan, dated May 5, 2017

- Langan prepared this report on behalf of 450 Union LLC c/o Pilot Estate Group LLC (the Volunteer), summarizing the results of their RI, which was conducted in accordance with the January 26, 2016 RIWP and a May 5, 2016 Vault Inspection Work Plan. The RI was performed between February and March 2016 including a geotechnical and environmental bulkhead/coal tar investigation and a vault inspection and closure.
- At the time of the RI, the subject property was utilized as a private event space, art gallery, and seasonal outdoor restaurant. The subject property was improved with a one-story building (the "Green Building") and two storage sheds. A 12-foot high bulkhead separated the subject property from the Gowanus Canal.
- The RI consisted of performance of a geophysical survey, installation of nine soil borings to depths ranging between 12 to 16 feet bgs and collection of thirty-two soil samples to investigate AOCs 1, 2, and 3 outlined in the 2016 RIWP, installation of nine soil borings and collection of thirty-seven soil samples, plus QA/QC samples to investigate AOC-4, and installation of four soil borings and collection of three soil samples to investigate AOC-5, installation and sampling of six permanent monitoring wells, installation and development of one recovery well, installation of three sub-slab and two soil-vapor points and collection of five vapor, one ambient air, and one indoor air samples, inspection and sampling of an undocumented vault, removal of sediment from within the vault, closure-in-place of the vault after collection of an endpoint sample.
- Langan identified the following as a result of the RI:
    - Presence of a UST,
    - Historic Fill: Historic fill was identified up to 14 feet bgs with a native soil horizon beneath the fill across the subject property. SVOCs, pesticides, metals, and localized PCBs attributed to the fill were detected at concentrations above 6 NYCRR Part 375 UUSCOs and/or RRUSCOs. Hazardous concentrations of lead were detected in soil samples at depths ranging from surface grade to approximately 4 feet bgs in the central portion of the subject property.
    - Petroleum-Impacted Soil, Groundwater, and Soil Vapor: Evidence of petroleum-impacted soil, groundwater, and soil vapor above 6 NYCRR Part 375 UUSCOs and/or RRUSCOs was identified through qualitative data and laboratory analytical results. The presence of these compounds was likely attributed to a release from the UST.
    - Undocumented Vault: An undocumented vault was inspected and closed-in-place by backfilling with a slurry mix to about 8 inches below the building slab grade.

  - Coal Tar-Impacted Soil and DNAPL: Coal tar impacts were identified along the eastern perimeter of the Site and west of the bulkhead wall at depths ranging from 23 to 54 feet bgs. VOCs and SVOCs were detected at concentrations above Part 375 UUSCOs and/or RRUSCOs in this area. Additionally, coal tar DNAPL was observed in a recovery well during gauging.
  - Regional Groundwater Quality: Concentrations of one or more metals typical to the regional groundwater quality were detected at concentrations exceeding TOGS Class GA SGVs in thirteen filtered groundwater samples.
  - Indoor Air Quality: While elevated levels of carbon tetrachloride were detected in an indoor air sample, it was not detected in the corresponding sub-slab vapor sample, thus concluding that its presence was likely interference from stored or applied chemicals used around the building.
- It was determined that sufficient analytical data were collected during the RI along with the prior environmental studies to establish site-specific SCOs and to develop a remedy for the property, except for coal-tar related impacts.

Phase I Environmental Investigation by Langan dated December 3, 2019

- Langan prepared this report on behalf of 450 Union LLC c/o Pilot Real Estate Group LLC in accordance with ASTM E1527-13.
- Langan's Phase I ESA included a review of the following prior reports:
  - Phase I ESA Report by New York Petroleum & Drilling, dated October 2001
  - Phase II Subsurface Investigation Report by New York Petroleum & Drilling, dated June and July 2001
  - Due Diligence Review by AKRF, Inc. (AKRF), dated February 2002
  - Phase II Site Investigation Report by AKRF, dated May 2002
  - Phase I ESA by Langan, dated May 29, 2014
  - Phase II Environmental Site Investigation by Langan, dated June 5, 2014
  - Phase I ESA Report by Hillmann Consulting (Hillmann), dated June 25, 2014
  - Subsurface Investigation Summary Letter by Hillmann, dated July 25, 2014
  - Brownfield Cleanup Program Application by Langan, dated May 7, 2015
  - Waterfront Geotechnical Engineering Report by Langan, dated October 26, 2016
  - Remedial Investigation Report by Langan, dated May 5, 2017
  - Interim Remedial Measures Work Plan by Langan, dated February 16, 2017
  - Draft Construction Completion Report by Langan, dated March 26, 2019
  - Draft Remediation Action Work Plan by Langan, dated April 5, 2019

According to the 2019 Langan Phase I ESA, the previous investigations conducted between 2001 and 2016 identified the presence of coal tar impacts to native soil between 23 and 54 feet below grade surface (bgs) and accumulation of coal tar DNAPL within an on-site recovery well. A potential underground storage tank (UST) and petroleum impacts associated with this potential UST were identified in its immediate vicinity up to 12 feet bgs. Additionally, a hazardous lead hotspot in soil near the center of the subject property, as well as the presence of historic fill, were identified. Langan further indicated that the Interim Remedial Measure (IRM), which was implemented between February 20 and May 3, 2017, addressed a portion of the remediation. The 2017 IRM consisted of excavation and off-site disposal of the hazardous lead hotspot, decommissioning and off-site disposal of a 550-gallon UST, localized excavations into the existing site cover for the installation of footings, planter beds, and tree pits and off-site disposal of excavated materials, collection and analysis of confirmation endpoint soil samples, and finally the restoration of the site cover system. As a result of the 2017 IRM, shallow soil impacts were remediated; however, the presence of coal tar impacts in deeper soils and in a recovery well still remained. Therefore, the presence of coal tar impacts was considered a REC, and the presence of historic fill was considered a business environmental risk (BER) at the time.

- Langan also identified the potential presence of ACM, LBP, and PCB-containing materials at the subject property as a BER.
- An Environmental Lien search was ordered during the 2019 Phase I ESA, and no Environmental Liens or other Activity and Use Limitations (AULs) were identified for the subject property.

Interim Remedial Measures Work Plan (IRMWP) by Langan dated January 21, 2020

- Langan prepared this IRMWP on behalf of 450 Union LLC c/o Pilot Estate Group LLC (the Volunteer) to propose one IRM as follows:
    - Installation of a new steel bulkhead/containment barrier with a hydrophilic water-stop installed at un-welded interlocking seams to serve as a subsurface containment/cut-off wall for coal tar-related dense non-aqueous phase liquid (DNAPL) migration onto the property from or into the Gowanus Canal/adjacent ecological receptor,
    - Excavation and off-site disposal of excess soil/fill generated during the construction of the new bulkhead/containment barrier,
    - Documentation soil sampling and analysis, collected from the base and (where available) sidewalls of bulkhead/containment barrier excavations, to document residual soil/fill exceeding Part 375 RRUSCOs,

  - Backfill above the high-level relieving platform to the original grade using certified-clean fill meeting the lower of Part 375 RRUSCOs and Protection of Groundwater SCOs, or with virgin, native crushed stone, in accordance with DER-10,
  - Restoration of the site cover consisting of asphalt, concrete pavement, and/or a minimum 2-foot-thick, clean soil cover meeting the lower of Part 375 RRUSCOs and Protection of Groundwater SCOs above a demarcation barrier,
  - Survey of excavations and the top of the site cover by a New York State Professional Land Surveyor, and
  - Development and execution of a Construction Health and Safety Plan (CHASP), Community Air Monitoring Program (CAMP), and Soil and Sediment Erosion (SSE) plan for the protection of on-site workers and the nearby community during remediation and construction activities.
- Residual coal tar recovery not addressed in this plan was planned to be addressed in a forthcoming RAWP.

Brownfield Cleanup Program (BCP) Application to Amend Brownfield Cleanup Agreement and Amendment dated January 29, 2020

- BCA amendment to add 450 Union Developer LLC as a Volunteer to be able to undertake the redevelopment activities at the subject property.

Remedial Action Work Plan by Langan, dated October 14, 2020

- Langan prepared this report on behalf of 450 Union LLC and 450 Union Developer LLC c/o Pilot Estate Group LLC (the Volunteer) to provide a remedial alternative analysis and summarize the nature and extent of remaining contamination at the subject property.
- The RAWP included a summary of the ongoing 2020 IRM at the time as proposed in the 2020 IRMWP. The IRM included construction of the bulkhead/contaminant barrier between the eastern part of the subject property and the Gowanus Canal and a high-level relieving platform on the inland area. The IRM further included waste characterization, excavation, and off-site disposal of approximately 920 cubic yards of non-hazardous historic fill from grade to about 12.5 feet bgs within the high-level relieving platform area, collection of documentation soil samples from the base of the excavation, installation of a watertight steel sheet pile bulkhead/contaminant barrier between the eastern part of the subject property and the Gowanus Canal, construction of a reinforced concrete platform above the excavated area to serve as the new floor, backfilling above the high-level relieving platform with imported

materials, and restoration of the site cover with an impervious surface (i.e., asphalt or concrete).

- The RAWP evaluated two remedial alternatives as Alternative I: Track 1 Unrestricted Use SCOs Cleanup and Alternative II: Track 4 Restricted Residential SCOs Cleanup and DNAPL Recovery. Based on the evaluation, Alternative II was recommended as the remedial Alternative for the subject property. Based on the evaluation factors described in detail in the RAWP, Alternative II was recommended as the remedial Alternative for the subject property.
- The proposed remedial actions included:
    - Implementation of a manual DNAPL recovery program, including recovery from the existing well and installation for a new well DNAPL recovery well, and a bulkhead monitoring program,
    - Maintenance of the site cover system consisting of asphalt pavement for the site exterior, the existing concrete building slabs, and 2 feet of clean fill in any landscaped areas to prevent human exposure to residual contaminated soil/fill remaining under the subject property,
    - Surveying the new recovery wells by a New York State Professional Land Surveyor,
    - Recording of an environmental easement as an Institutional Control,
    - Publication of an SMP for long term management of remaining contamination at the subject property.

Remedial Action Work Plan Approval and Decision Document by Division of Environmental Remediation NYSDEC dated October 23, 2020

- Langan's RAWP dated October 14, 2020, was approved by the NYSDEC and the New York State Department of Health (NYSDOH), and a Decision Document was issued on October 23, 2020.
- The remedial action objectives (RAOs) were established for soil, groundwater, and soil vapor. The elements of the selected remedy were as follows:
    - Remedial Design: A remedial design program to be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program.
    - Cover System: The maintenance of the existing site cover to allow for restricted residential, commercial, or industrial use of the subject property.
    - Coal Tar Recovery: Installation and operation of two coal tar recovery wells along the eastern edge of the subject property bordering the Gowanus Canal, and coal tar to be collected periodically from each well.

- Institutional Control: Implementing an institutional control in the form of an environmental easement.
- Site Management Plan: Preparation of a Site Management Plan (SMP) for long term management and maintenance of Institutional and Engineering Controls.

Final Engineering Report by Langan, dated December 18, 2020

- Langan prepared this report on behalf of 450 Union LLC and 450 Union Developer LLC c/o Pilot Real Estate Group LLC (the Volunteer) to summarize and certify the remediation conducted in accordance with the aforementioned NYSDEC and NYSDOH approved 2020 RAWP.
- The RAWP was implemented between November and December 2020 and consisted of the following:
  - Implementation of a manual DNAPL recovery program utilizing two extraction wells and a bulkhead monitoring program. The recovery was planned to be completed manually, and the need for an active recovery to be determined pending on observed DNAPL recovery rates. DNAPL recovery was planned to be performed in conjunction with the new bulkhead monitoring for potential evidence of coal tar seepage at the seam between the bulkhead fence and Canal cap installed under the USEPA Superfund Program for the Gowanus Canal. The recovery program was designed to continue until target completion goals as approved by the NYSDEC.
  - Maintenance of the existing site cover system consisting of asphalt pavement for the site exterior, the existing concrete building slabs, and 2 feet of clean fill in any landscaped areas to prevent human and environmental exposure to residual contamination remaining at the subject property.
  - Surveying the new recovery wells by a New York State Professional Land Surveyor.
  - Development and execution of a CHAP, CAMP, and SSE during remediation.
  - Recording of an environmental easement as an Institutional Control.
  - Publication of an SMP for long term management of remaining contamination at the subject property as required by the Environmental Easement.
- Based on the completed remediation, a Track 4 Restricted Residential cleanup was achieved.

Site Management Plan by Langan, dated December 18, 2020

- A Site Management Plan (SMP) was prepared by Langan for long term management and maintenance of the Institutional Controls (ICs) and Engineering Controls (ECs) that were established for the subject property in accordance with the requirements

of NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 3, 2010, and the guidelines provided by the NYSDEC.

- According to the SMP, after the completion of remediation at the subject property, some contamination was left behind. Therefore, ICs and ECs were incorporated into the site remedy to control exposure to the contamination that was left behind for the protection of public health and the environment.
- An Environmental Easement was recorded with the NYC Office of the City Register on September 10, 2020.
- The ICs for the subject property include:
    - The property may be used for restricted-residential, commercial, and industrial uses (land use is subject to local zoning laws),
    - All ECs must be operated and maintained as specified in the SMP,
    - All ECs must be inspected at a frequency and in a manner defined in the SMP,
    - The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department,
    - DNAPL Recovery and other environmental or public health monitoring must be performed as defined in the SMP,
    - Data and information pertinent to site management must be reported at the frequency and in a manner as defined in the SMP,
    - All future activities that will disturb the remaining contaminated material must be conducted in accordance with the SMP,
    - Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP,
    - Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in the SMP,
    - Access to the subject property must be provided to agents, employees, or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement,
    - The potential for vapor intrusion must be evaluated for any new buildings developed within the boundaries defined in the Environmental Easement, and any potential impacts that are identified must be monitored or mitigated, and
    - Vegetable gardens and farming on the subject property are prohibited.
- The ECs for the subject property include the following:
    - A site cover system consisting of concrete building slabs, asphalt paved areas, and landscaped areas.

  - Bulkhead/Contaminant Barrier to prevent migration of coal tar DNALP between the east adjoining Gowanus Canal and the subject property,
  - A manual DNAPL recovery program to be performed using two on-site recovery wells.
- The SMP requires site-wide inspections to be performed annually as well as after all severe weather conditions that may affect ECs or monitoring devices. The SMP also requires annual inspections of the site cover and bulkhead.
- The SMP requires a manual DNAPL recovery to be performed at monthly intervals, and findings will be reported to the NYSDEC on a quarterly basis. The need for active recovery will be evaluated depending on the results.
- A Periodic Review Report (PRR) needs to be submitted to the NYSDEC beginning 16 months after the COC is issued. After the initial PRR, the next PRR needs to be submitted annually or at a frequency required by the NYSDEC.
- The SMP further requires submission of a Corrective Measures Work Plan to the NYSDEC if there is evidence that a component of the remedy is compromised or failed.

NYSDEC Brownfield Cleanup Program Certificate of Completion dated December 29, 2020

- Certificate of Completion (COC) acknowledging the remedial program for 450 Union Street has achieved a Track 4 Restricted Residential cleanup including the following categories of uses: restricted-residential, commercial, and industrial uses.
- Tax credit provisions were determined for the site preparation and on-site groundwater remediation, and tangible property credit.

Change of Use Notification and Notice of Transfer of COC dated October 24, 2022

- A Change of Use Notification was submitted to the NYSEC transfer of COC to notify the Department of the new property owner as 2201 Union LLC.
- A notice of transfer of Certificate of Completion (COC) to the new entity 2201 Union LLC was submitted to the NYSDEC on October 24, 2022.

Soil Vapor Intrusion Investigation Work Plan by Vektor dated January 9, 2023

- Vektor prepared this Soil Vapor Investigation Work Plan (SVIWP) on behalf of 2201 Union LLC to evaluate the potential for a soil vapor intrusion as per the NYSDEC-approved SMP.
- The scope of the SVIWP included a geophysical survey to locate and identify utilities in the vicinity of the proposed boring locations, installation of eight soil vapor points, and collection of eight soil vapor samples and one ambient air sample as Quality Assurance/Quality Control (QA/QC).
- The NYSDEC, in consultation with the NYSDOH, approved the SVIWP on January 30, 2023.

- The SVIWP was implemented on February 14, 2023, and the results of that investigation will be summarized in a separate Soil Vapor Investigation Report.

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 or they can adopt this HASP during the RSO Work Plan 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 RSO 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 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)*, Saranda Alka (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 Site Supervisor
- 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 Consultants, 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/Email
Project Director	Ezgi Karayel	Vektor Consultants	(347) 871-0750
Project Manager	David Klein	Vektor Consultants	(347) 871-0750
Field Representative	Saranda Alka	Vektor Consultants	(347) 871-0750
Site Health and Safety Supervisor	Saranda Alka	Vektor Consultants	(347) 871-0750
Client Contact	Sam Alison-Mayne	2201 Union LLC	(718) 222-1028
Project Manager	Angela Martin	NYSDOH	angela.martin@health.ny.gov
Project Manager	Meghan Medwid	NYSDEC	meghan.medwid@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, 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 the person responsible for providing Site information, this HASP, and any modifications to this HASP to contractors and/or subcontractors working on this Site.

3.2 Phases, Site Tasks and Hazard Analysis

This HASP applies to the Soil Vapor Investigation phase at the Site. This HASP will apply to the following Tasks and/or Operations that will be accomplished during the RI:

- Drilling (installation of soil borings, monitoring wells, and soil vapor points)
- Test pits, if necessary
- Decontamination
- Inspection
- Sampling (soil, groundwater, soil vapor, air, investigative derived waste)

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.

No chemical hazards were identified at the time this HASP was prepared.

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, rather to augment one.

3.4 Physical Hazards

Below is a list of physical hazards that may be encountered during RI activities 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

Job hazard analysis indicates that workers are not expected to encounter biological hazards during the implementation of RSO 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, RSO Work Plan activities.

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 RSO Work Plan activities to identify conditions that may cause death or serious harm and to permit preliminary selection of site controls
- Periodic monitoring throughout implementation of the RSO Work Plan

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 particulates by dust monitor

Monitoring equipment calibration and maintenance procedures on this site are:

- Every morning

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, 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, Saranda Alka (or designated alternate), Site Health and Safety Supervisor, is responsible for implementing the Emergency Response Plan and coordinating emergency response activities on this Site. Saranda Alka (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

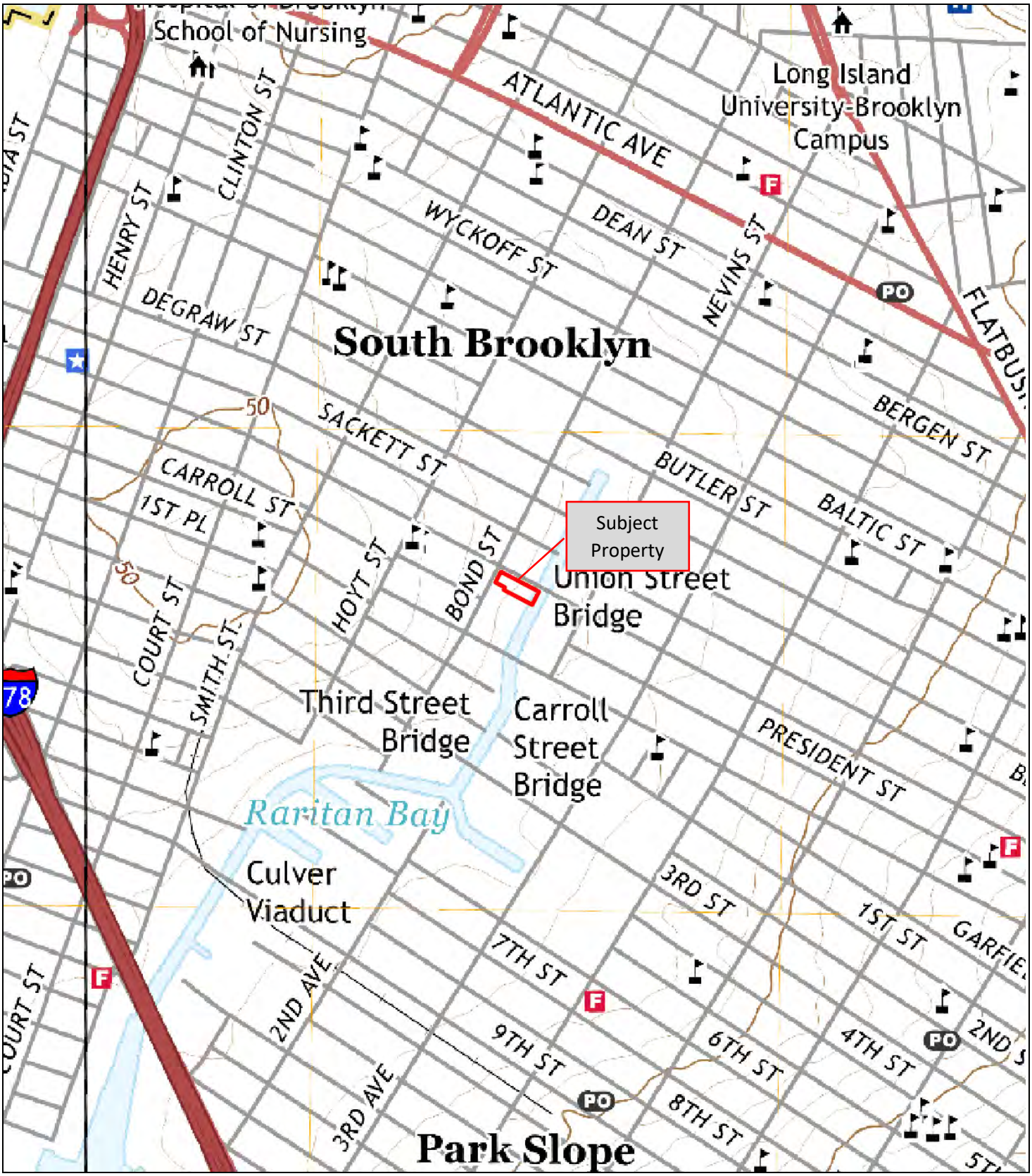
9.4 Emergency Medical Treatment and First Aid

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:

The Brooklyn Hospital Center
121 DeKalb Ave, Brooklyn, NY 11201
Tel: (718) 250-8000
Open 24 Hours

The route to the facility is shown in on the map included in Attachment 3 of this HASP.

Figure 1: Site Location
450 Union Street, Brooklyn, NY



Attachment 1

Hazardous Substance Profiles and/or 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

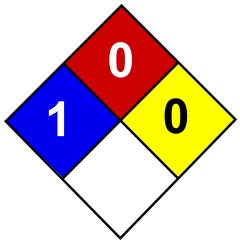
This product has a WHMIS classification of D2A.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

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



Health	1
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Lead MSDS

Section 1: Chemical Product and Company Identification

Product Name: Lead

Catalog Codes: SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

CAS#: 7439-92-1

RTECS: OF7525000

TSCA: TSCA 8(b) inventory: Lead

CI#: Not available.

Synonym: Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

Chemical Name: Lead

Chemical Formula: Pb

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Lead	7439-92-1	100

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

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

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

Serious Inhalation: Not available.

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

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

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Non-flammable in presence of open flames and sparks, of shocks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

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

Special Remarks on Fire Hazards: When heated to decomposition it emits highly toxic fumes of lead.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

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

Section 8: Exposure Controls/Personal Protection

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

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

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 0.05 (mg/m3) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m3) from OSHA (PEL) [United States] TWA: 0.03 (mg/m3) from NIOSH [United States] TWA: 0.05 (mg/m3) [Canada]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

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

Odor: Not available.

Taste: Not available.

Molecular Weight: 207.21 g/mole

Color: Bluish-white. Silvery. Gray

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

Boiling Point: 1740°C (3164°F)

Melting Point: 327.43°C (621.4°F)

Critical Temperature: Not available.

Specific Gravity: 11.3 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, excess heat

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation. Ingestion.

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

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungsby mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually abssorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, deliriuim, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead cholic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

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

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

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

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

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

Health: 1

Flammability: 0

Reactivity: 0

Specific hazard:

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

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:21 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Attachment 2

Job Hazard Analysis Worksheets

JOB HAZARD ANALYSIS WORKSHEET			
Phase Description:	GCM/DNAPL Delineation		
Task or Operation:	Mobilization, Drilling, Sampling		
Specific Location:	Entire Site		
Task or Operation Start Date(s):	March 2023	**Task or Operation Duration:**	6 Weeks
Date of Hazard Analysis:	May 2023		
Job Hazard Analysis Developed by:	EK		
Job Hazard Analysis Reviewed by:	EK		

POTENTIAL HAZARDS DURING THIS TASK and/or OPERATION			
Chemical*	**Physical**	**Biological**	**Radiological**
» VOCs » SVOCs » Metals	» 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

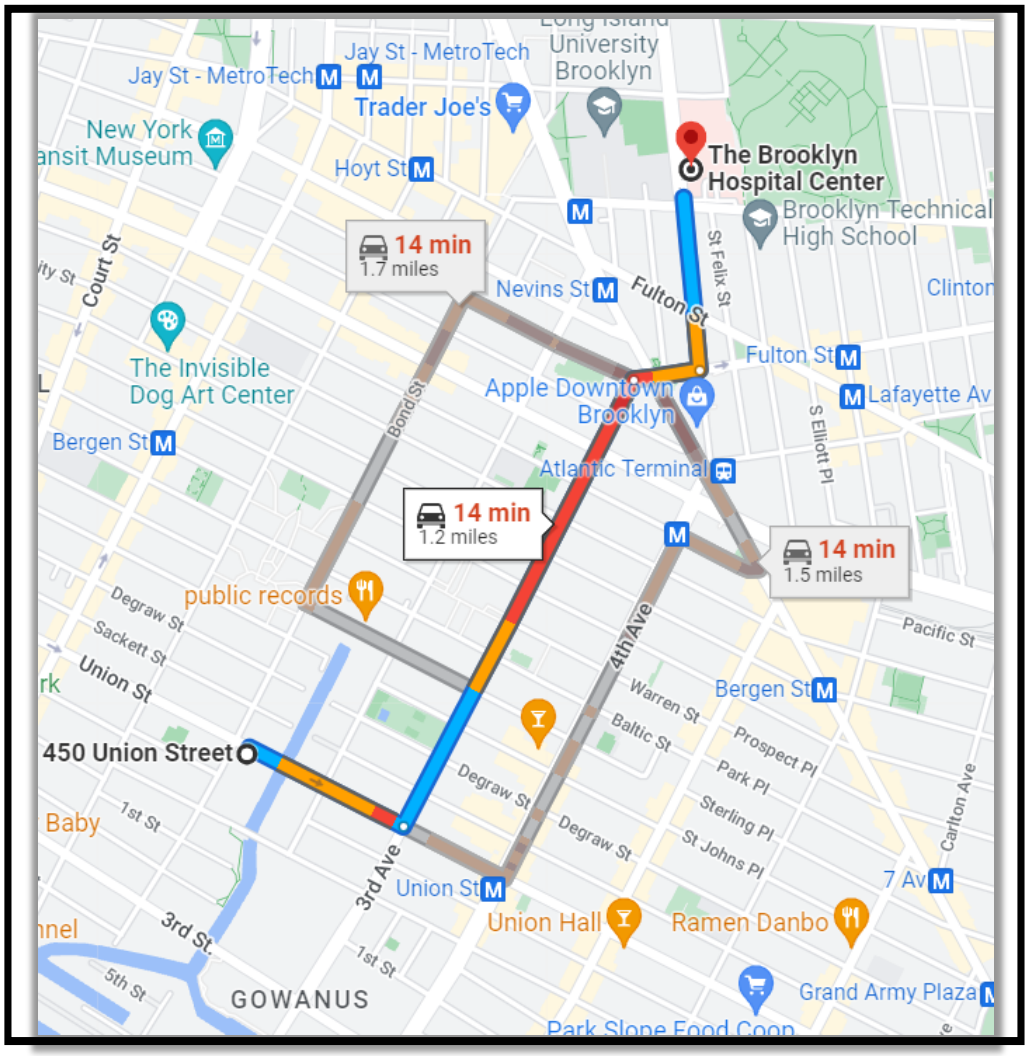
	Level C Ensemble
	Air purifying respirator - full face
	Boots, chemical-resistant, steel toe and shank
	Coveralls
	Disposable one-piece hooded chemical resistant splash clothing suit
	Escape Mask
	Gloves, inner, chemical-resistant
	Gloves, outer, chemical-resistant
	Level D Ensemble
	Dust Mask
	Escape 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



450 Union St
Brooklyn, NY 11231

1. Head southeast on Union St toward Nevins St

0.2 mi

2. Turn left at the 2nd cross street onto 3rd Ave
Pass by Fairfield Inn & Suites by Marriott New York Brooklyn (on the right)

0.6 mi

3. 3rd Ave turns right and becomes Lafayette Ave

449 ft

4. Turn left onto Ashland Pl

0.2 mi

The Brooklyn Hospital Ctr
121 DeKalb Ave, Brooklyn, NY 11201

APPENDIX D
COMMUNITY AIR MONITORING PLAN (CAMP)

vEKtor consultants

t: +1.347.871.0750 info@vektorconsultants.com
f: +1.347.402.7735 www.vektorconsultants.com

COMMUNITY AIR MONITORING PLAN

Prepared For: 2201 Union LLC

Project Name: 450 Union Street

BCP Site No: C224219

Project Location: 450 Union Street, Brooklyn, NY 11231

Date: March 2023

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

Table of Contents

1.0 INTRODUCTION

This site-specific Community Air Monitoring Plan (CAMP) has been prepared on behalf of 2201 Union LLC for the implementation of a Remedial Site Optimization (RSO) Work Plan by Vektor Consultants (Vektor) and its subcontractors at the property located at 450 Union Street in Brooklyn, New York (the Site). The Site is identified by the City of New York as Borough of Brooklyn, Tax Block 438 and Lot 7.

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.

2.0 COMMUNITY AIR MONITORING PLAN

A remedial investigation and associated interim remedial activities were conducted by Langan between February 20 and May 3, 2017 and February 22 and November 25, 2020 and the findings of their assessments were provided in a Final Engineering Report by Langan dated December 18, 2020. Prior to interim remedial measures in 2017, a soil vapor intrusion evaluation was conducted. As a result, the recommended actions ranged from 'no further action' to 'take reasonable and practical actions to identify source(s) and reduce exposures'. The petroleum-related volatile organic compounds (VOCs) identified in soil vapor were attributed to the former underground storage tank (UST) and associated impacted soil, which were removed from the Site during the 2017 Interim Remedial Measure (IRM). The chlorinated VOCs detected in soil vapor were attributed to off-site sources, as those VOCs were not detected above applicable regulatory standards in soil or groundwater samples.

Based on the endpoint soil sample results collected upon completion of 2017 and 2020 IRM, semi-volatile organic compounds (SVOCs) and metals are the constituents of concern at 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. APeriodic@ 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.

3.0 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.

4.0 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:

Meghan Medwid, EIT
Project Manager
NYSDEC Division of Remediation,
Bureau B, Section D
meghan.medwid@dec.ny.gov

Angela Martin
Project Manager
NYSDOH
angela.martin@health.ny.gov

APPENDIX A

ACTION LIMIT REPORT

CAMP
ACTION LIMIT REPORT

Project Location: 450 Union Street, 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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