REMEDIAL INVESTIGATION WORK PLAN

for

294 4th Avenue Metal Smelting & Auto Repair Site
294 4th Avenue
Brooklyn, New York 11215
BCP Site C224463

Prepared for:

294 LLC
478 Albany Avenue
Brooklyn, New York 11203

Prepared by:

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
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Project No.190140901

LANGAN

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CERTIFICATION

I, David Winslow, 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 Investigation Work Plan (RIWP) was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation.

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David Winslow, PhD, PG 136-01
Associate Principal

1.0 INTRODUCTION

This Remedial Investigation Work Plan (RIWP) was prepared on behalf of 294 LLC (the Requestor) for the property located at 294 4th Avenue in Brooklyn, New York (the site). The Requestor is submitting this RIWP as part of the Brownfield Cleanup Program (BCP) application as a Volunteer under the Brownfield Cleanup Program (BCP) and will implement this RIWP one approved by the Department.

The objective of the Remedial Investigation (RI) is to further investigate and characterize the nature and extent of environmental impacts at the site and to provide sufficient information to evaluate remedial alternatives, as required per the BCP. This RIWP was developed in accordance with the process and requirements identified in the NYSDEC Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation (May 2010) and the New York State Department of Health (NYSDOH) "Guidance for Evaluating Soil Vapor Intrusion in the State of New York, with updates" (October 2006), and the NYSDEC "Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs" (April 2023).

2.0 SITE BACKGROUND

2.1 Site Description

The about 16,435 square foot (±0.37 acre) site is identified as Brooklyn Tax Block 456, Lot 1.

The site is bound to the north by a 14-story mixed use commercial and residential building, and an undeveloped vacant property. To the east, the site is bound by 290 4th Avenue followed by an 11-story commercial and residential building. Additionally, beneath 4th Avenue to the west of the site lies an MTA subway line, which runs inline with 4th Avenue. To the south, the site is bound by 1st Street followed by 221 1st Street, a Consolidated Edison facility. The site is bound Denton Place to the west followed by 512 Carrol Street, a education and religious facility. A Site Location Map is provided as Figure 1 and a Site Plan is included as Figure 2.

2.2 Surrounding Property Land Use

The site is located in an urban setting that is characterized by residential, commercial, and industrial buildings. The following table summarizes surrounding property usage:

<table>
<tr><th>Direction</th><th>Brooklyn Borough Tax Parcel</th><th>Adjoining Properties</th><th>Surrounding Properties</th></tr>
<tr><td rowspan="2">North</td><td>3004560034</td><td>290 4th Avenue,
A 14 -story mixed-use commercial and residential building.</td><td rowspan="8">Multi-family mixed-use commercial and residential buildings and religious facilities.</td></tr>
<tr><td>3004560006</td><td>21 Denton Place,
A vacant undeveloped property.</td></tr>
<tr><td rowspan="2">East</td><td colspan="2">4th Avenue and NYCTA Subway Tunnel</td></tr>
<tr><td>3009647505</td><td>274 4th Avenue
11-story mixed-use commercial and residential building.</td></tr>
<tr><td rowspan="2">South</td><td colspan="2">1st Street</td></tr>
<tr><td>3009680001</td><td>222 1st Street,
A 7-acre Consolidated Edison property.</td></tr>
<tr><td rowspan="2">West</td><td></td><td>Denton Place</td></tr>
<tr><td>3004550001</td><td>512 Carrol Street,
An education and religious facility.</td></tr>
</table>

Land use within a half-mile of the site includes commercial, residential, industrial, institutional, and public parks. Sensitive receptors, as defined in DER-10, located within a half mile of the site include those listed below. Surrounding land use and sensitive receptors are shown on Figure 3.

Name (Approximate distance from Site)	Address
PS 282 Park Slope School (about 0.38 miles northeast of the site)	180 6th Avenue, Brooklyn, NY, 11217
PS 039 Henry Bristow (about 0.48 miles southeast of the site)	417 6th Avenue Brooklyn, NY 11215
PS 118, The Maurice Sendak Community School (about 0.32 miles east of the site)	211 8th Street Brooklyn, NY 11215

Name (Approximate distance from Site)	Address
Berkeley Carroll School – Lower School (about 0.38 miles to the east of the site)	701 Carroll Street Brooklyn, NY 11215
The Roberts Field School (about 0.50 miles east of the site)	84 7th Avenue Brooklyn, NY 11217
Bumblee Bee Daycare (about 0.07 miles north of the site	258 4th Avenue Brooklyn, NY 11215
Park Slope KinderCare (about 0.47 miles east of the site)	802 Union Street Brooklyn, NY 11215
Daycare Park Slope – Zusin Child Care Center (about 0.10 miles southeast of the site)	326 2nd Street Brooklyn, NY 11215
PS 133 William A. Butler School (about 0.40 miles north east of the site)	610 Baltic Street Brooklyn, NY 11217
Tiny Steps MB (about 0.07 miles north of the site)	256 4th Avenue Brooklyn, NY 11215
Daddy's Daycare 6 (about 0.33 miles northeast of the site)	357 Douglass Street Brooklyn, NY 11217
Daddy's Daycare 1 (about 0.33 miles south east of the site)	315 7th Street, 1st Floor Brooklyn, NY 11215

2.3 Site Physical Conditions

2.3.1 Topography

The 2023 United States Geological Survey (USGS) 7.5-minute quadrangle topographic map for Brooklyn depicts the subject property at an elevation of approximately 23 feet above mean sea level (amsl) with a gentle slope downward toward the west The regional topography slopes downward to the west towards the Gowanus canal, which is located approximately 0.22 mile west of the subject property.

2.3.2 Geology

Soil and bedrock stratigraphy throughout Brooklyn typically consists of a layer of fill material that overlies glacial till, decomposed unconsolidated bedrock, and bedrock. The United States Geological Survey (USGS) "Bedrock and Engineering Geologic Maps of New York County and Parts of Kings and Queens Counties, New York, and Parts of Bergen and Hudson Counties, New Jersey, dated 1994" indicates that the bedrock in the area is part of the Hartland Formation. The Hartland Formation is comprised of mica schist and quartz-feldspar granulite, with localized intrusions of granite and pegmatite. Based on previous investigations and Langan's experience at nearby properties, bedrock is expected at about 150 feet below grade surface (bgs).

The region has been commonly backfilled with fill material. The fill layer in the region is generally underlain by marsh/alluvial deposits and glacial outwash sands, followed by channel fill and marine deposits (Jameco Gravel and Gardiner's Clay), followed by Cretaceous age deltaic deposits. According to the Langan April 2026 Limited Phase II Environmental Site Investigation (ESA), subsurface conditions at the site consist of industrial fill materials extending from the ground surface to depths of approximately 12 feet below ground surface (bgs). The fill generally consists of brown to dark brown silty sand with varying amounts of gravel, brick, concrete, and ceramic fragments. The fill layer is underlain by brown silty sand with intermittent layers of clay and gravel, extending to the maximum explored depth of approximately 12 feet bgs. Langan observed a distinct dark black fine-grained sand layer with trace silt within the subsurface interval approximately 10 to 12 feet below ground surface (bgs).

2.3.3 Hydrogeology

Groundwater flow is typically topographically influenced, as shallow groundwater tends to originate in areas of topographic highs and flows toward areas of topographic lows, such as rivers, stream valleys, ponds, and wetlands. A broader, interconnected hydrogeologic network often governs groundwater flow at depth or in the bedrock aquifer. Groundwater depth and flow direction are also subject to hydrogeologic and anthropogenic variables such as precipitation, evaporation, extent of vegetation cover, coverage by impervious surfaces, and subsurface structures. Other factors influencing groundwater include depth to bedrock, the presence of anthropogenic fill, and variability in local geology and groundwater sources or sinks.

Based on the topography of the site and relation to the Gowanus Canal, which is about 1,100 feet west of the site, groundwater is inferred to flow west. Groundwater was encountered at depths of about 10 feet bgs during the 2022 Phase II ESA. Groundwater in Brooklyn is not used as a potable water source. Potable water provided to NYC is derived from surface impoundments in the Croton, Catskill, and Delaware watersheds.

2.3.4 Wetlands

Wetlands were evaluated by reviewing the National Wetlands Inventory and NYSDEC regulated wetlands map. There are no wetlands located on the site.

2.4 Summary of Previous Site Use

Historical records indicate that Block 456, Lot 1 has supported a range of industrial and auto-related uses dating back to the early 1900s. By the early 1920s, the site was developed with industrial structures operated by Fulton Smelting & Refining Works, Inc., which reportedly continued operations through the 1940s. Sanborn Fire Insurance Maps indicate the presence of industrial buildings and associated infrastructure during this period. By the early 1950s, the site was redeveloped and operated as a scrap metal facility, with four gasoline storage tanks depicted along the 4th Avenue frontage. From the mid-1960s, the site transitioned to wholesale and automotive-related commercial uses, including a wholesale linoleum operation, followed by auto body repair and automotive service uses beginning in the late 1970s. From approximately 1977 through the present, the site has been consistently utilized for auto-related purposes, including auto detailing, oil changes, transmission service, and car wash operations, representing a continuation of historical uses commonly associated with petroleum products, metals, and industrial chemicals.

2.5 Previous Environmental Reports

Previous environmental reports reviewed as part of this RIWP are summarized below.

Phase I Environmental Site Assessment Report, prepared by Haley & Aldrich, dated October 2022

This Phase I Environmental Site Assessment (ESA) was prepared in accordance with ASTM International Standard Practice for ESAs E1527-21, and identified the following recognized environmental conditions (REC):

1. Former Use of the Subject Property and Upgradient Properties for Industrial, Manufacturing, and Auto-Related Purposes: The subject property has historically been utilized for industrial, manufacturing, and auto-related operations. Historical records indicate that the site was previously occupied by Fulton Smelting & Refining Works, Inc., as well as a service station, auto repair facility, and auto detailing center. Facilities of this nature typically involve the use of hazardous materials, including petroleum products and chlorinated solvents. Accordingly, the historical use of the subject property and upgradient properties is considered a Recognized Environmental Condition (REC), as potential or undocumented releases of petroleum products, solvents, and/or other hazardous materials may have adversely impacted soil, groundwater, and/or soil vapor at the site.

2. Former Gasoline Storage Tanks at the Subject Property: Four gasoline storage tanks on Lot 1 are indicated on Sanborn Fire Insurance Maps from 1951 to 1965. There are no records of the installation or removal of these tanks with the New York State Department of Environmental Conservation (NYSDEC). Without proper documentation, it is unknown if these tanks were underground, the close-out status of the tanks, or if residual contamination remains in the former tank areas. Due to the dates of installation and duration of usage at the subject property, the former storage tanks are considered a REC.

Limited Subsurface Investigation (LSI) Report, prepared by Haley & Aldrich, dated October 2022

In October of 2022, Haley & Aldrich completed an LSI to evaluate subsurface soil and soil vapor conditions. The investigation consisted of the installation of three soil borings and three soil vapor points. Field observations and laboratory analytical results are summarized below:

- Fill material generally consisting of brown to dark brown silty sand with varying amounts of gravel, brick, concrete, and ceramic pieces was observed from surface grade to approximately 5 ft bgs in each soil boring. The fill layer was underlain by brown silty sand and intermittent layers of clay and gravel up to 12 ft bgs. Bedrock was not encountered before the terminus of the borings.

- Groundwater was observed at about 10 feet bgs in boring SB-1. The inferred regional groundwater flow direction for the area surrounding the site is to the west, towards the Gowanus Canal.

- Soil Analytical Results:
    - Semi-volatile organic compounds (SVOCs), specifically polycyclic aromatic hydrocarbons (PAHs) including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene, were detected in soil at concentrations exceeding the Title 6 of New York Codes, Rules, and Regulations (6 NYCRR) Part 375 Unrestricted Use (UU) and Restricted-Residential Use (RRU) Soil Cleanup Objectives (SCOs), with maximum concentrations identified in shallow soil (0 to 2 feet below ground surface [bgs]) at SB-1. Metals were also detected above UU and RRU SCOs in both shallow and deeper soils (up to 12 feet bgs), including arsenic, copper, lead, mercury, cadmium, nickel, silver, and zinc, with a notable lead concentration of up to 12,200 mg/kg identified in deeper soil (10 to 12 feet bgs) at SB-1. Additionally, toxicity characteristic leaching procedure (TCLP) lead was detected above the USEPA regulatory limit in soil at SB-1 (10 to 12 feet bgs), indicating the presence of hazardous lead in this interval. Volatile organic compounds (VOCs) were not detected above applicable SCOs; however, chlorinated VOCs (CVOCs), including trichloroethene (TCE) and tetrachloroethene (PCE), were detected at low concentrations above laboratory detection limits.
- Soil Vapor Analytical Results:
    - New York State currently does not have standards, criteria, or guidance for concentrations of VOCs in soil vapor. In lieu of regulatory standards, the Decision Matrices presented in the New York State Department of Health (NYSDOH) Soil Vapor Intrusion Guidance (October 2006, as updated) are typically used as screening criteria. Chlorinated VOCs (CVOCs), including trichloroethene (TCE) and tetrachloroethene (PCE), were detected in sub-slab soil vapor samples, with TCE detected at a maximum concentration of 515 micrograms per cubic meter (µg/m^3) in SV-2 and PCE detected at a maximum concentration of 16.3 µg/m^3 in SV-4. Additional CVOCs, including cis-1,2-dichloroethene and 1,1,1-trichloroethane, were also detected. Total VOC concentrations ranged from approximately 607.5 to 1,691.23 µg/m^3, with benzene, toluene, ethylbenzene, and xylenes (BTEX) also present, indicating impacts from both chlorinated and petroleum-related sources in soil vapor.

Soil and soil vapor results from the previous investigation are presented in Figures 4 through 6, respectively.

Phase I Environmental Site Assessment Report, prepared by Langan, dated February 2026

This Phase I Environmental Site Assessment (ESA) was prepared in accordance with ASTM International Standard Practice for ESAs E1527-21, and identified the following recognized environmental conditions (REC):

1. Historic Use: The subject property was historically used for industrial, manufacturing, and vehicle related purposes. Manufacturing and automotive-related operations typically involve the storage, handling, and use of hazardous substances, including petroleum hydrocarbons, chlorinated solvents, and related industrial chemicals. Accordingly, the historical industrial and auto-related uses of the subject property and hydraulically upgradient properties constitute a Recognized Environmental Condition (REC), as potential or undocumented releases of petroleum products, solvents, and other hazardous materials may have impacted soil, groundwater, and/or soil vapor at the site.
2. Historic Storage of Halogenated Solvents: Historic use of body/painting operations, and storage of hazardous halogenated solvents constitutes a material threat to the subject property and is considered a REC.
3. Undocumented USTs: The former gasoline storage tanks depicted on historical Sanborn maps represent a Recognized Environmental Condition (REC) because their installation, removal, and closure status are undocumented. In the absence of regulatory records confirming proper abandonment or removal, there is potential that the tanks remain in place or that releases occurred during operation or decommissioning. Given the age of the tanks and typical construction practices of that era, petroleum hydrocarbons may have impacted soil, groundwater, and/or soil vapor. Accordingly, the undocumented historical gasoline storage tanks constitute a REC due to the potential for residual petroleum contamination.
4. Chemical staining near floor drains: Staining was observed on the slab beneath certain chemical storage areas, and floor drains were present within the service areas of the building. Langan concludes that the staining represents as a REC due to the presence of floor drains at the site.
5. Current Use: The subject property is currently utilized as a car wash and automotive service facility. The use and storage of waste oils and chemical storage, and detergents and waxes commonly use PFAS, which constitutes as a REC.

Phase II Environmental Site Investigation, Prepared by Langan, Performed in April 2026

- Langan observed fill material generally consisting of brown to dark brown silty sand with varying amounts of gravel, brick, and concrete. The fill layer was underlain by brown silty sand and intermittent layers of clay and gravel up to 12 ft bgs. Bedrock was not encountered before the terminus of the borings.

- Two temporary well points were installed during the Phase II investigation. Groundwater was observed at 12.7' at the eastern end of the site and 13.6' bgs towards the western end of site.
- Soil Analytical Results
    - Semi-volatile organic compounds (SVOCs), specifically polycyclic aromatic hydrocarbons (PAHs) including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, phenanthrene, and benzo(ghi)perylene, were detected in soil at concentrations exceeding the Title 6 of New York Codes, Rules, and Regulations (6 NYCRR) Part 375 Restricted-Residential Use (RRU) Soil Cleanup Objectives (SCOs). The highest PAH concentrations were identified at location SB01 at approximately 14 to 14.5 feet below ground surface (bgs), including phenanthrene at a maximum concentration of 60 milligrams per kilogram (mg/kg), benzo(b)fluoranthene at 21 mg/kg, and benzo(a)anthracene at 20 mg/kg. Metals were also detected above applicable RRU SCOs, including arsenic, barium, cadmium, copper, lead, and mercury. Maximum metal concentrations included arsenic at 172 mg/kg, barium at 1,880 mg/kg, and mercury at 5.3 mg/kg in soil at SB01 (14 to 14.5 feet bgs), as well as copper at 2,410 mg/kg and cadmium at 3.2 mg/kg at SB02 (1 to 2 feet bgs). The highest lead concentration was identified in duplicate sample SODUP01_042826 at a concentration of 2,900 mg/kg. No volatile organic compounds (VOCs) or polychlorinated biphenyls (PCBs) were identified above applicable SCOs in the analyzed soil samples
- Groundwater Analytical Results
    - Groundwater analytical results identified concentrations of semi-volatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs) such as benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, phenol, and naphthalene, at concentrations exceeding the New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (AWQS) in groundwater samples collected from temporary well points TWP-01 and TWP-02. The highest PAH concentrations were identified in groundwater sample TWP-01_042726, including benzo(a)anthracene at 0.45 micrograms per liter (µg/L), chrysene at 0.44 µg/L, benzo(b)fluoranthene at 0.36 µg/L, and benzo(a)pyrene at 0.29 µg/L. Petroleum-related volatile organic compounds (VOCs), including benzene, isopropylbenzene, n-propylbenzene, p/m-xylene, and 1,2,4,5-tetramethylbenzene, were also

detected above applicable AWQS in groundwater at TWP-01, with maximum concentrations including n-propylbenzene at 22 µg/L, isopropylbenzene at 21 µg/L, and benzene at 4.8 µg/L

Metals were detected above applicable AWQS in groundwater samples collected from both TWP-01 and TWP-02, including arsenic, iron, lead, magnesium, manganese, mercury, nickel, selenium, and sodium. The highest concentrations were identified for sodium at 1,060,000 µg/L and iron at 33,100 µg/L in sample TWP-01_042726. Elevated lead concentrations of up to 122.1 µg/L were identified in TWP-02_042826, while arsenic was detected at a maximum concentration of 125 µg/L in TWP-01_042726. Groundwater analytical results indicate the presence of petroleum-related impacts, PAH contamination, and dissolved metals in site groundwater.

2.6 Areas of Concern

The following area of concern (AOC) was identified based on a review of previous environmental reports and site observations and will be further investigated during the RI. AOCs are shown on Figure 7.

AOC 1: Site-Wide SVOC-Impacted Soil and Groundwater

Analytical results identified semi-volatile organic compound (SVOC) impacts associated with historic fill material and former site use in both soil and groundwater. Polycyclic aromatic hydrocarbons (PAHs), including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene, were detected in soil at concentrations exceeding NYSDEC Part 375 Protection of Groundwater (PGW), Restricted-Residential Use (RR), Commercial Use (CU), and Industrial Use (IU) Soil Cleanup Objectives (SCOs). Groundwater analytical results also identified PAHs and other SVOCs above applicable NYSDEC TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values (AWQS), indicating impacts associated with historic fill material and former industrial/commercial site operations.

AOC 2: Site-Wide Metal Impacted soil and groundwater

Analytical results identified metals impacts associated with historic fill material and former industrial and automotive-related site use in both soil and groundwater. Metals including arsenic, barium, cadmium, copper, lead, and mercury were detected in soil at concentrations exceeding NYSDEC Part 375 Protection of Groundwater (PGW), Restricted-Residential Use (RR), Commercial Use (CU), and Industrial Use (IU) Soil Cleanup Objectives (SCOs). Elevated lead concentrations were identified throughout the site, with a maximum concentration of approximately 2,900 milligrams per kilogram (mg/kg) identified in soil. In addition, toxicity characteristic leaching procedure (TCLP) analytical results identified lead at concentrations exceeding USEPA hazardous waste regulatory thresholds, indicating the presence of hazardous lead-impacted soil associated with historic fill and former industrial operations. Dissolved and total metals including arsenic, iron, lead, manganese, mercury, nickel, selenium, and sodium were also detected in groundwater at concentrations exceeding applicable NYSDEC TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values (AWQS). Elevated lead concentrations in groundwater, with concentrations up to approximately 122 micrograms per liter (µg/L), indicate dissolved metals impacts associated with historic industrial/commercial operations and historic urban fill material.

<u>AOC 3: Former USTs</u>

Historical Sanborn Fire Insurance Maps reviewed as part of the Phase I Environmental Site Assessments identified four former gasoline underground storage tanks (USTs) located along the 4th Avenue frontage of the site between approximately 1951 and 1965. Although the USTs are no longer depicted on subsequent historical mapping and are not believed to remain in active use, no documentation regarding the tanks' installation, removal, abandonment, or regulatory closure was identified during the records review. In the absence of closure documentation, the former gasoline USTs represent an AOC due to the potential for historic petroleum releases to have impacted soil, groundwater, and/or soil vapor beneath the site. Given the age of the tanks, the duration of historic automotive and gasoline-related operations at the property, and the presence of documented petroleum-related impacts identified during previous environmental investigations, the former UST area is considered a potential source area requiring further evaluation during remedial investigation activities.

<u>AOC 4: Active AST use</u>

The subject property currently utilizes aboveground storage tanks (ASTs) for the temporary storage of used oil generated from ongoing automotive service and vehicle maintenance operations. The AST system and associated used oil handling activities represent an AOC, as historical or ongoing releases associated with AST systems, transfer activities, or ancillary piping may have adversely impacted soil, groundwater, and/or soil vapor beneath the property. Given the long-standing automotive use of the site and the documented presence of petroleum-related contamination identified during previous investigations, the used oil AST area is considered a potential source area for petroleum-related impacts requiring further evaluation during remedial investigation activities.

AOC 5: Vehicle Cleaning Chemical and Automotive Fluid Drum Storage Areas

Vehicle cleaning chemicals, detailing products, and automotive fluids are stored throughout the property in drums and other chemical storage containers in support of ongoing car wash and automotive service operations. These storage areas represent an Area of Concern (AOC), as historical or ongoing releases associated with chemical handling, drum storage, dispensing activities, and incidental spills may have adversely impacted soil, groundwater, and/or soil vapor beneath the site. Previous site reconnaissance identified staining in the vicinity of certain storage areas and floor drains within active service areas, indicating the potential for migration of petroleum-related constituents, solvents, detergents, and other automotive-related chemicals to the subsurface. Given the long-term automotive and car wash operations conducted at the property, the drum storage areas are considered potential source areas requiring further evaluation during remedial investigation activities.

AOC 6: Car Wash and Vehicle Detailing Operations (Potential PFAS Source Area)

Chemicals and materials historically and currently used as part of the car wash and vehicle detailing operations represent a potential source of per- and polyfluoroalkyl substances (PFAS) release at the site. Automotive cleaning products, including detergents, waxes, polishes, tire cleaners, surface protectants, water repellents, and degreasing agents, have historically contained fluorinated compounds due to their surfactant, stain-resistant, and water-repellent properties. The long-term use, storage, handling, and disposal of these products within active wash and service areas may have resulted in releases to the subsurface through spills, floor drains, wash water discharge, and infiltration through historic floor drain systems and utility penetrations. Given the persistence and mobility of PFAS compounds in the environment, historical and ongoing car wash operations are considered a potential source area for PFAS impacts to soil and groundwater beneath the site

AOC 7: Floor Drain and Trench Drain Systems

Floor drains and trench drains associated with the vehicle service and car wash operations represent potential preferential pathways for contaminant migration to the subsurface. Historical and ongoing discharge of wash water, petroleum-related fluids, detergents, solvents, and other automotive-related chemicals to these drainage systems may have resulted in releases to underlying soil and groundwater through deteriorated piping, historical leakage, or undocumented dry wells and subsurface discharge structures. Site reconnaissance identified floor drains within active service areas in the vicinity of chemical and fluid storage areas, as well as staining on the surrounding concrete slab, indicating the potential for historical releases associated with these systems. Given the long-term automotive and car wash use of the property, the floor and trench drain network is considered a potential source area and contaminant migration pathway requiring further evaluation during remedial investigation activities.

3.0 SCOPE OF INVESTIGATION

The objective of this RIWP is to supplement the data from the Haley and Aldrich 2022 LSI and Langan 2026 Phase II investigation, and to further investigate and characterize the nature and extent of the contamination at and/or emanating from the brownfield site, per Environmental Conservation Law (ECL) Article 27, Title 14 (BCP). The field investigation will include the tasks listed below to supplement the data and findings of previous investigations. Proposed sample locations are shown on Figure 7. The rationale for each sampling location in relation to the AOC and analytical parameters for each proposed sample are provided in Tables 1, 2, and 3.

<u>Building Demolition</u>

- The building will be demolished, and all hazardous building materials will be abated in accordance with local, state and federal requirement so allow access to the site for the remedial investigation.

<u>Geophysical Survey</u>

- Complete a supplemental geophysical survey to clear sample locations of underground utilities and scan the site for anomalies consistent with underground storage tanks (UST).

<u>Soil Borings and Sampling</u>

- Advance at up to 12 soil borings below the observed terminus of historic fill, which is assumed to be between 20 and 25 feet bgs. Soil borings to be converted to groundwater monitoring wells will be advanced to at least 5 feet below the observed groundwater interface.
- Collect up to three soil samples from each boring location (plus quality assurance/quality control [QA/QC] samples) for laboratory analysis.

<u>Monitoring Well Installation and Groundwater Sampling</u>

- Install and develop three monitoring wells.
- Collect one groundwater sample from each newly installed monitoring well (plus QA/QC samples) for laboratory analysis.
- Two groundwater samples will be collected from targeted intervals using SP-16 methods via geoprobe. Intervals to be targeted will be from 5-10 feet into the groundwater table and 15-20 feet into the groundwater table. Analysis of the targeted intervals will consist of CVOCs/VOCs.
- Survey and gauge newly installed monitoring wells to evaluate groundwater elevation and establish flow direction.

Soil Vapor and Ambient Air Sampling

- Install five soil vapor sampling points to 5 feet bgs or 2 feet above the groundwater table, whichever is shallower.
- Collect one soil vapor sample from each soil vapor point and one outdoor ambient air sample for laboratory analysis.
- If the building is not demolished prior to the remedial investigation, Langan will instead collect three sub slab samples and two soil vapor samples.

Modifications to this scope of work may be required: 1) due to site operations, equipment, or restrictions; 2) if unexpected contamination is detected and additional analytical data is needed to characterize the site; and 3) to confirm that impacts are adequately characterized and delineated in compliance with the Brownfield Law, regulations, and applicable investigation guidance documents (e.g., DER-10). NYSDEC and NYSDOH will be contacted to obtain approval for these modifications, and all modifications will be reflected in the Remedial Investigation Report (RIR).

The field investigation will be completed in accordance with the procedures specified in Langan's Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP) provided in Appendices A and B, respectively. A Community Air Monitoring Plan (CAMP) will be implemented during this investigation (see Section 3.7.2 and Appendix C).

Names, contact information, and roles of the principal personnel who will participate in the investigation, including laboratory subcontractor, are listed below. Résumés for each Langan employee are provided in the QAPP (Appendix B).

Personnel	Investigation Role	Contact Information
David Winslow, QEP Langan	Qualified Environmental Professional	Phone – 212-479-5404 Email – dwinslow@langan.com
Matthew Del Balzo Langan	Project Manager	Phone – 914-323- 7428 Email – mdelbalzo@langan.com
Tony Moffa, CHMM Langan	Langan Health & Safety Officer	Phone – 215-491-6500 Email – tmoffa@langan.com
Bill Bohrer Langan	Field Safety Officer	Phone – 410-984-3068 Email – wbohrer@langan.com
Shawn Martin Langan	Field Team Leader	Phone –973-385-8196 Email – shmartin@langan.com
Gerald Nicholls, PE, CHMM Langan	Quality Assurance Officer	Phone – 212-479-5404 Email – gnicholls@langan.com
Joe Conboy Langan	Data Validator/Program Quality Assurance Monitor	Phone – 609-282-8055 Email – jconboy@langan.com
Ben Rao York Laboratory	Laboratory	Phone – 201-812-2633 Email – Benjamin.Rao@pacelabs.com

3.1 Site Building Demolition

The existing building is anticipated to be demolished prior to implementation of the remedial investigation activities. Demolition activities will be conducted by qualified contractors in accordance with applicable local, state, and federal regulatory requirements, including implementation of appropriate health and safety measures. Building materials and demolition debris generated during the work will be properly characterized, segregated as necessary, and transported off-site for disposal or recycling at appropriately permitted facilities. Any regulated materials encountered during demolition will be managed in accordance with applicable handling, transportation, and disposal requirements. Dust suppression and debris control measures will also be implemented during demolition activities to minimize the potential for off-site impacts.

3.2 Geophysical Survey

A geophysical survey will be completed to clear sample locations of underground utilities and scan the site for anomalies consistent with USTs. The survey will be performed with ground-penetrating radar and electromagnetic detection equipment.

3.3 Soil Investigation

3.3.1 Drilling and Logging

An environmental drilling subcontractor will advance twelve soil borings (SB08 through SB19) as part of the RI to supplement findings from the 2022 LSI and 2026 Phase II ESI. Soil borings will be advanced below the native material to a depth of 25 feet bgs. The purpose of these borings is to further investigate AOC 1 identified in Section 2.7 and supplement the LSI data. A plan showing the proposed boring locations is provided as Figure 7. Table 1 summarizes the anticipated soil samples and analytical methodologies.

The soil borings will be advanced using direct-push drilling technology. The direct-push drill rig will be equipped with a closed-point Macro-Core sampler to prevent the collapse of sidewall material as borings are advanced. Langan field personnel will document the work, screen the soil samples for environmental impacts, and collect soil samples for laboratory analyses per Section 3.2.2. Soil will be screened continuously to the boring termination depth for organic vapors with a photoionization detector (PID) equipped with a 10.6 electron volt (eV) bulb, and for visual and olfactory indications of environmental impacts (e.g., staining and odors). Soil descriptions will be recorded in a field log. Work will comply with the safety guidelines outlined in the HASP (Appendix A).

Non-disposable, down-hole drilling equipment and sampling apparatus will be decontaminated between locations with Alconox (or similar) and water.

3.3.2 Soil Sampling and Analysis

Up to three grab soil samples will be collected for laboratory analysis from each boring location to further investigate AOC 1. Samples will be collected from up to three of the following intervals:

1. From the an interval above the water table characterized by the greatest observations of impacts.
2. From the native interval beneath the terminus of visually impacted
3. From the interval exhibiting the highest PID readings, olfactory evidence of visual evidence of contamination.

Soil samples will be collected into laboratory-supplied containers and will be sealed, labeled, and placed in a cooler containing ice (to maintain a temperature of approximately 4° Celsius) for delivery to York Analytical Laboratories, Inc. (York), a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified analytical laboratory. Soil samples will be analyzed for 6 NYCRR Part 375 VOCs via USEPA Method 8260, SVOCs via USEPA Method 8270, pesticides and herbicides via USEPA Method 8081B and 8151A, respectively, PCBs via USEPA Method 8082, metals via USEPA Method 6010 (including hexavalent and trivalent chromium), 1,4-dioxane via USEPA Method 8270D, cyanide via USEPA Method 9010C, and PFAS via USEPA Method 1633. QA/QC procedures to be followed are described in the QAPP provided as Appendix B.

3.4 Groundwater Investigation

3.4.1 Monitoring Well Installation

Proposed monitoring well locations are shown on Figure 7. Table 2 summarizes the anticipated groundwater samples and analytical methodologies.

During well installation, soil conditions will be screened, logged, and sampled as described in Section 3.2. The monitoring wells will be constructed to penetrate a minimum of 10’ past the observed groundwater interface.

Monitoring wells will be constructed with 2-inch-diameter, threaded, flush-joint, polyvinyl chloride (PVC) casing and 0.01-inch-slot well screens. Clean sand (e.g., Morie No. 2) will be used to backfill the annulus around the screen up to about 2 feet above the top of the screened interval. A 2-foot-thick bentonite seal will be installed above the sand, and the remaining borehole annulus will be backfilled with drill cuttings with no evidence of petroleum impacts (i.e., staining, odors, or PID readings above background) to within 12 inches of the surface and/or grouted to the surface with bentonite and cement slurry. The wells will be finished with flush-mounted well caps. Following installation, the wells will be developed via a surge block and/or a weighted bailer across the well screen to agitate and remove fine particles. The surge block and/or bailer will be surged across the submerged well screen in 2- to 3-foot increments for approximately 2 minutes per increment. After surging, the well will be purged via pumping until the water becomes clear. The well will then be allowed to sit for a minimum of one week before sampling.

3.4.2 Groundwater Sampling and Analysis

One groundwater sample will be collected from each newly-installed monitoring well. Prior to sampling, the monitoring wells will be synoptically gauged for static water levels and each well will be purged. Physical and chemical parameters (e.g., temperature, dissolved oxygen, oxidation-reduction potential, pH, turbidity) will be allowed to stabilize to the ranges specified in the USEPA Low Stress Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, dated July 30, 1996 and revised September 19, 2017. If stabilization is not achieved after one hour, samples will be collected. The groundwater samples will be collected in accordance with the sampling protocols for PFAS in monitoring wells delineated in the NYSDEC's April 2023 Sampling, Analysis, and Assessment of PFAS guidance document. Samples will be collected with a submersible monsoon pump or equivalent and dedicated polyethylene tubing. The pump will be decontaminated with Alconox (or similar) and water between each sample location. Development and purge water will be containerized for off-site disposal.

Groundwater samples will be collected into laboratory-supplied containers and will be sealed, labeled, and placed in a cooler containing ice (to maintain a temperature of approximately 4 degrees Celsius) for delivery to a NYSDOH ELAP-certified analytical laboratory. Groundwater samples will be analyzed for the 6 NYCRR Part 375 and Target Compound List (TCL) VOCs, SVOCs, PCBs, pesticides, and herbicides, and Target Analyte List (TAL) metals (field-filtered [dissolved]) including hexavalent and trivalent chromium, and cyanide. Additionally, groundwater samples will be collected and analyzed for emerging contaminants, including 1,4-dioxane by USEPA Method 8270D-Selected Ion Monitoring (SIM) and PFAS listed by the NYSDEC by USEPA Method 1633. QA/QC procedures are described in the QAPP provided as Appendix B.

Four multilevel groundwater samples will be collected for volatile organic compound (VOC) analysis using the SB-16 Geoprobe® groundwater sampling system. The multilevel sampling approach will allow for the collection of discrete groundwater samples at varying depth intervals within a single boring location to evaluate the vertical distribution of potential VOC impacts within the aquifer. Sampling locations and target depth intervals will be selected in the field based on site hydrogeologic conditions, observed lithology, and field screening observations. Groundwater samples will be submitted for laboratory analysis of VOCs in accordance with applicable NYSDEC analytical methods and protocols. All sampling activities will be performed in general accordance with the approved work plan and standard industry practices to ensure representative sample collection and minimize the potential for cross-contamination.

3.4.3 Monitoring Well Survey and Synoptic Gauging

Langan will survey the vertical location of the monitoring wells, including ground surface elevation, and inner casing elevation. This data will be used with the groundwater well gauging data to prepare a groundwater contour map depicting the elevation of the water table across the site. Vertical control will be established by surveying performed relative to NAVD88 by a New York State-licensed land surveyor. Elevations will be surveyed to the nearest 0.01 foot. A synoptic gauging event will be performed to document static water levels. All accessible wells will be gauged during this event. Obstacles obstructing access to monitoring wells will be addressed prior to the gauging event.

3.5 Soil Vapor Investigation

3.5.1 Soil Vapor Point Installation

Four temporary soil vapor points (SV01, SV02, SV03, and SV04) will be installed using direct-push technology in accordance with the NYSDOH's "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (October 2006, updated February 2024) (NYSDOH Soil Vapor Guidance). The proposed soil vapor sample locations are shown on Figure 6. Table 3 summarizes the anticipated soil vapor samples and analytical methodologies.

Soil vapor points will be installed to about 5 feet below grade surface or 2 feet above the groundwater table, whichever is shallower, in accordance with the October 2006 NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, revised February 2024. The soil vapor points will consist of a dedicated 1-7/8-inch polyethylene implant threaded into polyethylene tubing that will extend to surface grade. A clean sand filter pack will be placed around the screen implant and the remaining annular space will be sealed with hydrated bentonite.

A seal check will be performed at each installed soil vapor point with a helium tracer gas before and after sample collection. Prior to sampling, three tubing volumes will be purged from the sub-slab vapor point using a multi-gas monitor, with a flow rate of about 0.15 liters per minute (not to exceed 0.2 liters per minute). The multi-gas monitor will also be used to screen the vapor for the presence of VOCs.

If the existing building remains present during implementation of the remedial investigation, additional vapor intrusion assessment activities will be required in accordance with applicable NYSDEC guidance. Specifically, the investigation will include the collection of three sub-slab soil vapor samples beneath the building slab and three exterior soil vapor samples to evaluate potential vapor migration conditions. In conjunction with the sub-slab investigation, indoor air sampling will also be conducted within the building to assess potential vapor intrusion into occupied spaces. The sampling program will be completed using NYSDEC-approved procedures and methodologies to support evaluation of subsurface vapor conditions and potential exposure pathways associated with the site.

3.5.2 Soil Vapor Sampling and Analysis

Samples will be collected in accordance with the NYSDOH Soil Vapor Guidance. Before collecting vapor samples, a minimum of three vapor probe volumes (i.e., the volume of the sample implant and tubing) will be purged from each sample point at a flow rate of about 0.15 liters per minute (not to exceed 0.2 liters per minute) using a RAE Systems MultiRAE meter. Purged soil vapor will be monitored for VOCs with the MultiRAE during this process.

A construction and sampling log for each soil vapor sample will be completed to record sample identification; date and time of sample collection; sampling depth; name of the field personnel responsible for sampling; sampling methods and equipment; vapor purge volumes; volume of vapor extracted; flow rate; and vacuum of canisters before and after sample collection.

After the integrity of each seal is confirmed, soil vapor samples will be collected into laboratory-supplied batch-certified clean 2.7- or 6-liter air canisters equipped with 2-hour sample interval flow controllers. Soil vapor samples will be analyzed for VOCs by USEPA Method TO-15.

3.5.3 Ambient Air Sampling

One ambient air sample will be collected at a height above the ground to represent the breathing zone (about 3 to 5 feet). The air sample will be collected concurrently with the soil vapor samples over a 2-hour sampling period and analyzed for VOCs by USEPA TO-15 to evaluate potential outdoor air interferences with the sampling apparatus.

QA/QC procedures to be followed are described in the QAPP in Appendix B.

3.5.4 Indoor Air Sampling

If the building is still present indoor air sampling will be performed in accordance with New York State Department of Environmental Conservation (NYSDEC) sampling procedures. Sampling will be conducted within existing on-site structures to evaluate potential vapor intrusion conditions. The current site structures is anticipated to be removed and/or demolished following implementation of the RIWP; however, indoor air data will be collected if the building is still present.

3.6 Data Management and Validation

Laboratory analyses of soil, groundwater, vapor, and air samples will be conducted by a NYSDOH ELAP-approved laboratory in accordance with USEPA SW-846 methods and NYSDEC Analytical Services Protocol (ASP) Category B deliverable format. Environmental data will be reported electronically using the database software application EQuIS as part of NYSDEC's Environmental Information Management System (EIMS).

Tables 1, 2, and 3 summarize the proposed samples and laboratory analyses. QA/QC procedures required by the NYSDEC ASP and SW-846 methods, including initial and continuing instrument calibrations, standard compound spikes, surrogate compound spikes, and analysis of other samples (blanks, laboratory control samples, and matrix spikes/matrix spike duplicates), will be followed. The laboratory will provide sample bottles, which will be pre-cleaned and preserved in accordance with the SW-846 methods. Where there are differences in the SW-846 and NYSDEC ASP requirements, the NYSDEC ASP shall take precedence.

Data validation will be performed for all data collected during the LSI and RIWP in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:

- Verification of QC sample results (both qualitative and quantitative).
- Verification of sample results (both positive hits and non-detects).
- Recalculation of 10 percent of all investigative sample results.
- Preparation of Data Usability Summary Reports (DUSRs).

The DUSRs will be prepared and reviewed by the Program Quality Assurance Monitor (PQAM). The DUSRs will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody (COC) procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each sample delivery group (SDG) will follow. Additional details on the DUSRs are provided in the QAPP in Appendix B.

3.7 Management of Investigation-Derived Waste

Investigation-derived wastes (IDW) (i.e., grossly-contaminated soil cuttings and purge water) will be containerized and staged on-site, pending proper disposal at an off-site facility. Soil cuttings with no apparent staining, odors, or elevated PID readings will be used to backfill boring holes. Soil to be disposed off-site will be placed in 55-gallon, United Nations/Department of Transportation (UN/DOT)-approved drums. Decontamination fluids, if necessary, will be placed in UN/DOT-approved fluid drums with closed tops. All drums will be properly labeled, sealed, and characterized as necessary. If RI analytical data is insufficient to gain disposal facility acceptance, waste characterization samples will be analyzed for parameters that are typically required by disposal facilities, such as TCL VOCs, SVOCs, metals, PCBs, pesticides, herbicides, Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, RCRA characteristics including ignitability, corrosivity and reactivity, and paint filter. Additional sampling and analyses may be required based on the selected disposal facility. Waste characterization samples will be submitted to York for analysis in accordance with the QAPP provided in Appendix B. Management of IDW will comply with NYSDEC DER-10 3.3(e).

3.8 Air Monitoring

Air monitoring will be conducted for site personnel and the community (CAMP). Fugitive particulate (dust) generation that could affect site personnel or the public is not expected because intrusive work is limited to boring, monitoring well, and soil vapor point installation, which does not disturb large volumes of soil.

Dust emissions will be monitored using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10). Organic odors will be monitored with a PID. Dust and odor suppression measures (e.g., water misting, odor suppressant) will be implemented as required. All PIDs used will be equipped with a 10.6 eV bulb.

3.8.1 Personnel Air Monitoring

Langan will conduct air monitoring of the breathing zone periodically during drilling and sampling activities to evaluate health and safety protection for the field personnel. Initially, ambient air monitoring will be performed within the work area. Langan will monitor VOCs with a PID (MultiRAE 3000 or similar) in accordance with the HASP (Appendix A). If air monitoring during intrusive operations identifies the presence of VOCs, on-site personnel will follow the guidelines outlined in the HASP regarding action levels, permissible exposure, engineering controls, and personal protective equipment. If the VOC action level is exceeded, work will cease, and the work location will be evacuated. Monitoring will be continued until the levels drop to safe limits. At that time, work can resume with continued monitoring. If high levels persist, field activities will be halted, and the work relocated to another area. If dust emissions are observed, work will stop, and dust suppression measures will be used.

3.8.2 Community Air Monitoring Plan

In addition to air monitoring in the worker breathing zone, Langan will conduct community air monitoring in compliance with the NYSDOH Generic CAMP. CAMP deployment will comply with NYSDEC DER-10 Appendix 1A and Appendix 1B. The CAMP is included in Appendix C and summarized below.

Langan will conduct monitoring for VOCs during ground-intrusive work (i.e., soil boring advancement and monitoring well installation). Langan will measure upwind concentrations at the start of each workday to establish background concentrations. Langan will continuously monitor VOCs at the downwind perimeter of the work zone, which will be established at a point on the site where the general public or site employees may be present. Monitoring for VOCs will be conducted with a PID. Dust emissions will be monitored using real-time monitoring equipment capable of measuring PM-10 (e.g., DustTrak). If dust emissions are observed, work will stop, and dust suppression measures will be used. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements will be determined in consultation with NYSDOH.

3.9 Green Remediation Standards

Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per the NYSDEC DER-31 Green Remediation Policy (DER-31). DER-31 requires the following green remediation/sustainability concepts be considered and/or implemented, to the extent feasible, during investigations:

- Increase energy efficiency/minimize total energy use and direct and indirect CO2/greenhouse gas (GHG) emissions to the atmosphere
- Reduce emissions of air pollutants
- Minimize habitat disturbance and create or enhance habitat or usable land

- Conserve natural resources such as soil and water; promote the sequestration of carbon through reforestation or afforestation
- Minimize fresh water consumption and maximize water reuse during daily operations and treatment processes
- Prevent long-term erosion, surface runoff, and off-site water quality impacts Prevent unintended soil compaction
- Minimize waste or implement beneficial use of materials that would otherwise be considered a waste
- Minimize equipment and truck idling and use sustainably produced biofuels to reduce discharges of pollutants and GHGs to the atmosphere
- Utilize clean diesel (new or retrofitted) equipment to reduce emissions to the atmosphere
- Minimize truck travel for disposal to save energy, reduce emissions, reduce localized noise, vibration, and wear and tear on roads
- Minimize use of heavy equipment to save energy and reduce emissions

During implementation of this RIWP, the following elements will be implemented, to the extent feasible, to reduce greenhouse gas and other emissions:

- Use of Ultra Low Sulfur Diesel in vehicles and machinery by drilling contractor
- Use of diesel exhaust purifier scrubbers on machinery (drill rigs) by drilling contractor
- Minimization of idling of all vehicles (including construction equipment) in accordance with 6 NYCRR Part 217 Motor Vehicle Emissions, Subpart 217-3 Idling Prohibition for Heavy Duty Vehicles
- Reduction of materials consumption and off-site transport by reuse of non-impacted drilling spoils as backfill within the boring of origin and containerization of drilling spoils exhibiting visual, olfactory, and instrumental signs of contamination.

3.10 Qualitative Human Health Exposure Assessment

A Qualitative Human Health Exposure Assessment (QHHEA) will be conducted in accordance with Appendix 3B of the NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation. The assessment will be submitted in the RIR.

4.0 REPORTING

4.1 Remedial Investigation Report

Following completion of the RI and receipt of analytical data, an RIR will be prepared in accordance with the applicable requirements of DER-10 Section 3.14. The report will:

- Describe site history and previous investigations
- Describe site environmental conditions
- Describe sampling methodology and field observations
- Evaluate analytical results and describe findings, including validated Category B laboratory deliverables for data from the LSI
- Provide conclusions and recommendations for any further assessment (if warranted), and remedial action objectives

The report will summarize the nature and extent of contamination at each AOC and identify unacceptable exposure pathways (as determined through a QHHEA). DUSRs will be included in the RIR, and electronic data deliverables will be submitted to the NYSDEC EQuIS database prior to submission of the draft RIR.

The report will include soil boring and well construction logs, sampling logs, tabulated analytical results, figures, and laboratory data packages. The tabulated analytical results will be organized in table format and include sample location, media sampled, sample depth, field/laboratory identification numbers, analytical results and the applicable Standards, Criteria, and Guidance (SCG) pertaining to the site and contaminants of concern for comparison. The report will include scaled figures showing the locations of soil borings, monitoring wells, and soil vapor points, sample concentrations above SCGs for each media, groundwater elevation contours and flow direction, and if appropriate, groundwater contaminant concentration contours.

The RIR will be provided in an electronic format to the NYSDEC.

4.2 Daily Reports

Daily reports will be prepared and submitted to the NYSDEC and NYSDOH project managers the following week after the reporting period and will include:

- An update of progress made during the reporting day
- Photographic documentation of the activities completed during the reporting day
- Identification of samples collected during the reporting day
- Locations and references to a site map for completed activities
- A summary of any and all complaints with relevant details, including contact information

- A summary of CAMP findings, including elevated concentrations and response actions, if any
- An explanation of notable site conditions
- A list of anticipated work for the following reporting day

Daily reports are not intended to notify the NYSDEC of emergencies (e.g., accident, spill), request changes to the RIWP, or communicate other sensitive or time-critical information. However, such conditions will also be included in the daily reports. Emergency conditions and changes to the RIWP will be communicated directly to the NYSDEC Project Manager.

The NYSDEC-assigned project number will appear on all reports.

4.3 Monthly Reports

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

- Activities relative to the site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed (e.g., tons of material exported and imported)
- Description of approved activity modifications, including changes of work scope and/or schedule
- Sampling results received following internal data review and validation, as applicable
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays

4.4 Other Reporting

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

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

5.0 SCHEDULE

It is anticipated that the RIWP will be implemented immediately upon approval from the NYSDEC.

Figures

Notes:
1. Brooklyn USGS Quadrangle Map
Topographic basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online
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LANGAN	Project	Figure Title	Project No.	Figure
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.	**294 4TH AVENUE**	**SITE LOCATION MAP**	190140901	1
368 Ninth Avenue, 8th Floor New York, NY 10001-2727	BLOCK No. 456, LOT No. 1 BROOKLYN		Date 5/11/2026	
T: 212.479.5400 F: 212.479.5444 www.langan.com	KINGS COUNTY NEW YORK		Scale 1" = 2,000 feet	
			Drawn By GS	

Path: \\langan.com\data\WPW\data9\190140901\Project Data\ArcGIS\APRX\190140901\190140901.aprx

Legend

Approximate Brownfield Cleanup Program Site Boundary

Notes:
1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 7/3/2025.
2. Parcel data provided by the New York City Department of City Planning.

WARNING: It is a violation of the NYS Education Law Article 145 for any person, unless acting under the direction of a licensed professional engineer, land surveyor or geologist, to alter this item in any way.

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Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
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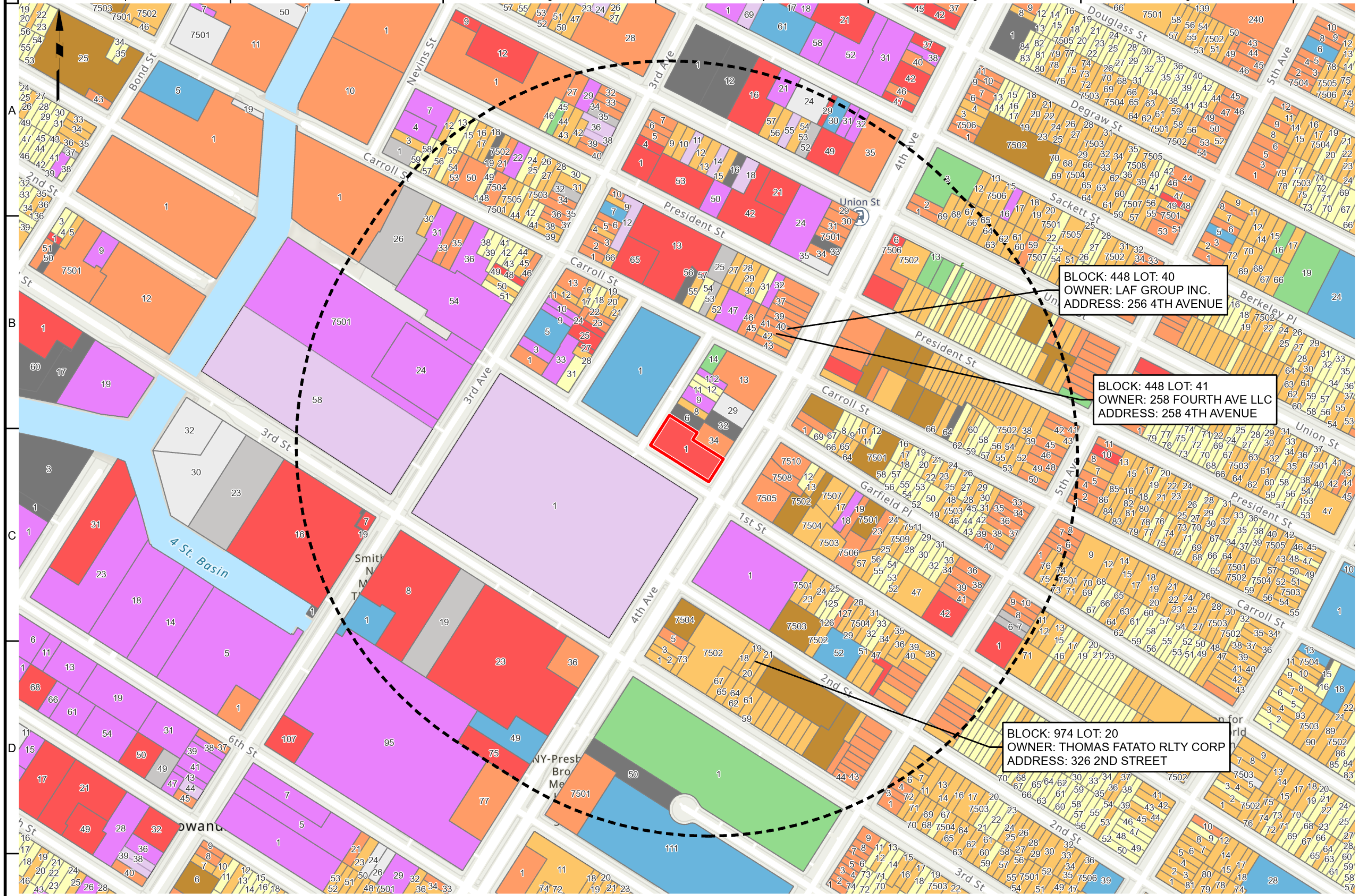
Project	Figure Title	Project No.	Figure No.
294 4TH AVENUE BLOCK No. 456, LOT No. 1 BROOKLYN KINGS COUNTY NEW YORK	SITE PLAN	190140901 Date 5/11/2026 Scale 1"=50' Drawn By GS	2

Path: \\langan.com\data\WPW\data9\190140901\Project Data\ArcGIS\APRX\190140901\190140901.aprx Date: 5/11/2026 User: Gsajbel Time: 10:02 AM



Legend

- Approximate Brownfield Cleanup Program Site Boundary
- 1,000-foot Radius
- 1 Tax Parcel

Land Use

- One & Two Family Buildings
- Multi-Family Walk-Up Buildings
- Multi-Family Elevator Buildings
- Mixed Residential & Commercial Buildings
- Commercial & Office Buildings
- Industrial & Manufacturing
- Transportation & Utility
- Public Facilities & Institutions
- Open Space & Outdoor Recreation
- Parking Facilities
- Vacant Land
- Other/No Data

Notes:
1. Topographic basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online.
2. Parcel and land use data provided by the New York City Department of City Planning.

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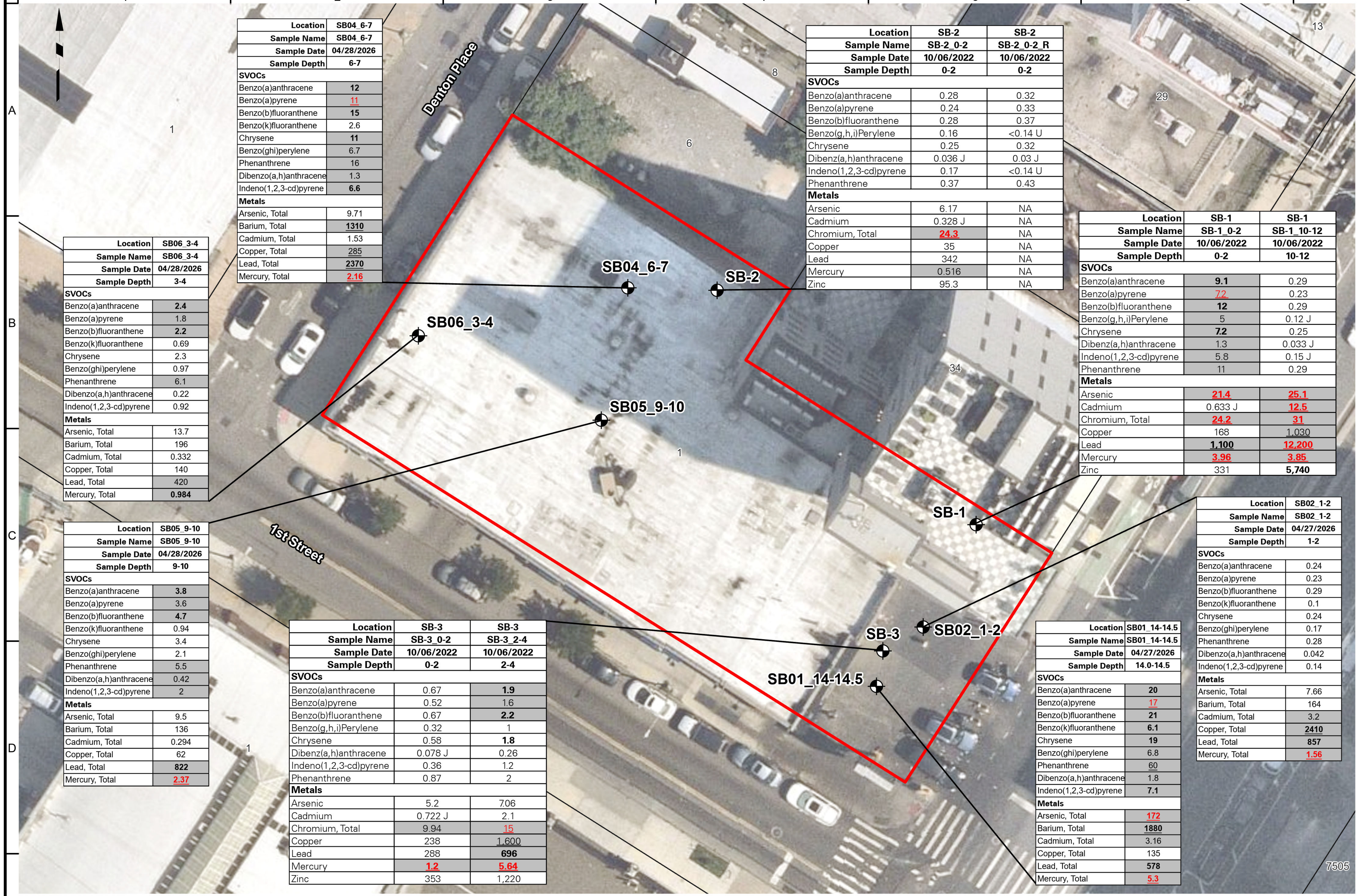
Project	Figure Title	Project No.	Figure No.
294 4TH AVENUE BLOCK No. 456, LOT No. 1 BROOKLYN KINGS COUNTY NEW YORK	**SURROUNDING LAND USE AND SENSITIVE RECEPTORS MAP**	190140901 Date: 5/6/2026 Scale: 1"=300' Drawn By: TO	3

Path: \\langan.com\data\WPW\data9\190140901\Project Data\ArcGIS\APRX\190140901\190140901.aprx Date: 5/6/2026 User: Toulie Time: 4:26 PM



Location	SB04_6-7
Sample Name	SB04_6-7
Sample Date	04/28/2026
Sample Depth	6-7
SVOCs	
Benzo(a)anthracene	12
Benzo(a)pyrene	11
Benzo(b)fluoranthene	15
Benzo(k)fluoranthene	2.6
Chrysene	11
Benzo(ghi)perylene	6.7
Phenanthrene	16
Dibenzo(a,h)anthracene	1.3
Indeno(1,2,3-cd)pyrene	6.6
Metals	
Arsenic, Total	9.71
Barium, Total	1310
Cadmium, Total	1.53
Copper, Total	285
Lead, Total	2370
Mercury, Total	2.16

Location	SB-2	SB-2
Sample Name	SB-2_0-2	SB-2_0-2_R
Sample Date	10/06/2022	10/06/2022
Sample Depth	0-2	0-2
SVOCs		
Benzo(a)anthracene	0.28	0.32
Benzo(a)pyrene	0.24	0.33
Benzo(b)fluoranthene	0.28	0.37
Benzo(g,h,i)Perylene	0.16	<0.14 U
Chrysene	0.25	0.32
Dibenz(a,h)anthracene	0.036 J	0.03 J
Indeno(1,2,3-cd)pyrene	0.17	<0.14 U
Phenanthrene	0.37	0.43
Metals		
Arsenic	6.17	NA
Cadmium	0.328 J	NA
Chromium, Total	24.3	NA
Copper	35	NA
Lead	342	NA
Mercury	0.516	NA
Zinc	95.3	NA

Location	SB06_3-4
Sample Name	SB06_3-4
Sample Date	04/28/2026
Sample Depth	3-4
SVOCs	
Benzo(a)anthracene	2.4
Benzo(a)pyrene	1.8
Benzo(b)fluoranthene	2.2
Benzo(k)fluoranthene	0.69
Chrysene	2.3
Benzo(ghi)perylene	0.97
Phenanthrene	6.1
Dibenzo(a,h)anthracene	0.22
Indeno(1,2,3-cd)pyrene	0.92
Metals	
Arsenic, Total	13.7
Barium, Total	196
Cadmium, Total	0.332
Copper, Total	140
Lead, Total	420
Mercury, Total	0.984

Location	SB-1	SB-1
Sample Name	SB-1_0-2	SB-1_10-12
Sample Date	10/06/2022	10/06/2022
Sample Depth	0-2	10-12
SVOCs		
Benzo(a)anthracene	9.1	0.29
Benzo(a)pyrene	7.2	0.23
Benzo(b)fluoranthene	12	0.29
Benzo(g,h,i)Perylene	5	0.12 J
Chrysene	7.2	0.25
Dibenz(a,h)anthracene	1.3	0.033 J
Indeno(1,2,3-cd)pyrene	5.8	0.15 J
Phenanthrene	11	0.29
Metals		
Arsenic	21.4	25.1
Cadmium	0.633 J	12.5
Chromium, Total	24.2	31
Copper	168	1,030
Lead	1,100	12,200
Mercury	3.96	3.85
Zinc	331	5,740

Location	SB05_9-10
Sample Name	SB05_9-10
Sample Date	04/28/2026
Sample Depth	9-10
SVOCs	
Benzo(a)anthracene	3.8
Benzo(a)pyrene	3.6
Benzo(b)fluoranthene	4.7
Benzo(k)fluoranthene	0.94
Chrysene	3.4
Benzo(ghi)perylene	2.1
Phenanthrene	5.5
Dibenzo(a,h)anthracene	0.42
Indeno(1,2,3-cd)pyrene	2
Metals	
Arsenic, Total	9.5
Barium, Total	136
Cadmium, Total	0.294
Copper, Total	62
Lead, Total	822
Mercury, Total	2.37

Location	SB-3	SB-3
Sample Name	SB-3_0-2	SB-3_2-4
Sample Date	10/06/2022	10/06/2022
Sample Depth	0-2	2-4
SVOCs		
Benzo(a)anthracene	0.67	1.9
Benzo(a)pyrene	0.52	1.6
Benzo(b)fluoranthene	0.67	2.2
Benzo(g,h,i)Perylene	0.32	1
Chrysene	0.58	1.8
Dibenz(a,h)anthracene	0.078 J	0.26
Indeno(1,2,3-cd)pyrene	0.36	1.2
Phenanthrene	0.87	2
Metals		
Arsenic	5.2	7.06
Cadmium	0.722 J	2.1
Chromium, Total	9.94	15
Copper	238	1,600
Lead	288	696
Mercury	1.2	5.64
Zinc	353	1,220

Location	SB02_1-2
Sample Name	SB02_1-2
Sample Date	04/27/2026
Sample Depth	1-2
SVOCs	
Benzo(a)anthracene	0.24
Benzo(a)pyrene	0.23
Benzo(b)fluoranthene	0.29
Benzo(k)fluoranthene	0.1
Chrysene	0.24
Benzo(ghi)perylene	0.17
Phenanthrene	0.28
Dibenzo(a,h)anthracene	0.042
Indeno(1,2,3-cd)pyrene	0.14
Metals	
Arsenic, Total	7.66
Barium, Total	164
Cadmium, Total	3.2
Copper, Total	2410
Lead, Total	857
Mercury, Total	1.56

Location	SB01_14-14.5
Sample Name	SB01_14-14.5
Sample Date	04/27/2026
Sample Depth	14.0-14.5
SVOCs	
Benzo(a)anthracene	20
Benzo(a)pyrene	17
Benzo(b)fluoranthene	21
Benzo(k)fluoranthene	6.1
Chrysene	19
Benzo(ghi)perylene	6.8
Phenanthrene	60
Dibenzo(a,h)anthracene	1.8
Indeno(1,2,3-cd)pyrene	7.1
Metals	
Arsenic, Total	172
Barium, Total	1880
Cadmium, Total	3.16
Copper, Total	135
Lead, Total	578
Mercury, Total	5.3

Legend

Approximate Brownfield Cleanup Program Site Boundary

1 Tax Parcel

Approximate Soil Boring Location

Analyte	NYSDEC Part 375 Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	NYSDEC Part 375 Restricted Use Commercial SCOs	NYSDEC Part 375 Restricted Use Industrial SCOs
SVOCs				
Benzo(a)anthracene	1	1.4	37	37
Benzo(a)pyrene	22	1	3.7	3.7
Benzo(b)fluoranthene	2.1	1.4	37	37
Benzo(g,h,i)Perylene	1000	4.9	47	78
Chrysene	1	4.9	47	78
Dibenz(a,h)anthracene	1000	0.33	3.7	3.7
Indeno(1,2,3-cd)pyrene	6.6	1.4	37	37
Phenanthrene	1000	4.9	47	78
Metals				
Arsenic	16	16	16	16
Cadmium	7.5	2.5	3.7	4.4
Chromium, Total	19	1	11	11
Copper	1720	280	280	10000
Lead	450	400	1000	3900
Mercury	0.73	0.3	1.1	1.1
Zinc	2480	6600	10000	10000

Exceedance Summary:

10 - Result exceeds NYSDEC Part 375 Protection of Groundwater SCOs

10 - Result exceeds NYSDEC Part 375 Restricted Use Restricted-Residential SCOs

10 - Result exceeds NYSDEC Part 375 Restricted Use Commercial SCOs

10 - Result exceeds NYSDEC Part 375 Restricted Use Industrial SCOs

Notes:

1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 7/3/2025.
2. Parcel data provided by the New York City Department of City Planning.
3. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Protection of Groundwater, Restricted Use Restricted-Residential, Commercial, and Industrial Soil Cleanup Objectives (SCO) (December 2025).
4. Criterion comparisons for 3- & 4-methylphenol (m&p cresol) are provided for reference. Promulgated SCOs are for 3-methylphenol (m-cresol) and 4-methylphenol (p-cresol).
5. The criteria comparison for total chromium is provided for reference. The promulgated SCO shown is for hexavalent chromium.
6. Results are shown in mg/kg (milligrams per kilogram).

Qualifiers:

J - The analyte was detected above the method detection limit (MDL), but below the reporting limit (RL); therefore, the result is an estimated concentration.

U - The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.

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Project

294 4TH AVENUE

BLOCK No. 456, LOT No. 1

BROOKLYN

KINGS COUNTY NEW YORK

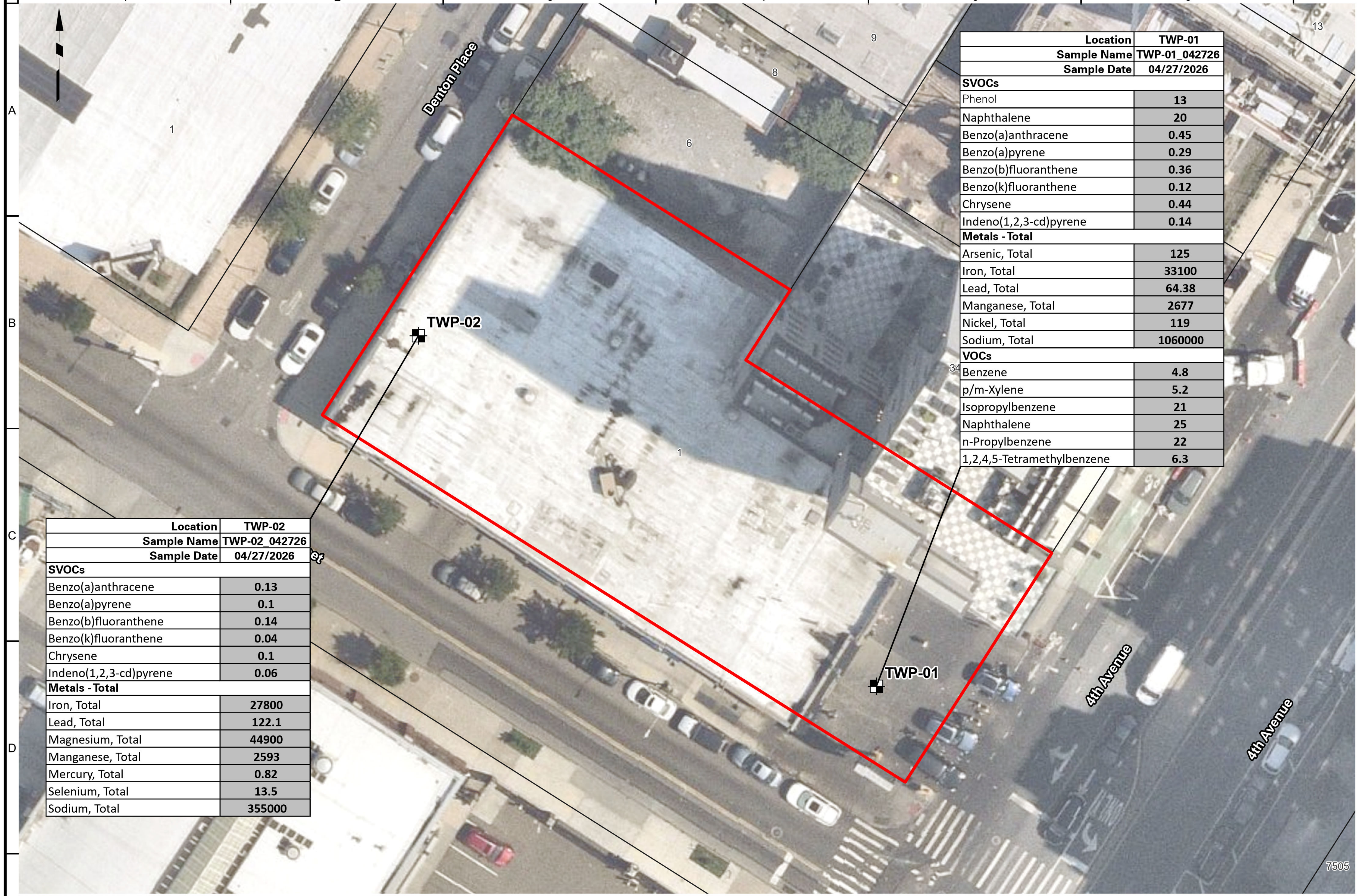
Figure Title

PREVIOUS SOIL SAMPLE LOCATIONS AND ANALYTICAL RESULTS MAP

Project No.	190140901
Date	5/11/2026
Scale	1"=30'
Drawn By	GS

Figure No. 4

Path: \\langan.com\data\WPW\data9\190140901\Project Data\ArcGIS\APRX\190140901\190140901.aprx Date: 5/11/2026 User: Gsajbel Time: 10:03 AM



Location	TWP-01
Sample Name	TWP-01_042726
Sample Date	04/27/2026
SVOCs	
Phenol	13
Naphthalene	20
Benzo(a)anthracene	0.45
Benzo(a)pyrene	0.29
Benzo(b)fluoranthene	0.36
Benzo(k)fluoranthene	0.12
Chrysene	0.44
Indeno(1,2,3-cd)pyrene	0.14
Metals - Total	
Arsenic, Total	125
Iron, Total	33100
Lead, Total	64.38
Manganese, Total	2677
Nickel, Total	119
Sodium, Total	1060000
VOCs	
Benzene	4.8
p/m-Xylene	5.2
Isopropylbenzene	21
Naphthalene	25
n-Propylbenzene	22
1,2,4,5-Tetramethylbenzene	6.3

Location	TWP-02
Sample Name	TWP-02_042726
Sample Date	04/27/2026
SVOCs	
Benzo(a)anthracene	0.13
Benzo(a)pyrene	0.1
Benzo(b)fluoranthene	0.14
Benzo(k)fluoranthene	0.04
Chrysene	0.1
Indeno(1,2,3-cd)pyrene	0.06
Metals - Total	
Iron, Total	27800
Lead, Total	122.1
Magnesium, Total	44900
Manganese, Total	2593
Mercury, Total	0.82
Selenium, Total	13.5
Sodium, Total	355000

Legend

- Approximate Brownfield Cleanup Program Site Boundary
- 1 Tax Parcel
- Approximate Groundwater Sample Location

Analyte	NY-AWQS
SVOCs	
Phenol	1
Naphthalene	10
Benzo(a)anthracene	0.002
Benzo(a)pyrene	0
Benzo(b)fluoranthene	0.002
Benzo(k)fluoranthene	0.002
Chrysene	0.002
Indeno(1,2,3-cd)pyrene	0.002
Metals - Total	
Arsenic, Total	25
Iron, Total	300
Lead, Total	25
Magnesium, Total	35000
Manganese, Total	300
Mercury, Total	0.7
Nickel, Total	100
Selenium, Total	10
Sodium, Total	20000
VOCs	
Benzene	1
p/m-Xylene	5
Isopropylbenzene	5
Naphthalene	10
n-Propylbenzene	5
1,2,4,5-Tetramethylbenzene	5

Exceedance Summary:

10 - Result exceeds NYSDEC AWQS

Notes:
1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 7/3/2025.
2. Parcel data provided by the New York City Department of City Planning.
3. Groundwater sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 Codes, Rules, and Regulations (NYCRR) Part 703.5 and the NYSDEC Technical and Operation Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Class GA Water and published addenda (herein collectively referenced as "NYSDEC SGVs").
4. Results are shown in µg/l (micrograms per liter)

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Project
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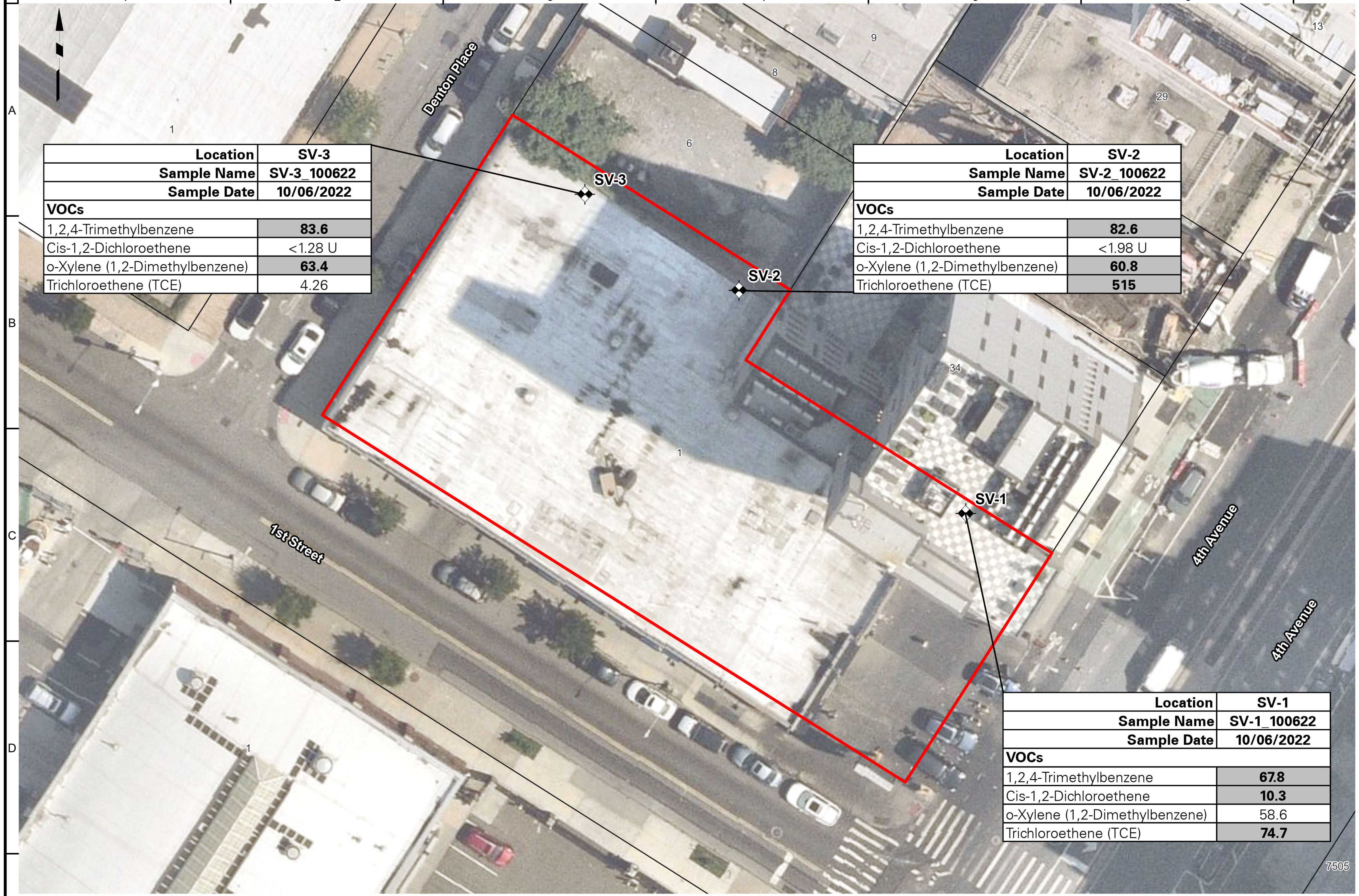
BLOCK No. 456, LOT No. 1
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
PREVIOUS GROUNDWATER SAMPLE LOCATIONS AND ANALYTICAL RESULTS MAP

Project No. 190140901
Date 5/11/2026
Scale 1"=30'
Drawn By GS
Figure No. 5

Path: \\langan.com\data\WPW\data9\190140901\Project Data\ArcGIS\APRX\190140901\190140901.aprx Date: 5/11/2026 User: Gsajbel Time: 10:05 AM



Location	SV-3
Sample Name	SV-3_100622
Sample Date	10/06/2022
VOCs	
1,2,4-Trimethylbenzene	**83.6**
Cis-1,2-Dichloroethene	<1.28 U
o-Xylene (1,2-Dimethylbenzene)	**63.4**
Trichloroethene (TCE)	4.26

Location	SV-2
Sample Name	SV-2_100622
Sample Date	10/06/2022
VOCs	
1,2,4-Trimethylbenzene	**82.6**
Cis-1,2-Dichloroethene	<1.98 U
o-Xylene (1,2-Dimethylbenzene)	**60.8**
Trichloroethene (TCE)	**515**

Location	SV-1
Sample Name	SV-1_100622
Sample Date	10/06/2022
VOCs	
1,2,4-Trimethylbenzene	**67.8**
Cis-1,2-Dichloroethene	**10.3**
o-Xylene (1,2-Dimethylbenzene)	58.6
Trichloroethene (TCE)	**74.7**

Legend

Approximate Brownfield Cleanup Program Site Boundary

1 Tax Parcel

Approximate Sub-Slab Soil Vapor Probe Location

Analyte	NYSDOH Decision Matrix (SV)
VOCs	
1,2,4-Trimethylbenzene	60
Cis-1,2-Dichloroethene	6
o-Xylene (1,2-Dimethylbenzene)	60
Trichloroethene (TCE)	6

Exceedance Summary:

10 - Result exceeds minimum soil vapor concentrations recommending mitigation

Notes:
1. Aerial imagery provided through Langan's subscription to NearMap.com, flown 7/3/2025.
2. Parcel data provided by the New York City Department of City Planning.
3. Soil vapor sample analytical results are compared to the minimum soil vapor concentrations at which mitigation is recommended as set forth in the New York State Department of Health (NYSDOH) October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York Decision Matrices for Sub-Slab Vapor and Indoor Air and subsequent updates (through to 2024).

Qualifiers:
J - The analyte was detected above the method detection limit (MDL), but below the reporting limit (RL); therefore, the result is an estimated concentration.

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Project
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BLOCK No. 456, LOT No. 1
BROOKLYN
KINGS COUNTY NEW YORK

Figure Title
PREVIOUS SOIL VAPOR SAMPLE LOCATION AND ANALYTICAL RESULTS MAP

Project No. 190140901
Date 5/11/2026
Scale 1"=30'
Drawn By GS
Figure No. 6

Path: \\langan.com\data\WPW\data9\190140901\Project Data\ArcGIS\APRX\190140901\190140901.aprx Date: 5/11/2026 User: Gsajbel Time: 10:03 AM

Tables

Attachment A Health and Safety Plans

HEALTH AND SAFETY PLAN

FOR

294 4th Avenue
BROOKLYN, NEW YORK
Bronx Borough Tax Map
Block 456, Lot 1

Prepared For

294 LLC
478 Albany Avenue
Brooklyn, New York 11203

Prepared By:

Langan Engineering, Environmental, Surveying
Landscape Architecture and Geology, D.P.C.
360 West 31st Street, 8th Floor
New York, New York 10001

LANGAN

May 2026
Langan Project No. 190140901

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***** Items to be posted prominently on-site or made readily available to personnel.

1.0 INTRODUCTION

1.1 General

This HEALTH AND SAFETY PLAN (HASP) was developed to address the disturbance of known and reasonably anticipated subsurface contaminants and comply with Occupational Safety and Health Administration (OSHA) Standard 29 Code of Federal Regulation (CFR) 1910.120(b)(4), Hazardous Waste Operations and Emergency Response during anticipated site work for the property located at 383 Morris Avenue in the South Bronx neighborhood of the Bronx, New York ("the Site"). The property also is addressed as 275 Morris Avenue and 268 East 143rd Street. The Site is identified on the Bronx Borough Tax Map as Block 2334, Lots 62, 63, and 66.

All contractors performing work on this site must implement their own HASP that, at a minimum, adheres to this HASP. The contractor is responsible for their own health and safety and that of their subcontractors. Langan personnel will implement this HASP while onsite.

The content of this HASP may change or undergo revision based on additional information made available to health and safety personnel, monitoring results, or changes in the work plan.

1.2 Site Location and Background

The approximately 0.37-acre site at 294 4th Avenue in Brooklyn, New York, has historically supported a variety of industrial and automotive-related uses, including smelting operations, scrap metal handling, and long-term auto service activities. Historical Sanborn maps identified four former gasoline underground storage tanks (USTs) along the 4th Avenue frontage between approximately 1951 and 1965, although closure documentation was not identified. The property is currently operated as the Golden Touch Car Wash and vehicle service station, where vehicle repair, detailing, oil changes, and car wash operations are conducted. Due to the site's historic and ongoing automotive and industrial uses, potential environmental concerns related to petroleum products, metals, solvents, and other automotive-related chemicals have been identified.

1.3 Summary of Work Tasks

1.3.1 Geophysical Investigation

Prior to the commencement of intrusive field activities (i.e., soil borings); a geophysical consultant may conduct a geophysical survey using ground penetrating radar (GPR) and electromagnetic detection equipment. Langan personnel will coordinate the geophysical survey. The objective of the survey will be to identify any underground storage tank (UST) structures, drains, underground utilities, and other subsurface anomalies that may be encountered during the investigation. During this time Langan personnel will inspect the site and confirm sample locations.

1.3.2 Hand Clearing of Borehole Locations

If there is no geophysical survey for utility clearance or the results of the geophysical survey are inconclusive at specific locations subject to intrusive work, the contractor may hand clear each location to confirm utilities or other known or suspected subsurface structures. Hand clearing of a soil boring location should extend to a depth of 5-feet and be about 1.5 times the anticipated diameter of the borehole when drilled. Langan personnel will confirm that hand clearing activities are completed to these specifications.

1.3.3 Soil Investigation and Sampling

Langan will retain a drilling contractor to advance soil borings to a depth below grade surface (bgs) specified in the work plan. Borings will be installed at the approximate locations indicated in Langan's work plan but may be moved in the field based on utility clearance and accessibility. The drilling contractor will contact the appropriate utility mark-out authority and make available to their drilling staff the verification number and effective dates. Langan will record the verification number and effective dates from the drillers. Langan will also note the location of marked out utilities on the site plan and scan the data into the project folder.

Langan personnel will screen soil for visual, olfactory, and instrumental indicators suggestive of a potential petroleum release. Instrument screening for the presence of volatile organic compounds (VOCs) may be performed with a duly field-calibrated photoionization detector (PID) (or equivalent). Langan personnel will collect soil samples from the proposed soil boring locations following the sampling plan outlined in the work plan. The borings will be filled with clean soil cuttings, clean sand or bentonite grout and capped at grade to match the surrounding surface after samples are collected.

Soil samples will be submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory and analyzed in accordance with work plan specifications.

1.3.4 Groundwater Investigation and Sampling

Selected soil borings will be converted into groundwater monitoring wells and sampled to evaluate groundwater quality. Groundwater samples will be collected from one or more of the new and if available, pre-existing monitoring wells in accordance with the Langan Low Flow Groundwater Sampling SOP (SOP #12). Groundwater samples will be submitted to an approved laboratory and analyzed for constituents as specified in the work plan. Temporary monitoring wells will be plugged and abandoned during the investigation in the manner defined in Section 1.3.2 for soil boring. Permanent monitoring wells will be completed with a road box set in concrete. Permanent monitoring wells will be eventually backfilled and abandoned in accordance with State and Local regulations.

Groundwater samples will be submitted to a NYSDOH ELAP-certified laboratory and analyzed in accordance with work plan specifications.

1.3.5 Groundwater/Product Gauging

Langan may gauge one or more of the observation/monitoring wells to collect synoptic head data or determine the presence of product. When gauging, Langan may also survey head space VOCs within the well using a duly calibrated PID. When collected, gauging data will be based on the northernmost point at top of casing (TOC) using an interface probe (IP) capable of determining the presence of free product in the monitoring well as light non-aqueous phase liquid (LNAPL) at the top of the water column. If gauging for dense non-aqueous phase liquid (DNAPL) at the base of the monitoring well, the IP may not be appropriate. The field engineer will coordinate with the project team to devise an alternative method to gauge the thickness of DNAPL at base of the well. Langan will decontaminate gauging equipment between wells as required by the work plan.

1.3.6 Product Bailing

Langan may remove free product from on-site monitoring wells as part of this HASP or subsequent SMP activities. Langan may use a bailer, peristaltic pump or submersible as determined by the work plan. Langan will record the volume of product and groundwater recovered. Recovered product and groundwater will be drummed in accordance with procedures outlined in the work plan.

1.3.7 Sub Slab or Soil Vapor Point Installation and Sampling

Langan (or its contractor) will install one or more sub-slab or soil vapor points at selected locations. If installed, the sub-slab points will be set at or just below the bottom of the slab in accordance with the work plan. The sub-slab points may be installed using an electric hammer drill to advance small diameter borings through the concrete (or equivalent) slab as defined in the work plan. The borings will terminate in and sample from the gravel substrate below the slab. Conditions in the field may require adjustment of sampling locations.

Langan personnel (or contractor) may install VaporPin® vapor points (or equivalent) in accordance with the manufacturer's instructions. If no point is used, Langan (or contractor) will set a sampling tube defined as an open-ended Teflon™-lined polyethylene tubing (or equivalent tubing as approved by the project manager [PM]). The sampling tube will be set either within the base of the concrete slab or within the support gravel underlying the slab.

When using the VaporPin® or equivalent, the installation sleeve will provide the necessary annulus seal required for subsequent sampling. However, if a sampling tube as defined above is use, the annulus at the top of the concrete slab will be filled with bentonite or food grade clay to seal the slab. A sand pack is not required for sub-slab vapor sampling. Unless specified by the work plan, the sub slab points are temporary and will be pulled after the sampling event and the hole will be patched at grade with material similar to the surrounding surface.

Langan personnel will confirm that the soil vapor points (implants) are 2-inches in length constructed of polyethylene material and are connected to the surface by Teflon™-line polyethylene material (equivalent materials for the point and tubing are acceptable as approved by the PM). The annulus around the implant will be filled with clean sand to 6-inches above the implant. A 1-foot bentonite slurry will be applied to the top of the sand up to seal the sampling points. The remaining soil vapor point annulus may be backfilled with clean cuttings are sand to grade. Unless specified by the work plan, the vapor points are temporary and will be pulled after the sampling event and the hole will be patched at grade with material similar to the surrounding surface.

Vapor samples will be collected in accordance with following guidance including Final Guidance for Evaluating Soil Vapor Intrusion published by the New York State Department of Health (NYSDOH) in October 2006, Langan's Sub-Slab Vapor Sampling SOP (SOP #14) and as specified in the work plan. In addition, ambient air and indoor air samples may be collected for use as a comparison sample. As part of the indoor air sampling program, Langan personnel may complete a building inventory inspection. The inspection may take place prior to the commencement of actual field sampling. Vapor samples may be submitted to a NYSDOH ELAP-certified laboratory and analyzed in accordance with work plan specifications or to another laboratory as specified by the client.

1.3.8 Geotechnical Soil Boring

Langan may retain a geotechnical drilling contractor to advance geotechnical soil borings to a depth bgs specified in the work plan. Soil boring locations may on shore or advanced from a barge. The locations may be based on the results of the geophysical investigation, site inspection and document review. The drilling contractor will contact the appropriate utility mark-out authority and make available to their drilling staff the verification number and effective dates.

Langan will observe the borehole advancement and record appropriate geotechnical data including the results of Standard Penetration Tests (SPT), soil and stratigraphic identification and other data as required by the work plan. One or more borings may be completed as observation wells to be completed as specified in the work plan. All soil borings will be filled with clean soil cuttings after the subsurface exploration is completed. Observation wells may be abandoned.

Langan personnel may collect soil samples for geotechnical evaluation. Soil samples may be submitted to a geotechnical laboratory and analyzed in accordance with work plan specifications.

1.3.9 Observation/Monitoring Well Plugging and Abandonment

At an unspecified future date, the observation/monitoring wells will be abandoned. Plugging and abandonment will be in accordance with federal and state requirements. Langan may retain a drilling contractor to complete the plugging and abandonment activities. The contractor will contact the appropriate utility mark-out authority and make available to their field staff the verification number and effective dates. Langan may observe the plugging and abandonment of one or more observation/monitoring wells to document that the plugging and abandonment activities were completed in accordance with the work plan and regulations.

1.3.10 QA/QC Sampling

Samples for quality assurance/quality control [QA/QC] samples may also be collected and submitted to an approved laboratory and analyzed in accordance with work plan specifications. Information regarding the QA/QC samples including required method of analysis may be included in the same COC as the soil samples unless otherwise instructed by the work plan.

1.3.11 Equipment Decontamination

Before the start of the day's sampling and after sampling each run, sampling equipment will be decontaminated by the decontamination process outlined Attachment B - Decontamination Procedures. Decontamination wastes and purge water will be temporarily stored on site pending analytical results.

1.3.12 Management of Investigative-Derived Waste

The investigative-derived waste (IDW) generated during this investigation will be contained in DOT-approved 55-gallon drums. The drums will be temporarily stored on the site or as directed by the client representative. All drums will be filled between to two-thirds full to allow easy maneuvering during drum pickup and disposal. Drum labels are to be provided by Langan (Environmental Closet). All drums will be labeled as "IDW Pending Analysis" until sample data are reported from the laboratory. Drum labels will include date filled and locations where waste was generated along with the standard information required by the labels in accordance with the Langan SOP09, Drum Labeling.

Closed top drums are to be used to store liquids. Debris, including plastic sheeting, polyethylene tubing, personal protection equipment (PPE), decontamination debris, etc. will be segregated from and disposed in large heavy duty garbage bags and disposed of at the site. Excess unused glassware should be returned to the lab along with the last day of collection samples.

1.3.13 Drum Sampling

Langan personnel may collect drum samples, as required, prior to off-site drum disposal. Samples will be placed into laboratory-supplied batch-certified clean glassware and submitted to an approved laboratory and analyzed in accordance with work plan specifications, if required.

1.3.14 Surveying

Surveying activities may be completed by Langan. Surveying will be conducted by licensed surveyors.

2.0 IDENTIFICATION OF KEY PERSONNEL/HEALTH AND SAFETY PERSONNEL

The following briefly describes the health and safety (H&S) designations and general responsibilities that may be employed for this site. The titles have been established to accommodate the project needs and requirements and ensure the safe conduct of site activities. The H&S personnel requirements for a given work location are based on the proposed site activities.

2.1 Langan Project Manager

The Langan Environmental Project Manager's (PM), Matthew Del Balzo, responsibilities include:

- Ensuring that this HASP is developed, current, and approved prior to on-site activities.
- Ensuring that the tasks in the project are performed in a manner consistent with Langan's comprehensive *Health and Safety Program for Hazardous Waste Operations* and this HASP.

2.2 Langan Corporate Health and Safety Manager

The Langan Corporate Health and Safety Manager is Tony Moffa. His responsibilities include:

- Updating the *Construction Health and Safety Program for Hazardous Waste Operations*.
- Assisting the site Health and Safety Officer (HSO) with the development of the HASP, updating HASP as dictated by changing conditions, job site inspection results, etc., and approving changes to this HASP.
- Assisting the HSO in the implementation of this HASP and conducting Jobsite Safety Inspections and assisting with communication of results and correction of shortcomings found.
- Maintaining records on personnel (medical evaluation results, training and certifications, accident investigation results, etc.).

2.3 Langan Site Health & Safety Officer

The Langan site HSO is William Bohrer. His responsibilities include:

- Participating in the development and implementation of this HASP.
- When on-site, assisting the Langan Field Team Leader in conducting Tailgate Safety Meetings and Jobsite Safety Inspections and correcting any shortcomings in a timely manner.
- Ensuring that proper PPE is available, worn by employees, and properly stored and maintained.
- Controlling entry into and exit from the site contaminated areas or zones.
- Monitoring employees for signs of stress, such as heat stress, fatigue, and cold exposure.
- Monitoring site hazards and conditions.
- Knowing (and ensuring that all site personnel also know) emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.
- Resolving conflicts that may arise concerning safety requirements and working conditions.
- Reporting all incidents, injuries, and near misses to the Langan Incident/Injury Hotline immediately and the client representative.

2.4 Langan Field Team Leader Responsibilities

The Langan Field Team Leader (FTL) is to be determined prior to the start of field activities. The Field Team Leader's responsibilities include:

- The management of the day-to-day site activities and implementation of this HASP in the field.
- Participating in and/or conducting Tailgate Safety Meetings and Jobsite Safety Inspections and correcting any shortcomings in a timely manner.

- When a Community Air Monitoring Operating Program (CAMP) is part of the scope, the FTL will set up and maintain community air monitoring activities and instruct the responsible contractor to implement organic vapor or dust mitigation when necessary.
- Overseeing the implementation of activities specified in the RAP.

2.5 Contractor Responsibilities

The contractor must develop and implement their own HASP for their employees, their subcontractors, and consultants. The contractor is responsible for their own health and safety and that of their subcontractors. Contractors operating on the site must designate their own FTL, HSO, and Health and Safety Manager (HSM). The contractor's HASP will be at least as stringent as this HASP. The contractor must be familiar with and abide by the requirements outlined in their own HASP. A contractor may elect to adopt Langan's HASP as its own provided that it has given written notification to Langan, but where Langan's HASP excludes provisions pertinent to the contractor’s work (i.e., confined space entry); the contractor must provide written addendums to this HASP. Additionally, the contractor must:

- Ensure their employees are trained in the use of all appropriate PPE for the tasks involved.
- Notify Langan of any hazardous material brought onto the job site or site-related area, the hazards associated with the material, and must provide a material safety data sheet (MSDS) or safety data sheet (SDS) for the material.
- Have knowledge of, understand, and abide by all current federal, state, and local health and safety regulations pertaining to the work.
- Ensure their employees handling hazardous materials, if identified at the Site, have received current training in the appropriate levels of 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response* (HAZWOPER) if hazardous waste is identified at the Site.
- Ensure their employees handling hazardous materials, if identified at the Site, have been fit-tested within the year on the type of respirator they will wear; and
- Ensure all air monitoring is in place pertaining to the health and safety of their employees as required by OSHA 1910.120; and
- All contractors must adhere to all federal, state, and local regulatory requirements.

3.0 TASK/OPERATION SAFETY AND HEALTH RISK ANALYSES

A Task-Hazard Analysis (Table 1) was completed for general construction hazards that may be encountered at the Site. The potential contaminants that might be encountered during the field activities and the exposure limits are listed in Table 2 complete inventory of MSDS/SDS for chemical products used on site is included in Attachment E.

3.1 Specific Task Safety Analysis

3.1.1 Work Zone Vapor Monitoring

The work scope may require drilling in locations where there may be a potential for exposure to concentrations of select VOCs including 2,2,4-Trimethylpentatne based on initial soil vapor sampling data; 2,2,4-Trimehtylpentane is flammable additive to gasoline.to prevent engine knocking. Therefore, the work scope will require continuous monitoring of work zone atmospheric VOCs and lower explosion limits (LEL) using a five-gas multimeter (MultiRAE or equivalent).

The OSHA Time Weighted Average (TWA) Permissible Exposure Limit (PEL) for 2,2,4-Trimethylpentante is 500 ppm. Langan will monitor atmospheric VOCs. If VOCs atmospheric concentration exceed 5 ppm, Langan will cease operations and relocate off-site. The Langan field engineer will inform the Langan Environmental PM of the situation.

If the LEL alarm sounds, the Langan engineer will instruct the contractor to shut off all operating equipment (electrical and mechanical) and relocate off-site. The Langan field engineer will inform the Langan Environmental PM of the situation.

3.1.2 Geophysical Survey

Langan personnel are not permitted to operate or otherwise handle the geophysical equipment including any downhole geophysical equipment subsequently used to survey boreholes. When boring locations are surveyed with surface geophysical equipment, the locations of the borings as well as utilities and other artifacts that may interfere with the subsurface investigation are to be marked with indelible paint, flags, or color tape (when marking indoor locations that the client has specifically requested not be marked with indelible paint). This information must also be added to the site map. When applying paint, proper PPE including hand protection should be used.

3.1.3 Hand Clearing of Borehole Locations

Hand clearing will be completed by the contractor. Langan personnel are not permitted to operate or otherwise handle the contractor equipment. Langan will update the site map to include the locations of the cleared borehole locations as well as utilities and other artifacts that may interfere with the subsurface investigation.

3.1.4 Soil Investigation and Sampling

Sampling the soil requires the donning of chemical resistant gloves in addition to the standard PPE. Langan personnel are not to operate drilling or excavation equipment nor open sampling devices (acetate liners, sonic sample bags, etc.). These tasks are to be completed by the driller or excavation contractor.

3.1.5 Indoor Drilling and Excavation

The work scope may require indoor drilling or drilling in locations where there may not be adequate ventilation sufficient to safely operate any rig or excavation equipment powered by an internal combustion engine. Where possible, all such work should be done by equipment powered by electricity. If such equipment is used and must be directly wired to the buildings electrical system or to an independent system, this work must be completed by a licensed electrician in accordance with all electrical codes applicable to the work.

Indoor work which is to be completed with equipment powered by an internal combustion engine must incorporate air monitoring of carbon monoxide (CO) using calibrated air monitoring equipment (MultiRAE or equivalent). In addition, the work plan should incorporate mitigation for venting engine exhaust fumes directly to the outdoors and for circulating fresh air into the work area.

The OSHA Time Weighted Average (TWA) Permissible Exposure Limit (PEL) for CO from 50 to 35 parts per million (ppm). Langan will monitor CO with a suitable monitoring device. If CO levels exceed 5 ppm, Langan will instruct contractors to begin mitigation measures. These measures are at a minimum:

- Increase air circulation using industrial size fans to bring additional fresh air into the building or vent exhaust to the outside.
- Modify the passive exhaust method being used to increase venting circulation by using wider diameter tubing or sealing tubing connections; or
- Modify the work schedule where the rig is turned off to allow time for CO levels to fall back to background.

All work must cease if CO levels reach 35 ppm. The Langan engineer is to report to the PM and H&S officer when an action level is reached.

3.1.6 Groundwater Investigation and Sampling

Sampling groundwater requires the donning of chemical resistant gloves in addition to the standard PPE and cut resistant gloves when cutting sampling-tubing to length. Langan personnel are not to operate drilling equipment nor assemble or install monitoring well equipment. These tasks are to be completed by the driller contractor.

1.3.7 Groundwater/Product Gauging

Gauging product requires additional safety considerations including the presence of VOCs and protection of both field cloths and property. Langan will monitor air for VOCs using a duly calibrated PID. Langan will don protective clothing including Tyvek® over-cloths, as necessary. To protect property, Langan will work set a plastic barrier to protect floors or protect landscaping and use absorbent pads as necessary to collect pooled product. If sampling for PFAS from the same well, Langan will complete the product check first, if the well can be sampled without including product, Langan will remove the Tyvek® material from the well head vicinity.

3.1.8 Product Recovery Well Bailing

Langan may bail free product from monitoring wells. Free product bailing requires the donning of Tyvek™ suits, Tyvek™ boots and chemical resistant gloves in addition to the standard PPE and cut resistant gloves when cutting sampling-tubing to length. In addition, Langan will place plastic sheeting around the recovery well head to control spillage during product recovery. Langan will also keep on hand and readily available product absorbing pads to use as needed.

3.1.9 Electrical Pumps

Langan may use an electric pump to collect product from the recovery wells or to sample groundwater. Langan will inspect the electric pump and control box prior to use and specifically note the condition of the electrical connectors, pump, control box and the electrical cord. The electrical connection must be a grounded and connect to the power source using a functional three prong grounded plug. The power source must be a Ground Fault Circuit Interrupter (GFI or GFCI) receptacle.

3.1.10 Geotechnical Soil Boring Investigation

Handling soil requires the donning of chemical resistant gloves in addition to the standard PPE. Langan personnel are not to operate drilling equipment nor open sampling devices (split spoons, acetate liners, sonic sample bags, etc.). These tasks are to be completed by the drilling contractor.

3.1.11 Plugging and Abandonment of Observation/Monitoring Wells

Langan personnel are not to operate equipment nor assist in the plugging and abandonment of the observation/monitoring wells. These tasks are to be completed by the contractor.

3.1.12 Electric Hammer Drill

Langan or the contractor may use an electric hammer drill to install the sub slab vapor points, Langan will confirm that hammer drill and all extension cords are inspect prior to use. The electrical cords must be a grounded and connect to the power source using a functional three prong grounded plug. The power source must be a Ground Fault Circuit Interrupter (GFI or GFCI) receptacle. Langan will confirm that there is a portable GFCI circuit from the outlet to the extension cord and that the GFCI is tested before commencing drilling activities.

3.1.13 Vapor Investigation and Sampling

Sampling vapor requires the donning of work gloves in addition to the standard PPE when assembling the Summa™ canister with the regulator and cut resistant gloves when cutting sampling- or silicone-tubing to length. Langan personnel are not to operate contractor equipment nor assemble or install the contractor vapor point sampling equipment unless instructed by the work plan. When not instructed by the work plan, these tasks are to be completed by the contractor.

3.1.14 Additional Vapor Screening

Langan personnel may prescreen vapor samples for volatile organic compounds (VOCs), methane, hydrogen sulfide and lower explosion limit (LEL) conditions using duly calibrated devices design to screen vapor for these parameters. Langan personnel may also perform atmospheric screening for LEL. Results of the screening may be used in determining which soil vapor samples will be submitted for analysis.

Work activities will immediately cease, and the work area is to be evacuated if the MultiRAE returns a reading of 10% of the LEL (an alarm will sound). Langan personnel will contact the Langan PM. Instrument action levels for monitored gases are provided in Table 4.

3.1.15 Drum Sampling

Drilling fluid, rinse water, grossly contaminated soil samples and cuttings will be containerized in 55-gallon drums for disposed off-site. Each drum must be labeled in accordance with the Langan Drum Labeling Standard Operating Procedure (SOP-#9). Sampling drums requires the donning of work gloves when opening the drums and chemical resistant gloves when sampling in addition to standard PPE.

Langan personnel and contractors are not to move or opened any orphaned (unlabeled) drum found on the site without approval of the project manager.

3.2 Radiation Hazards

No radiation hazards are known or expected at the site.

3.3 Physical Hazards

Physical hazards, which may be encountered during site operations for this project, are detailed in Table 1.

3.3.1 Explosion

No explosion hazards are expected for the scope of work at this site.

3.3.2 Heat Stress

The use of Level C protective equipment, or greater, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 72^{O}F or above. Table 6 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Refer to Table 7 to assist in assessing when the risk for heat-related illness is likely. To use this table, the ambient temperature and relative humidity must be obtained (a regional weather report should suffice). Heat stress monitoring should be performed by the HSO or the FTL, who must be able to recognize symptoms related to heat stress.

To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

- **Heat Cramps:** Painful spasms of arm, leg, or abdominal muscles, during or after work
- **Heat Exhaustion:** Headache, nausea, dizziness; cool, clammy, moist skin; heavy sweating; weak, fast pulse; shallow respiration, normal temperature
- **Heat Stroke**: Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. *This is a life-threatening condition*.

Do not permit a worker to wear a semi-permeable or impermeable garment when they are showing signs or symptoms of heat-related illness.

To monitor the worker, measure:

- **Heart rate:** Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 100-beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 100-beats per minute at the next rest period, shorten the following work cycle by one-third. A worker cannot return to work after a rest period until their heart rate is below 100-beats per minute.
- **Oral temperature:** Use a clinical thermometer (3 minutes under the tongue) or a similar device to measure the oral temperature at the end of the work period (before drinking). If oral temperature exceeds 99.6^{O}F (37.6^{O}C), shorten the next work cycle by one-third without changing the rest period. A worker cannot return to work after a rest period until their oral temperature is below 99.6^{O}F. If oral temperature still exceeds 99.6^{O}F (37.6^{O}C) at the beginning of the next rest period, shorten the following cycle by one-third. Do <u>not</u> permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6^{O}F (38.1^{O}C).

<u>Prevention</u> <u>of</u> <u>Heat</u> <u>Stress</u> - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat-related illnesses. To avoid heat-stress the following steps should be taken:

- Adjust work schedules.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must equal the amount of water lost in sweat, id., eight fluid ounces (0.23 liters) of water must be ingested for every eight ounces (0.23 kilograms [kg]) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
    - o Maintain water temperature 50^{O} to 60^{O}F (10^{O} to 16.6^{O}C).
    - o Provide small disposal cups that hold about four ounces (0.1-liters).
    - o Have workers drink 16-ounces (0.5-liters) of fluid (preferably water or dilute drinks) before beginning work.

- o Urge workers to drink a cup or two every 15- to 20-minutes, or at each monitoring break. A total of 1- to 1.6-gallons (4- to 6-liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
- o Train workers to recognize the symptoms of heat-related illness.

3.3.3 Cold-Related Illness

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is called frostbite.

- **Hypothermia -** Hypothermia is defined as a decrease in the patient core temperature below 96^{o}F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interference with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include shivering, apathy, listlessness, sleepiness, and unconsciousness.
- **Frostbite -** Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20^{o}F. Symptoms of frostbite are a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

<u>Prevention of Cold-Related Illness</u> - To prevent cold-related illness:

- Educate workers to recognize the symptoms of frostbite and hypothermia.
- Identify and limit known risk factors:
- Assure the availability of an enclosed, heated environment on or adjacent to the site.
- Assure the availability of dry changes of clothing.
- Assure the availability of warm drinks.
- Start (oral) temperature recording at the job site:
- At the FSO or Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status.
- At a worker's request.
- As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20^{o}F, or wind-chill less than 30^{o}F with precipitation).
- As a screening measure whenever anyone worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92^{o}F) cannot return to work for 48 hours.

3.3.4 Noise

Work activities during the proposed activities may be conducted at locations with high noise levels from the operation of equipment. Hearing protection will be used, as necessary.

3.3.5 Hand and Power Tools

The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut, or struck by the tool, fire, and electrocution. All hand and power tools should be inspected for health and safety hazards prior to use. If deemed unserviceable/un-operable, notify the supervisor and tag equipment out of service. Ground Fault Circuit Interrupters (GFCIs) are required for all power tools requiring direct electrical service.

3.3.6 Slips, Trips, and Fall Hazards

Care should be exercised when walking at the site, especially when carrying equipment. The presence of surface debris, uneven surfaces, pits, facility equipment, and soil piles contribute to tripping hazards and fall hazards. To the extent possible, all hazards should be identified and marked on the site, with hazards communicated to all workers in the area.

3.3.7 Utilities (Electrocution and Fire Hazards)

3.3.7.1 Utility Clearance

The possibility of encountering underground utilities poses fire, explosion, and electrocution hazards. All excavation work will be preceded by a review of available utility drawings and by notification of the subsurface work to N.Y. One –Call--Center.

3.3.7.2 Lockout-Tagout

The potential adverse effects of electrical hazards include burns, arc flashes, and electrocution, which could result in serious injury including death. Therefore, there is a procedure that establishes the requirements for the lockout/tag out (LOTO) of energy isolating devices in accordance with the OSHA electrical lockout and tagging requirements as specified in 29CFR1910.147 and 29 CFR 1926.417. This procedure will be used to ensure that all machines and equipment are isolated from potentially hazardous energy. If possible, equipment that could cause injury due to unexpected energizing, start-up, or release of stored energy will be locked/tagged, before field personnel performs work activities.

The facility owner/operator/representative is to be the authorized person that will initiate and perform the LOTO in accordance with applicable rules and practices. Inerting of electrical power sources is to be completed by an authorized and licensed electrician. Langan personnel will follow LOTO protocols and practices including adding a separate lock/signature to the LOTO chain in accordance with said protocols and practices.

SPECIAL NOTE: Project personnel will assume that all electrical equipment at the surface, subsurface, and overhead locations are energized until equipment has been designated and confirmed as de-energized by a utility company representative. Langan will notify the designated utility representative prior to working adjacent to this equipment and will verify that the equipment is energized or de-energized in the vicinity of the work location. No project work shall be performed by Langan personnel or subcontractors near energized electrical lines or equipment.

The FTL shall accompany the designated facility owner/operator/representative or authorized/licensed electrician in surveying to locate and identify all energy-isolating devices. Langan will note which switches, valves or other isolating devices are used for inerting the equipment and how they are set assuring LOTO. The lockout/tagout procedure involves, but is not limited to, electricity, motors, steam, natural gas, compressed air, hydraulic systems, digesters, sewers, etc.

3.3.8 Physical Hazard Considerations for Material Handling

There are moderate to severe risks associated with moving heavy objects at the Site. The following physical hazards should be considered when handling materials at the Site:

- Heavy objects will be lifted and moved by mechanical devices rather than manual effort whenever possible.
- The mechanical devices will be appropriate for the lifting of moving tasks and will be operated only by trained and authorized personnel.
- Objects that require special handling or rigging will only be moved under the guidance of a person who has been specifically trained to move such objects.
- Lifting devices will be inspected, certified, and labeled to confirm their weight capacities. Defective equipment will be taken out of service immediately and repaired or destroyed.
- The wheels of any trucks being loaded or unloaded will be choked to prevent movement. Outriggers will be fully extended on a flat, firm surface during operation.
- Personnel will not pass under a raised load, nor will a suspended load be left unattended.
- Personnel will not be carried on lifting equipment unless it is specifically designed to carry passengers.
- All reciprocating, rotating, or other moving parts will be guarded at all times.
- Accessible fire extinguishers, currently (monthly) inspected, will be available in all mechanical lifting devices.

- Verify all loads/materials are secure before transportation.

Material handling tasks that are unusual or require specific guidance will need a written addendum to this HASP. The addendum must identify the lifting protocols before the tasks are performed. Upon approval, the plan must be reviewed with all affected employees and documented. Any deviation from a written plan will require approval by the Langan HSM.

3.3.9 Hearing Conservation

Under the construction industry standard, the maximum permissible occupational noise exposure is 90 A-weighted decibels (dbA) (8-hour TWA), and noise levels in excess of 90-dbA must be reduced through feasible administrative and engineering controls. (20 CFR 1926.52). Hearing protection is required when working within 15-feet of vacuum extraction equipment and drill rigs.

3.4 Biological Hazards

3.4.1 Animals

There is a possibility of encountering wildlife including reptiles, rodents, and other small and medium-size mammals. The Langan personnel is to avoid interacting with any wildlife.

3.4.2 Insects

Ticks and other biting or stinging insects may be encountered during site operations. Langan personnel should take necessary precautions including donning long sleeve shirts and insecticide to prevent bites and stings. After fieldwork, Langan personnel should perform a complete visual inspection of their clothing to insure they are not inadvertently harboring ticks. If they do observe a tick bite, they are to contact the HSM or HSO and report the event.

3.4.3 Plants

Poisonous plants may be encountered during site operations. Langan personnel should take necessary precautions including donning long sleeve shirts and applying preventative poison Ivy/Sumac lotion to prevent or limit the effects of exposure. If after fieldwork, Langan employees do observe a reaction to poisonous plant exposure, they are to contact the HSM or HSO and report the event.

3.5 Additional Safety Analysis

3.5.1 Presence of Non-Aqueous Phase Liquids (NAPL)

Special care and PPE should be considered when NAPL is observed as NAPL is a typically flammable fluid and releases VOCs known to be toxic and/or carcinogenic. If NAPL is present in a monitoring well, vapors from the well casing may contaminate the work area breathing zone with concentrations of VOCs potentially exceeding health and safety action levels. In addition, all equipment used to monitor or sample NAPL (or ground water from wells containing NAPL) must be intrinsically safe. Equipment that directly contacts NAPL must also be resistant to organic solvents.

At a minimum, a PID should be used to monitor for VOCs when NAPL is observed. If NAPL is expected to be observed in an excavation or enclosed area, air monitoring must be started using calibrated air monitoring equipment designed to sound an audio alarm when atmospheric concentrations of VOC are within 10% of the LEL. In normal atmospheric oxygen concentrations, the LEL monitoring may be done with a Wheatstone bridge/catalytic bead type sensor (i.e., MultiRAE). However, in oxygen-depleted atmospheres (confined space), only an LEL designed to work in low-oxygen environments may be used. Best practices require that the LEL monitoring unit be equipped with a long sniffer tube to allow the LEL unit to remain outside the UST excavation.

When NAPL is present, Langan personnel are required to use disposable nitrile gloves at all times to prevent skin contact with contaminated materials. They should also consider having available a respirator and protective clothing (Tyvek® overalls), especially if NAPL is in abundance and there are high concentrations of VOCs.

All contaminated disposables including PPE and sampling equipment must be properly disposed of in labeled 55-gallon drums.

3.6 Job Safety Analysis

A Job Safety Analysis (JSA) is a process to identify existing and potential hazards associated with each job or task so these hazards can be eliminated, controlled, or minimized. A JSA will be performed at the beginning of each workday, and additionally whenever an employee begins a new task or moves to a new location. All JSAs must be developed and reviewed by all parties involved. A blank JSA form and documentation of completed JSAs are in Attachment G.

4.0 PERSONNEL TRAINING

4.1 Basic Training

Completion of an initial 40-hour HAZWOPER training program as detailed in OSHA's 29 CFR 1910.120(e) is required for all employees working on a site engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances, health hazards, or safety hazards as defined by 29 CFR 1910.120(a). Annual 8-hour refresher training is also required to maintain competencies to ensure a safe work environment. In addition to these training requirements, all employees must complete the OSHA 10-hour Construction Safety and Health training and supervisory personnel must also receive eight additional hours of specialized management training. Training records are maintained by the HSM.

4.2 Initial Site-Specific Training

Training will be provided to specifically address the activities, procedures, monitoring, and equipment for site operations at the beginning of each field mobilization and the beginning of each discrete phase of work. The training will include the site and facility layout, hazards, and emergency services at the site, and will detail all the provisions contained within this HASP. For a HAZWOPER operation, training on the site must be for a minimum of 3 days. Specific issues that will be addressed include the hazards described in Section 3.0.

4.3 Tailgate Safety Briefings

Before starting work each day or as needed, the Langan HSO will conduct a brief tailgate safety meeting to assist site personnel in conducting their activities safely. Tailgate meetings will be documented in Attachment H. Briefings will include the following:

- Work plan for the day.
- Review of safety information relevant to planned tasks and environmental conditions.
- New activities/tasks being conducted.
- Results of Jobsite Safety Inspection Checklist.
- Changes in work practices.
- Safe work practices; and
- Discussion and remedies for noted or observed deficiencies.

5.0 MEDICAL SURVEILLANCE

All personnel who will be performing fieldwork involving potential exposure to toxic and hazardous substances (defined by 29 CFR 1910.120(a)) will be required to have passed an initial baseline medical examination, with follow-up medical exams thereafter, consistent with 29 CFR 1910.120(f). Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine.

Additionally, personnel who may be required to perform work while wearing a respirator must receive medical clearance as required under CFR 1910.134(e), *Respiratory Protection*. Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine. Results of medical evaluations are maintained by the HSM.

5.1 Mercury Monitoring

Langan includes medical monitoring for mercury during the initial baseline and annual physical.

5.2 Coronavirus

General Preventative Measures

Field personnel must follow general proper hygiene measures while in the field including:

- Avoid touching eyes, nose, and mouth.
- Cover coughs or sneezes with tissue and throw in the trash.
- Wash hands often with soap and water for 20 seconds after going to the bathroom, before eating, after blowing nose, coughing, or sneezing.
- Use hand sanitizer with at least 60% alcohol if soap and water are not available.
- Avoid physical contact with other people (e.g., no handshakes).
- Maintain a safe distance of at least six feet from other people (social distancing).
- Wear face coverings when around other workers to minimize the spread of COVID-19. (May be required in certain states or locations.)

Construction Trailers

Employees should avoid the use of shared construction trailers or where employees cannot maintain a safe distance (minimum 6-feet) from other workers. If trailer use is needed, areas such as desks, phones, chairs, and other common areas, should be cleaned and disinfected before and after use. Protocols should be developed to minimize trailer use to essential personnel, restrict use from any workers who are ill or showing symptoms of being ill, use face coverings and ensure a safe distance of six feet can be established between workers.

Communication

Include Coronavirus topics and prevention topics in daily tailgate meetings to ensure Coronavirus awareness is communicated daily. Discussions can focus on general topics including social distancing, prevention measures for field personnel, signs and symptoms, and recent news on the Coronavirus. Site-specific topics should include minimizing face-to-face contact, disinfecting/sterilizing field equipment, use of PPE to reduce exposure, site security, use of face coverings, and other potential exposure issues/concerns.

Sick/Ill Workers

No Langan employee is permitted to be onsite when ill and/or showing potential symptoms of the Coronavirus. Symptoms of the Coronavirus may appear 2-14 days after exposure and can range from mild to severe. The most common symptoms include fever, fatigue, dry cough, shortness of breath chills, repeated shaking with chills, muscle pain, headache, sore throat, or new loss of taste or smell. If an employee or subcontractor is observed being ill or exhibiting symptoms of Coronavirus, employees must immediately utilize their Stop Work Authority and contact their project manager to address the situation. If an employee observes another worker onsite exhibiting symptoms of Coronavirus, immediately utilize Stop Work Authority, notify their project manager, and site construction manager or safety officer. Work should resume when the safety and health of Langan and subcontractors is adequately addressed.

6.0 PERSONAL PROTECTIVE EQUIPMENT

6.1 Levels of Protection

Langan will provide PPE to Langan employees to protect them from the specific hazards they are likely to encounter on-site. Directly hired contractors will provide their employees with equivalent PPE to protect them from the specific hazards likely to be encountered on-site. Selection of the appropriate PPE must take into consideration: (1) identification of the hazards or suspected hazards; (2) potential exposure routes; and (3) the performance of the PPE construction (materials and seams) in providing a barrier to these hazards.

Human exposure to contaminants found in the subsurface can occur through three primary routes:

- Inhalation of gases, vapors, dust, or mists is a common route of exposure. Chemicals can enter and irritate the airways and the lungs. They can become deposited in the airways or can be absorbed through the lungs into the bloodstream.
- Direct contact of contaminants with the skin or eyes is a common route of exposure. Some substances are absorbed through the skin and can enter the bloodstream. Broken, cut, or cracked skin will allow substances to enter the body more easily.
- Ingestion or swallowing of food, drink, or other substances is the third route of exposure. Chemicals that get in or on food, utensils, or hands can be ingested. Substances can be absorbed into the blood.

Based on anticipated site conditions and the proposed work activities to be performed at the site, Level D protection will be used. The upgrading/downgrading of the level of protection will be based on continuous air monitoring results as described in Section 6.0 (when applicable). The decision to modify standard PPE will be made by the site HSO or FTL after conferring with the PM. The levels of protection are described below.

Level D Protection (as needed)

- Safety glasses with side shields or chemical splash goggles
- Safety boots/shoes
- Coveralls (Tyvek® or equivalent)
- Hard hat
- Long sleeve work shirt and work pants
- Nitrile gloves
- Hearing protection
- Reflective safety vest

Level D Protection (Modified, as needed)

- Safety glasses with side shields or chemical splash goggles
- Safety boots/shoes (toe-protected)
- Disposable chemical-resistant boot covers.
- Coveralls (poly-coated Tyvek or equivalent to be worn when contact with wet contaminated soil, groundwater, or non-aqueous phase liquids is anticipated)
- Hard hat
- Long sleeve work shirt and work pants
- Nitrile gloves
- Hearing protection (as needed)
- Personal floatation device (for work within 5 ft of the water)
- Reflective traffic vest

Level C Protection (as needed)

- Full or Half face, air-purifying respirator, with NIOSH approved High-Efficiency Particulate Air (HEPA) filter.
- Inner (latex) and outer (nitrile) chemical-resistant gloves
- Safety glasses with side shields or chemical splash goggles
- Chemical-resistant safety boots/shoes
- Hard hat
- Long sleeve work shirt and work pants
- Coveralls (Tyvek® or equivalent)
- Hearing protection (as needed)

- Reflective safety vest

The action levels used in determining the necessary levels of respiratory protection and upgrading to Level C are summarized in Table 4. The written Respiratory Protection Program is maintained by the HSM and is available if needed. The monitoring procedures and equipment are outlined in Section 6.0 (when applicable).

6.2 Respirator Fit-Test

All Langan employees who may be exposed to hazardous substances at the work site must be in possession of a full or half face piece air-purifying respirator and have been successfully fit-tested within the past year. Fit-test records are maintained by the HSM.

6.3 Respirator Cartridge Change-Out Schedule

Respiratory protection is required to be worn when certain action levels (Table 2) are reached. A respirator cartridge change-out schedule has been developed to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is as follows:

- Cartridges must be removed and disposed of at the end of each shift when cartridges become wet or the wearer experiences a breakthrough, whichever occurs first.
- If the humidity exceeds 85%, then cartridges must be removed and disposed of after 4 hours of use.

Respirators must not be stored at the end of the shift with contaminated cartridges left on. Cartridges must not be worn on the second day, no matter how short the time period was the previous day they were used.

7.0 AIR QUALITY MONITORING AND ACTIONS LEVELS

7.1 Monitoring During Site Operations

Atmospheric air monitoring results may be collected and used to provide data to determine when exclusion zones need to be established and when certain levels of personal protective equipment are required. For all instruments, there are Site-specific action-level criteria that are used in making field health and safety determinations. Other data, such as the visible presence of contamination or the steady state nature of air contaminant concentration, are also used in making field health and safety decisions. Therefore, the HSO may establish an exclusion zone or require a person to wear a respirator even though atmospheric air contaminant concentrations are below established HASP action levels.

During site work involving disturbance of petroleum-impacted or fill material, real-time air monitoring may be conducted for methane and VOCs. A MultiRAE LEL/Oxygen (O2) meter and FID will be used to monitor the LEL of methane, and a PID and/or FID will be used to monitor concentrations of VOCs at personnel breathing-zone height. Air monitoring will be the responsibility of the HSO or designee. Air monitoring may be conducted during intrusive activities associated with the completion of excavation, debris removal, and soil grading. All manufacturers' instructions for instrumentation and calibration will be available onsite.

Subcontractors' air monitoring plans must be equal to or more stringent than the Langan plan.

An air monitoring calibration log is provided in Attachment D of this HASP.

7.1.1 Volatile Organic Compounds

Monitoring with a PID, such as a MiniRAE 2000 (10.6v) or equivalent may occur during intrusive work in the Areas of Concern (AOCs). Colorimetric Indicator Tubes for benzene may be used as a backup for the PID if measurements remain above background monitor every 2 hours. The HSO will monitor the employee's breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (odors, visible gases, etc.) since the last measurement. If VOC levels are observed above 5 ppm for longer than 5 minutes or if the site PPE is upgraded to Level C, the HSO will begin monitoring the site perimeter at a location downwind of the AOC every 30 minutes in addition to the employee breathing zone. Instrument action levels for monitored gases are provided in Table 4.

7.1.2 Metals

Based upon the site historical fill, there is a potential for the soils to contain Polycyclic Aromatic Hydrocarbons (PAHs) and metals. During invasive procedures which have the potential for creating airborne dust, such as excavation of dry soils, a real-time airborne dust monitor such as a Mini-Ram may be used to monitor for air particulates. The HSO will monitor the employee's breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (appearance of visible dust) since the last measurement. If dust levels are observed to be greater than 0.100 milligrams per cubic meter (mg/m^3) or visible dust is observed for longer than 15 minutes or if the site PPE is upgraded to Level C, the HSO will begin monitoring the site perimeter at a location downwind of the AOC every 30 minutes in addition to the employee breathing zone. Instrument action levels for dust monitoring are provided in Table 4.

7.1.3 Methane

During soil excavation or other intrusive activities, direct reading air monitoring will be performed in the excavation area to determine exposure to workers. Monitoring with an LEL/O2 meter and

FID may occur during intrusive work in the AOCs. The HSO will monitor the employee's breathing zone at least hourly during intrusive activities. If LEL levels are observed above 20% the professional engineer (PE) or their designee will stop work and evacuate the area; warn others; and determine source of readings and take corrective actions. The Contractor will be responsible for mitigating explosive gas levels.

7.2 Monitoring Equipment Calibration and Maintenance

Instrument calibration must be documented and included in a dedicated safety and health logbook or on separate calibration pages of the field book. All instruments must be calibrated before and after each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument responses.

All instruments must be operated in accordance with the manufacturers' specifications. Manufacturers' literature, including an operation manual for each piece of monitoring equipment, will be maintained on-site by the HSO for reference.

7.3 Determination of Background Levels

Background (BKD) levels for VOCs, dust, and methane will be established prior to intrusive activities within the AOC at an upwind location. A notation of BKD levels will be referenced in the daily monitoring log. BKD levels are a function of prevailing conditions. BKD levels will be taken in an appropriate upwind location as determined by the HSO.

Table 4 lists the instrument action levels.

8.0 COMMUNITY AIR MONITORING PROGRAM

Community air monitoring may be conducted in compliance with local standards. If conducted, Langan will implement the generic CAMP outlined below amended to comply with local conditions or standards:

Monitoring for dust and odors will be conducted during all ground intrusive activities by the FTL. Continuous monitoring of the perimeter of the work zones for odor, VOCs, and dust may be required for all ground intrusive activities such as soil excavation and handling activities. The work zone is defined as the general area in which machinery is operating in support of remediation activities. A portable PID will be used to monitor the work zone and for periodic monitoring for VOCs during activities such as soil and groundwater sampling and soil excavation. The site perimeter will be monitored for fugitive dust emissions by visual observations as well as instrumentation measurements (if required). When required, particulate or dust will be monitored continuously with real-time field instrumentation that will meet, at a minimum, the local standards or, default to the performance standards below:

If VOC monitoring is required, the following actions will be taken based on VOC levels measured:

- If total VOC levels exceed 5 ppm above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the hot zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps work activities will resume provided that the total organic vapor level is 200-feet downwind of the hot 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 above background for the 15-minute average.
- If the total VOC level is above 25 ppm at the perimeter of the hot zone, activities will be shut down.

If dust monitoring with field instrumentation is required, the following actions will be taken based on instrumentation measurements:

- If the downwind particulate level is 100-micrograms per cubic meter (μg/m³) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression must be employed. Work may continue with dust suppression techniques provided that downwind particulate matter less than 10 microns (PM10) levels do not exceed 150 μg/m³ above the background level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM10 levels are greater than 150 μg/m³ above the background 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 PM10 concentration to within 150 μg/m³ of the upwind level and in preventing visible dust migration.

8.1 Dust Suppression Techniques

Preventative measures for dust generation may include wetting site fill and soil, construction of an engineered construction entrance with a gravel pad, a truck wash area, covering soils with tarps, and limiting vehicle speeds to five miles per hour.

Work practices to minimize odors and vapors include limiting the time that the excavations remain open, minimizing stockpiling of contaminated-source soil, and minimizing the handling of contaminated material. Offending odor and organic vapor controls may include the application of foam suppressants or tarps over the odor or VOC source areas. Foam suppressants may include biodegradable foams applied over the source material for short-term control of the odor and VOCs.

If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include direct load-out of soils to trucks for off-site disposal; use of chemical odorants in spray or misting systems; and use of staff to monitor odors in surrounding neighborhoods.

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

9.0 WORK ZONES AND DECONTAMINATION

9.1 Site Control

Work zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas.

Any person working in an area where the potential for exposure to site contaminants exists will only be allowed access after providing the HSO with proper training and medical documentation.

Exclusion Zone (EZ) - All activities which may involve exposure to site contaminants, hazardous materials, and/or conditions should be considered an EZ. Decontamination of field equipment will also be conducted in the Contaminant Reduction Zone (CRZ) which will be located on the perimeter of the EZ. The EZ and the CRZ will be delineated by cones, tapes, or other means. The HSO may establish more than one EZ where different levels of protection may be employed, or different hazards exist. The size of the EZ must be determined by the HSO allowing adequate space for the activity to be completed, field members, and emergency equipment.

9.2 Contamination Zone

9.2.1 Personnel Decontamination Station

Personal hygiene, coupled with diligent decontamination, will significantly reduce the potential for exposure.

9.2.2 Minimization of Contact with Contaminants

During the completion of all site activities, personnel should attempt to minimize the chance of contact with contaminated materials. This involves a conscientious effort to keep "clean" during site activities. All personnel should minimize kneeling, splash generation, and another physical contact with contamination as PPE is intended to minimize accidental contact. This may minimize the degree of decontamination required and the generation of waste materials from site operations.

Field procedures will be developed to control spray and runoff and to ensure that unprotected personnel working nearby are not affected.

9.2.3 Personnel Decontamination Sequence

Decontamination may be performed by removing all PPE used in EZ and placing it in drums/trash cans at the CRZ. Baby wipes should be available for wiping hands and face. Drums/trash cans-will be labeled by the field crews in accordance with all local, state, and federal requirements. Management plans for contaminated PPE, and tools are provided below.

9.2.4 Emergency Decontamination

If circumstances dictate that contaminated clothing cannot be readily removed, then remove gross contamination and wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or transporting equipment. If the injured person can be moved, he/she will be decontaminated by site personnel as described above before emergency responders handle the victim. If the person cannot be moved because of the extent of the injury (a back or neck injury), provisions must be made to ensure that emergency response personnel will be able to respond to the victim without being exposed to potentially hazardous atmospheric conditions. If the potential for inhalation hazards exists, such as with open excavation, this area will be covered with polyethylene sheeting to eliminate any potential inhalation hazards. All emergency personnel should be immediately informed of the injured person's condition, and potential contaminants, and provided with all pertinent data.

9.2.5 Hand-Held Equipment Decontamination

Hand-held equipment includes all monitoring instruments as stated earlier, samples, hand tools, and notebooks. The hand-held equipment is dropped at the first decontamination station to be decontaminated by one of the decontamination team members. These items must be decontaminated or discarded as waste prior to removal from the CRZ.

To aid in decontamination, monitoring instruments can be sealed in plastic bags or wrapped in polyethylene. This will also protect the instruments against contaminants. The instruments will be wiped clean using wipes or paper towels if contamination is visually evident. Sampling equipment, hand tools, etc. will be cleaned with non-phosphorous soap to remove any potentially contaminated soil and rinsed with deionized water. All decontamination fluids will be containerized and stored on-site pending waste characterization sampling and appropriate off-site disposal.

9.2.6 Heavy Equipment Decontamination

All heavy equipment and vehicles arriving at the work site will be free from contamination from offsite sources. Any vehicles arriving to work that are suspected of being impacted will not be permitted on the work site. Potentially contaminated heavy equipment will not be permitted to leave the EZ unless it has been thoroughly decontaminated and visually inspected by the HSO or his designee.

9.3 Support Zone

The support zone or cold zone will include the remaining areas of the job site. Break areas and support facilities (including equipment storage and maintenance areas) will be located in this zone. No equipment or personnel will be permitted to enter the cold zone from the hot zone without passing through the decontamination station in the warm zone (if necessitated). Eating, smoking, and drinking will be allowed only in this area.

9.4 Communications

The following communications equipment will be utilized as appropriate.

- Telephones - A cellular telephone will be located with the HSO for communication with the HSM and emergency support services/facilities.
- Hand Signals - Hand signals must be used by field teams, along with the buddy system. The entire field team must know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

Hand Signal	Meaning
Hand gripping throat	Out of air, cannot breathe
Grip your partner's wrists or place both hands around the waist	Leave immediately without debate
Hands on top of head	Need assistance
Thumbs up	OK; I am all right; I understand
Thumbs down	No; negative
Simulated "stick" break with fists	Take a break; stop work

9.5 The Buddy System

When working in teams of two or more, workers will use the "buddy system" for all work activities to ensure that rapid assistance can be provided in the event of an emergency. This requires work groups to be organized such that workers can remain close together and maintain visual contact with one another. Workers using the "buddy system" have the following responsibilities:

- Provide his/her partner with assistance.
- Observe his/her partner for signs of chemical or heat exposure.
- Periodically check the integrity of his/her partner's PPE.
- Notify the HSO or other site personnel if emergency service is needed.

10.0 NEAREST MEDICAL ASSISTANCE

The address and telephone number of the nearest hospital:

New York Presbyterian Brooklyn Methodist Hospital
506 6th Street
Brooklyn, New York
718-780-3000

A map with directions to the hospital is shown in Figure 2. This information will either be posted prominently at the site or will be available to all personnel all of the time. Further, all field personnel, including the HSO & FTL, will know the directions to the hospital.

11.0 STANDING ORDERS/SAFE WORK PRACTICES

The standing orders, which consist of a description of safe work practices that must always be followed while on-site by Langan employees and contractors, are shown in Attachment A. The site HSO and FTL each have the responsibility for enforcing these practices. The standing orders will be posted prominently at the site or are made available to all personnel at all times. Those who do not abide by these safe work practices will be removed from the site.

12.0 SITE SECURITY

No unauthorized personnel must be permitted access to the work areas.

13.0 UNDERGROUND UTILITIES

As provided in Langan's Underground Utility Clearance Guidelines, the following safe work practices should be followed by Langan personnel and the contractor before and during subsurface work in accordance with federal, state, and local regulations:

- Obtain available utility drawings from the property owner/client or operator.

- Provide utility drawings to the project team.
- In the field, mark the proposed area of subsurface disturbance (when possible).
- Ensure that the utility clearance system has been notified.
- Ensure that utilities are marked before beginning subsurface work.
- Discuss subsurface work locations with the owner/client and contractors.
- Obtain approval from the owner/client and operators for proposed subsurface work locations.
- Use safe digging procedures when applicable.
- Stay at least 10-feet from all equipment performing subsurface work.

14.0 SITE SAFETY INSPECTION

The Langan HSO or alternate will check the work area daily, at the beginning and end of each work shift, or more frequently to ensure safe work conditions. The HSO or alternate must complete the Jobsite Safety Inspection Checklist, found in Attachment F. Any deficiencies must be shared with the FTL, HSM, and PM and will be discussed at the daily tailgate meeting.

15.0 HAND AND POWER TOOLS

All hand- and electric-power tools and similar equipment must be maintained in a safe operating condition. All electric-power tools must be inspected before initial use. Damaged tools must be removed immediately from service or repaired. Tools must be used only for the purpose for which they were designed. All users must be properly trained in their safe operation.

16.0 EMERGENCY RESPONSE

16.1 General

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures that are addressed in the following subsections include communications, local emergency support units, and preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures. In case of emergency, in addition to 911, call *WorkCare - Incident Intervention®* at 1-888-479-7787 to report their injuries. For all other communications, contact the Langan Incident Hotline at **973-560-4699** as soon as possible.

Should outside assistance be needed for accidents, fire, or release of hazardous substances, the emergency numbers will be available and posted at the site (Table 5) where a readily accessible telephone is made available for emergency use.

Also, in the event of an incident where a team member becomes exposed or suffers from an acute symptom from contact with site materials and has to be taken to a hospital, a short medical data sheet (Attachment C) for that individual will be made available to the attending physician. The medical data sheet will include the following:

- Name, address, home phone
- Age, height, weight
- Name of person to be notified in case of an accident.
- Allergies
- Particular sensitivities
- Does he/she wear contact lenses?
- Short checklist of previous illness
- Name of personal physician and phone
- Name of company physician and phone
- Prescription and non-prescription medications currently used.

An incident reporting form is included in Attachment C.

16.2 Responsibilities

16.2.1 Health and Safety Officer (HSO)

The HSO is responsible for ensuring that all personnel are evacuated safely, and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The HSO is responsible for ensuring the HSM is notified of all incidents, all injuries, near misses, fires, spills, releases, or equipment damage. The HSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the HSM can notify OSHA within the required time.

16.2.2 Emergency Coordinator

The HSO or their designated alternate will serve as the Emergency Coordinator. The Emergency Coordinator is responsible for ensuring that all personnel are evacuated safely, and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. They are also responsible for ensuring the HSM is notified of all incidents, all injuries, near misses, fires, spills, releases, or equipment damage. The Emergency Coordinator is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized.

The Emergency Coordinator must locate emergency phone numbers and identify hospital routes prior to beginning work on the sites. The Emergency Coordinator must make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator is responsible for implementing the Emergency Response Plan.

16.2.3 Site Personnel

Project site personnel are responsible for knowing the Emergency Response Plan and the procedures contained herein. All personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency. Project site personnel, including all subcontractors, will be trained in the Emergency Response Plan.

16.3 Communications

Once an emergency situation has been stabilized, or as soon as the injured Langan personnel can be transported should contact *WorkCare - Incident Intervention®* at 1-888-479-7787 to report their injuries. For all other communications, contact the Langan Incident Hotline at **973-560-4699** as soon as possible.

16.4 Local Emergency Support Units

In order to be able to deal with any emergency that might occur during investigative activities at the site, the Emergency Notification Numbers (Table 5) will be posted and provided to all personnel conducting work within the EZ.

Figure 2 shows the hospital route map. Outside emergency number 911 and local ambulance should be relied on for response to medical emergencies and transport to emergency rooms. Always contact first responders when there are serious or life-threatening emergencies on the site. Project personnel are instructed not to drive injured personnel to the Hospital. In the event of an injury, provide first aid and keep the injured party calm and protected from the elements, and treat for shock when necessary.

16.5 Pre-Emergency Planning

Langan will communicate directly with administrative personnel from the emergency room at the hospital to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and each site vehicle.

16.6 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, if an injury occurs, no matter how slight, it will be reported to the HSO immediately. First-aid equipment will be available on-site at the following locations:

- First Aid Kit: Contractor Vehicles
- Emergency Eye Wash: Contractor Vehicles

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that has been set up. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. First-aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

16.7 Personnel with current first aid and CPR certification will be identified.

Only in non-emergency situations may an injured person be transported to an urgent care facility. Due to hazards that may be present at the site and the conditions under which operations are conducted, an emergency may develop. Emergencies can be characterized as injury or acute chemical exposure to personnel, fire or explosion, environmental release, or hazardous weather conditions.

16.8 Emergency Site Evacuation Routes and Procedures

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs as a result of the site investigation activities, including but not limited to fire, explosion, or significant release of toxic gas into the atmosphere, the Langan Project Manager will be verbally notified immediately. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the nearest intersection to be accounted for and to receive further instructions.

If an emergency arises, the FTL will implement an immediate evacuation of all project personnel due to immediate or impending danger. The FTL will also immediately communicate with the contractor to coordinate any needed evacuation of the property.

The FTL or Site Supervisor will give necessary instructions until the Designated Incident Commander (IC) assumes control. After the emergency has been resolved, the FTL or Site Supervisor will coordinate with the IC and indicate when staff should resume their normal duties. If dangers are present for those at the designated assembly point, another designated location of assembly will be established.

It will be the responsibility of the FTL or Site Supervisor to report a fire or emergency, assess the seriousness of the situation, and initiate emergency measures until the arrival of the local fire fighters or other first responders, should they be necessary. The FTL, working with emergency responders, may also order the closure of the Site for an indefinite period as long as it is deemed necessary.

Under no circumstances will incoming visitors be allowed to proceed to the area of concern once an emergency evacuation has been implemented. Visitors or other persons present in the area of the emergency must be instructed to evacuate the area. The FTL will ensure that access roads are not obstructed and will remain on-site to provide stand-by assistance upon the arrival of emergency personnel.

If it is necessary to temporarily control traffic in the event of an emergency, those persons controlling traffic will wear proper reflection warning vests until the arrival of police or fire personnel.

16.8.1 Designated Assembly Locations

All personnel will evacuate the site and assemble at a designated assembly location. The assembly location will be designated by Langan personnel and discussed during each shift's pre-job safety briefing.

16.8.2 Accounting for Personnel

All contractor and subcontractor supervisors are responsible for the accounting of all personnel assembled at the designed assembly area. The Designated Incident Commander must be notified if personnel are not found.

16.9 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site and notification of the Langan Project Manager of the investigation activities. Portable fire extinguishers will be provided at the work zone. The extinguishers located in the various locations should also be identified prior to the start of work. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

16.9.1 Fire Prevention

Fires will be prevented by adhering to the following precautions:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.

- Shutting off engines to refuel.
- Grounding and bonding metal containers during transfer of flammable liquids.
- Use of UL approved flammable storage cans.
- Fire extinguishers rated at least 10-pounds ABC located on all heavy equipment, in all trailers and near all hot work activities.

The person responsible for the control of fuel source hazards and the maintenance of fire prevention and/or control equipment is the HSO.

16.10 Significant Vapor Release

Based on the proposed tasks, the potential for a significant vapor release is low. However, if a release occurs, the following steps will be taken:

- Move all personnel to an upwind location. All non-essential personnel must evacuate.
- Upgrade to Level C Respiratory Protection.
- Downwind perimeter locations must be monitored for volatile organics.
- If the release poses a potential threat to human health or the environment in the community, the Emergency Coordinator must notify the Langan Project Manager.
- Local emergency response coordinators will be notified.

16.11 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet (MSDS) will be followed, when necessary.

SKIN AND EYE: Use copious amounts of soap and water from eye-wash kits and portable hand-wash stations.

CONTACT: Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Skin must also be rinsed for 15 minutes if contact with caustics, acids, or hydrogen peroxide occurs. Affected items of clothing must also be removed from contact with skin.

Providing wash water and soap will be the responsibility of each individual contractor or subcontractor on-site.

16.12 Decontamination during Medical Emergencies

If emergency lifesaving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or omitted. The HSO or designee will accompany contaminated victims to the medical facility to advice on matters involving decontamination when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Respiratory equipment must always be removed.

Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, normal decontamination procedures will be followed.

16.13 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work will continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds).
- Limited visibility (fog).
- Potential for electrical storms.
- Earthquakes.
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The HSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

16.14 Spill Control and Response

All small spills/environmental releases must be contained as close to the source as possible. Whenever possible, the MSDS will be consulted to assist in determining proper waste characterization and the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust, or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. All spill containment materials will be properly disposed of. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill.

All contractor vehicles must have spill kits on them with enough material to contain and absorb the worst-case spill from that vehicle. All vehicles and equipment must be inspected prior to being admitted on-site. Any vehicle or piece of equipment that develops a leak will be taken out of service and removed from the job site.

The following seven steps must be taken by the Emergency Coordinator:

1. Determine the nature, identity, and amounts of major spills.
2. Make sure all unnecessary persons are removed from the spill area.
3. Notify the HSO immediately.
4. Use proper PPE in consultation with the HSO.
5. If a flammable liquid, gas, or vapor is involved, remove all ignition sources, and use non-sparking and/or explosion-proof equipment to contain or clean up the spill (diesel-only vehicles, air-operated pumps, etc.)
6. If possible, try to stop the leak with the appropriate material.
7. Remove all surrounding materials that can react or compound with the spill.

In addition to the spill control and response procedures described in this HASP, Langan personnel will coordinate with the designated project manager relative to spill response and control actions. Notification to the Project Manager must be immediate and, to the extent possible, include the following information:

- Time and location of the spill.
- Type and nature of the material spilled.
- Amount spilled.
- Whether the spill has affected or has a potential to affect a waterway or sewer.
- A brief description of affected areas/equipment.
- Whether the spill has been contained.
- Expected time of cleanup completion. If spill cleanup cannot be handled by Langan's on-site personnel alone, such fact must be conveyed to the Project Manager immediately.

Langan will not make any notification of spills to outside agencies. The client will notify regulatory agencies as per their reporting procedures.

16.15 Emergency Equipment

The following minimum emergency equipment must be kept and maintained on site:

- Industrial first aid kit.
- Fire extinguishers (one per site).

16.16 Restoration and Salvage

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies, and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers.
- Refilling medical supplies.
- Recharging eyewashes and/or showers.
- Replenishing spill control supplies.

16.17 Documentation

Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan Incident/Injury Hotline at 1-(800)-9-LANGAN (extension 4699) and the client representative to report the incident or near miss. For emergencies involving personnel injury and/or exposure, the HSO and affected employee will complete and submit an Employee Exposure/Injury Incident Report (Attachment C) to the Langan Corporate Health and Safety Manager as soon as possible following the incident.

17.0 SPECIAL CONDITIONS

This guideline contains information and requirements for special conditions that may not be routinely encountered.

17.1 Scope

The guideline applies to the specific projects identified within this document. Additional provisions will be addressed in each Site-Specific HEALTH AND SAFETY PLAN (HASP), as needed.

17.2 Responsibilities

Site Personnel - All site personnel must be alert to safety hazards on work sites and take action to minimize such hazards. Personnel must utilize the buddy system, watch for inappropriate behavior, and be alerted to changes in site conditions.

Health and Safety Officer (HSO) - The HSO is responsible for considering these procedures in the development of site-specific HASPs. The HSO must schedule frequent "tail gate" safety briefings to enhance safety awareness and discuss potential problems.

17.3 Procedures

The procedures outlined below must be followed when such conditions are encountered.

17.3.1 Ladders

Langan safety procedures must be used to ensure employee safety when using ladders in the office or work sites. All ladders must be coated or repaired to prevent injury to the employee from punctures or lacerations and to prevent snagging or clothing. Any wood ladders used must have an opaque covering except for identification or warning labels, which may be placed on one face only of a side rail.

17.3.1.1 Ladder Use

Employees must only use ladders for the purposes they were designed for and must not be used as scaffolding. Ladders will be maintained and inspected prior to use for slip hazards including oil and grease. Employees must use ladders only on stable and level surfaces unless the ladder is secured to prevent its movement. Ladders should not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Ladders should not be used in locations where they could be displaced by workplace activities or traffic. Ladder rungs, cleats and steps must be parallel, level and uniformly spaced when the ladder is in the use position.

Employees should not be carrying anything including equipment that could cause injury if there was a fall while utilizing the ladder. The top and bottom of the ladder area must remain clear while in use. When ascending and descending the ladder, employees must face the ladder.

Ladders must not be loaded beyond the maximum intended load for which they were built or the manufacturer's rated capacity.

17.3.1.2 Portable Ladders

Rungs, cleats, and steps for portable ladders and fixed ladders must be spaced not less than 10 inches apart, nor more than 14-inches apart, as measured between center lines of the rungs, cleats, and steps. When used to access an upper landing surface, the ladder side rails must extend at least three feet above the upper landing surface to which the ladder is used to gain access. If this is not possible, due to the length of the ladder, then the top of the ladder must be secured at its top to a rigid support.

17.3.1.3 Step Stools

Rungs, cleats, and steps of step stools must not be less than 8-inches apart, nor more than 12-inches apart, as measured between center lines of the rungs, cleats, and steps.

17.3.1.4 Extension Ladders

Rungs, cleats, and steps of the base section of extension trestle ladders must be spaced not less than 8 inches apart, nor more than 18-inches apart, as measured between center lines of the rungs, cleats, and steps. The rung spacing on the extension section of the extension trestle ladder must not be less than 6 inches nor more than 12-inches, as measured between the center lines of the rungs, cleats and steps. Ladders must be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).

17.3.1.5 Inspection

Ladders will be inspected for visible detects periodically, prior to utilization or after any occurrence that could have negatively affected the ladder. Portable ladders with defects including broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty components must not be used. The ladder will be immediately marked as defective, tagged as "Do Not Use" or blocked from being used and removed from service until repaired.

17.3.2 First Aid/Cardiopulmonary Resuscitation (CPR)

Langan field and office personnel will be encouraged to be trained in First Aid and Cardiopulmonary Resuscitation (CPR). Training will be provided free of charge by Langan to all employees. Employees will receive a training certificate that will be kept on file with the Health & Safety Coordinator (HSC). Training and certification will be provided by a credited provider such as American Red Cross or equivalent.

17.3.2.1 Emergency Procedures

Prior to site work, the Langan employees certified in first aid and CPR will be identified in the site-specific HASP. Langan will endear to have at least one employee at a job site trained and able to render first aid and CPR. The site-specific HASP will contain first aid information on both potential chemical and physical hazards. Emergency procedures to be followed in case of injury or illnesses are provided in the HASP. The HASP will include emergency contact information including local police and fire departments, hospital emergency rooms, ambulance services, on-site medical personnel, and physicians. The HASP will also include directions and contact information for the nearest emergency facility in case immediate medical attention is required.

The emergency contact information will be conspicuously posted at the worksite. Employees that are injured and require immediate medical attention must call either 911 or the local posted emergency contacts. Employees should use ambulatory services to transport injured workers to the nearest facility for emergency medical care. In areas where 911 is not available, the telephone numbers of physicians, hospitals, or ambulances must be conspicuously posted.

17.3.2.2 First Aid Supplies

First aid supplies are readily available to all Langan employees when required. First aid kits are located in each Langan office. Portable first aid kits are available for employees to use at work sites. First aid kits should consist of items needed to treat employees for potential chemical and physical injuries. At a minimum, first aid kits should contain items to allow basic first aid to be rendered. Where the eyes or body of an employee may be exposed to corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body must be provided within the work area for immediate emergency use including eye wash.

First aid kits will be weatherproof with individually sealed packages of each item. All portable first aid kits must be inspected by Langan employees before and after use to ensure all used items are replaced. When out in the field, employees must check first aid kits weekly to ensure used items are replaced.

17.3.3 Hydrogen Sulfide

Langan employees with the potential to be exposed to hydrogen sulfide while at work sites must have training in hydrogen sulfide awareness. The training will include the identification of areas where employees could be exposed to hydrogen sulfide, health effects, permissible exposure limits, first aid procedures, and personnel protective equipment. Langan employees could be exposed to hydrogen sulfide while at job sites including petroleum refineries, hazardous waste treatment, storage and disposal facilities, uncontrolled hazardous waste sites, and remediation projects.

17.3.3.1 Characteristics

Hydrogen sulfide is a colorless gas with a strong odor of rotten eggs that is soluble in water. Hydrogen sulfide is used to test and make other chemicals. It is also found as a by-product of chemical reactions, such as in sewer treatment. It is a highly flammable gas and a dangerous fire hazard. Poisonous gases are produced in fires including sulfur oxides. Hydrogen sulfide is not listed as a carcinogen.

17.3.3.2 Health Effects

Hydrogen Sulfide can affect employees if inhaled or through contact with skin or eyes. Acute (or short-term) health effects of hydrogen sulfide exposure include irritation of the nose and throat, dizziness, confusion, headache, and trouble sleeping. Inhalation of hydrogen sulfide can irritate the lungs causing coughing and/or shortness of breath. Higher levels of exposure can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

Chronic (or long-term) health effects of low levels of exposure to hydrogen sulfide can cause pain and redness of the eyes with blurred vision. Repeated exposure may cause bronchitis with cough, phlegm, and shortness of breath.

17.3.3.3 Protective Clothing and Equipment

Respirators are required for those operations in which employees will be exposed to hydrogen sulfide above OSHA permissible exposure level. The maximum OSHA permissible exposure limit (PEL) for hydrogen sulfide is 20-parts of hydrogen sulfide vapor per million parts of air (20 ppm) for an 8-hour workday and the maximum short-term exposure limit (STEL) is 10 ppm for any 10-minute period.

Where employees are exposed to levels up to 100-parts of hydrogen sulfide vapor per million parts of air (100 ppm), the following types of respiratory protection are allowed:

- Any powered, air-purifying respirator with cartridge(s).
- Any air-purifying, full-facepiece respirator (gas mask) with a chin style, front- or back-mounted canister.
- Any supplied air system with escape self-contained breathing apparatus, if applicable; and,
- Any self-contained breathing apparatus with a full facepiece.

Respirators used by employees must have joint Mine Safety and Health Administration and the National Institute for Occupational Safety and Health (NIOSH) seal of approval. Cartridges or canisters must be replaced before the end of their service life, or the end of the shift, whichever occurs first. Langan employees that have the potential to be exposed to hydrogen sulfide will be trained in the proper use of respirators. Respirator training is discussed under– Langan's Respiratory Protection Program.

Employees with potential exposure to hydrogen sulfide, or when required by the client, will wear a portable hydrogen sulfide gas detector. The detector should have an audible, visual, and vibrating alarm. The detector may also provide detection for carbon monoxide, sulfur dioxide, and oxygen-deficient atmospheres. The hydrogen sulfide monitor will, at a minimum, be calibrated to detect hydrogen sulfide at a level of 20-parts of hydrogen sulfide vapor per million parts of air (20 ppm). Many portable gas detectors will have factory defaults with a low-level alarm at 10 ppm and a high-level alarm at 15 ppm. Langan employees must consult clients to determine if any site-specific threshold levels exist.

If the hydrogen sulfide gas detector sounds and employees are not wearing appropriate respiratory protection, employees must immediately vacate the area and meet at the assigned emergency location. Langan employees may not re- enter the site without proper respiratory protection and approval from the client or property owner if needed.

Employees must wear PPE to prevent eye and skin contact with hydrogen sulfide. Employees must wear appropriate protective clothing including boots, gloves, sleeves, and aprons, over any parts of their body that could be exposed to hydrogen sulfide. Non-vented, impact-resistant goggles should be worn when working with or exposed to hydrogen sulfide.

17.3.3.4 Emergency and First Aid Procedures

Eye and Face Exposure

If hydrogen sulfide comes in contact with eyes, it should be washed out immediately with large amounts of water for 30 minutes, occasionally lifting the lower and upper eye lids. Seek medical attention immediately.

Skin Exposure

If hydrogen sulfide contaminates clothing or skin, remove the contaminated clothing immediately and wash the exposed skin with large amounts of water and soap. Seek medical attention immediately. Contaminated clothing should either be disposed of or washed before wearing again.

Breathing

If a Langan employee or other personnel breathe in hydrogen sulfide, immediately get the exposed person to fresh air. If breathing has stopped, artificial respiration should be started. Call for medical assistance or a doctor as soon as possible.

Safety Precautions

Hydrogen sulfide is a highly flammable gas and a dangerous fire hazard. Containers of hydrogen sulfide may explode in a fire situation. Poisonous gases are produced during fires.

Langan employees should contact property owners and operators prior to conducting work onsite to be aware of any site-specific contingency plans, identify where hydrogen sulfide is used at the facility, and be informed about additional safety rules or procedures.

17.3.4 Fire Protection/Extinguishers

Langan field personnel that have been provided with portable fire extinguishers for use at worksites will be trained to familiarize employees with general principles of fire extinguisher use and hazards associated with the incipient stage of firefighting. Training will be provided prior to the initial assignment for field work and annually thereafter.

Portable fire extinguishers must be visually inspected monthly and subjected to an annual maintenance check. Langan will retain records of the annual maintenance date.

17.3.5 Overhead lines

When field work is performed near overhead lines, the lines must be de-energized and grounded, or other protective measures must be provided before the work commences. If overhead lines are to be de-energized, arrangements must be made with the client, property owner, or organization that operates or controls the electric circuits involved to de-energize and ground them. If protective measures, such as guarding, isolating, or insulating, are provided, these precautions must prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.

When unqualified Langan personnel are working in an elevated position near overhead lines, the location must be such that the person and the longest conductive object they may contact cannot come closer to any unguarded, energized overhead line than the following distances:

1. For voltages to ground 50-kilovolts (kV) or below - 10-feet; and
2. For voltages to ground over 50kV - 10-feet, plus 4-inches for every 10kV over 50kV.

As previously indicated, Langan does not retain qualified employees to perform work on energized equipment.

17.3.5.1 Vehicle and Equipment Clearance

Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines must be operated so that a clearance of 10-feet is maintained. If the voltage of the overhead lines is higher than 50kV, the clearance must be increased by 4-inches for every 10kV over that voltage.

If any of the following discussed conditions occur, the clearance may be reduced.

- If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4-ft. If the voltage is higher than 50kV, the clearance must be increased to 4-inches for every 10 kV over that voltage.
- If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the line being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments unless the employee is using protective equipment rated for the voltage, or the equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path to employees on the ground) can come closer to the overhead line than permitted.

If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of overhead line contact. Additional precautions, such as the use of barricades or insulation, must be taken to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents, which can develop within the first few feet or more outward from the grounding point.

17.3.6 Trade Secret

Langan employees could potentially be provided trade secret information by the client or property owner when site-specific information is provided about highly hazardous chemicals. Trade secret means any confidential formula, pattern, process, device, information, or compilation of information that is used in an employer's business, and that allows the employer to obtain an advantage over competitors who do not know or use it. Langan employees understand that this information should be kept confident and if required, may enter into a confidentiality agreement with the client.

17.3.7 Bloodborne Pathogens

Langan employees that can anticipate exposure to blood or other potentially infectious material while at work sites must have training in bloodborne pathogens. Applicable employees would include those trained in first aid and serving a designated role as an emergency medical care provider. Bloodborne pathogens are pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include but are not limited to, hepatitis B virus and human immunodeficiency virus.

17.3.7.1 Training

Langan employees with potential occupational exposure to blood or other potentially infectious material must participate in a training program. Training must be conducted prior to the initial assignment where there would be potential for exposure and annually thereafter within one year of previous training. The training program will be provided to Langan employees at no cost to them and during working hours.

Langan will ensure the training program must consist of the following:

- An accessible copy of the regulatory text of 29 CFR 1910.1030 and an explanation of its contents.
- A general explanation of the epidemiology and symptoms of bloodborne diseases.
- An explanation of the modes of transmission of bloodborne pathogens.
- An explanation of Langan's exposure control plan and how the employee can obtain a copy of the written plan.
- An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials.
- An explanation of the use and limitations of personal protective equipment (PPE) to prevent and reduce exposure.
- Information on the types, proper use, location, removal, handling, and disposal of PPE.
- An explanation of the basis for the selection of PPE.
- Information on the hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated, and that the vaccine and vaccination will be offered free of charge.
- Information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials.
- An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available.
- Information on the post-exposure evaluation and determining whether the employer is required to provide for the employee following an exposure incident.
- An explanation of the signs and labels and/or color coding required by paragraph 29 CFR 1910.1030(g)(1); and
- An opportunity for interactive questions and answers with the person conducting the training session.

Langan will develop and implement a written Exposure Control Plan, which will be designed to eliminate or minimize employee exposure to bloodborne pathogens. The Exposure Control Plan will contain the following elements:

- An exposure determination for employees.
- The schedule and method of implementation for Methods of Compliance (29 CFR 191.1030(d)), Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up (29 CFR 1910.1030(f)), Communication of Hazards to Employees (29 CFR 1910.1030(g)) and (h) Recordkeeping (29 CFR 1910.1030(h)).
- The procedure for the evaluation of circumstances surrounding exposure incidents.
- Ensure a copy of the Exposure Control Plan will be accessible to employees; and,
- The Exposure Control Plan must be reviewed and updated at least annually.

Langan employees with occupational exposure to bloodborne pathogens include any employees trained in first aid that would be expected to provide emergency medical care. This determination is made without regard to the use of PPE, which could eliminate or minimize exposure.

Universal precautions must be observed to prevent contact with blood or other potentially infectious materials. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for bloodborne pathogens. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids must be considered potentially infectious materials.

Work practice controls must be used to eliminate or minimize employee exposure, if applicable. Since Langan employees will have occupational exposure only during the rendering of first aid, personnel protective equipment will be utilized to reduce or minimize exposure. PPE that could be available to Langan personnel when administering first aid includes safety glasses, gloves, and Tyvek suits or sleeves. PPE and first aid kits will be provided to employees at no cost to them.

Langan employees that render first aid in office areas will have access to hand-washing facilities or restrooms. For first aid rendered at field locations, first aid kits will contain an appropriate antiseptic hand cleanser and clean cloth/paper towels or antiseptic towelettes. After using antiseptic hand cleansers or towelettes, employees must wash their hands with soap and running water as soon as feasible.

After administering first aid, potentially infectious materials, including towels, personnel protective equipment, clothes, and bandages, must be placed in a container, which prevents leakage during collection, handling, processing, storage, transport, or shipping. All PPE will be disposed of after use. Any equipment or working surfaces which was been exposed to blood or potentially infectious materials due to an injury will be decontaminated prior to reuse.

Langan will make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident. These services will be available to the employee at no cost to them through a medical provider.

17.3.7.2 Recordkeeping

Langan will maintain training and medical records for each employee with occupational exposure to blood or potentially infectious materials. Medical and training records will be maintained by Langan's H&S Department.

Training records will include the following:

- Dates of the training sessions.
- Contents or a summary of the training sessions.
- Names and qualifications of persons conducting the training; and
- Names and job titles of all persons attending the training sessions.

Training records must be maintained for 3 years from the date on which the training occurred. Medical records will be preserved and maintained for the duration of employment plus 30 years.

All records will be made available upon request to employees, the Assistant Secretary of Labor for Occupational Safety and Health, and the Director of the National Institute for Occupational Safety and Health Director of OSHA for examination and copying. Medical records must have written consent from the employee before releasing.

If Langan ceases to do business, all records must be transferred to the successor employer. The successor employer must receive and maintain these records.

If there will not be a successor, Langan will notify current employees of their rights to access records at least three months prior to the cessation of business.

18.0 RECORDKEEPING

The following is a summary of required health and safety logs, reports, and recordkeeping.

18.1 Field Change Authorization Request

Any changes to the work to be performed that are not included in the HASP will require an addendum that is approved by the Langan project manager and Langan HSM to be prepared. Approved changes will be reviewed with all field personnel at a safety briefing.

18.2 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training, documentation of three-day on-the-job training (OJT)), and respirator fit-test records) and medical clearance for site work and respirator use will be maintained in the office and available upon request. Records for all subcontractor employees must also be available upon request. All employee medical records will be maintained by the HSM.

18.3 Onsite Log

A log of personnel on-site each day will be kept by the HSO or designee.

18.4 Daily Safety Meetings ("Tailgate Talks")

Completed safety briefing forms will be maintained by the HSO.

18.5 Exposure Records

All personal monitoring results, laboratory reports, calculations, and air sampling data sheets are part of an employee exposure record. These records will be maintained by the HSO during site work. At the end of the project, they will be maintained according to 29 CFR 1910.1020.

18.6 Hazard Communication Program/MSDS-SDS

Material safety data sheets (MSDS) Safety Data Sheets (SDS) have been obtained for applicable substances and are included in this HASP (Attachment D). Langan's written hazard communication program, in compliance with 29 CFR 1910.1200, is maintained by the HSM.

18.7 Documentation

Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan incident/injury hotline at 1-800-952-6426, extension 4699, and the Project Manager to report the incident or near miss. The Project Manager will contact the client or client representative. A written report must be completed and submitted HSM within 24 hours of the incident. For emergencies involving personnel injury and/or exposure, the employee will complete and submit the Langan incident/injury report to the Langan corporate health and safety manager as soon as possible following the incident. Accidents will be investigated in-depth to identify all causes and to recommend hazard control measures.

18.7.1 Accident and Injury Report Forms

18.7.1.1 Accident/Incident Report

All injuries, no matter how slight, must be reported to the FTL and the PM immediately. The accident/incident report forms, attached in Attachment C, will be filled out on all accidents by the applicable contractor supervision personnel, the FTL, or the HSO. Copies of all accident/incident reports must be kept on-site and available for review. Project personnel will be instructed on the location of the first aid station, hospital, and doctor and ambulance service near the job. The emergency telephone numbers will be conspicuously posted in site vehicles near the work zone. First aid supplies will be centrally located and conspicuously posted between restricted and nonrestricted areas to be readily accessible to all on the site.

18.7.1.2 First Aid Treatment Record

The forms will be used for recording all non-lost time injuries treated by the project first-aid attendant, the local physician or hospital will be entered in detail on this record. "Minor" treatment of scratches, cuts, etc. will receive the same recording attention as treatment of more severe injuries.

18.7.1.3 OSHA Form 300

An OSHA Form 300 will be kept at the Langan Corporate Office in Parsippany, New Jersey. All recordable injuries or illnesses will be recorded on this form. Subcontractor employers must also meet the requirements of maintaining an OSHA 300 form. The Incident Report form used to capture the details of work-related injuries/illnesses meets the requirements of the OSHA Form 301 (supplemental record) and must be maintained with the OSHA Form 300 for all recordable injuries or illnesses. Forms for recording OSHA work-related injuries and illnesses are included in Attachment C.

19.0 CONFINED SPACE ENTRY

Confined spaces are not anticipated at the Site during planned construction activities. If confined spaces are identified, the contractor must implement their own confined space program that all applicable federal, state, and local regulations. Confined spaces **will not** be entered by Langan personnel.

20.0 HASP ACKNOWLEDGEMENT FORM

All Langan personnel and contractors will sign this HASP Compliance Agreement indicating that they have become familiar with this HASP and that they understand it and agree to abide by it.

Printed Name	Signature	Company	Date

TABLES

TABLE 1
TASK HAZARD ANALYSES

Task	Hazard	Description	Control Measures	First Aid
1.3.1 – 1.3.14	Contaminated Soil or Groundwater-Dermal Contact	Contaminated water spills on skin, splashes in eyes; contact with contaminated soil/fill during construction activities or sampling.	Wear proper PPE; follow safe practices, maintain safe distance from construction activities	See Table 2, seek medical attention as required
1.3.1 – 1.3.14	Lacerations, abrasions, punctures	Cutting bailer twine, pump tubing, acetate liners, etc. with knife; cuts from sharp site objects or previously cut piles, tanks, etc.; Using tools in tight spaces	Wear proper PPE; follow safe practices	Clean wound, apply pressure and/or bandages; seek medical attention as required.
1.3.1 – 1.3.14	Contaminated Media Inhalation	Opening drums, tanks, wells; vapors for non-aqueous phase liquids or other contaminated site media; dust inhalation during excavation; vapor accumulation in excavation	Follow air monitoring plan; have quick access to respirator, do not move or open unlabeled drums found at the site, maintain safe distance from construction activities	See Table 2, seek medical attention as required
1.3.1 – 1.3.14	Lifting	Improper lifting/carrying of equipment and materials causing strains	Follow safe lifting techniques. Langan employees are not to carry contractor equipment or materials	Rest, ice, compression, elevation; seek medical attention as required
1.3.1 – 1.3.14	Slips, trips, and falls	Slips, trips, and falls due to uneven surfaces, cords, steep slopes, debris, and equipment in work areas	Good housekeeping at site; constant awareness and focus on the task; avoid climbing on stockpiles; maintain safe distance from construction activities and excavations; avoid elevated areas over six feet unless fully accredited in fall protection and wearing an approved fall protection safety apparatus	Rest, ice, compression, elevation; seek medical attention as required
1.3.1 – 1.3.14	Noise	Excavation equipment, hand tools, drilling equipment.	Wear hearing protection; maintain safe distance from construction activities	Seek medical attention as required
1.3.1 – 1.3.14	Falling objects	Soil material, tools, etc. dropping from drill rigs, front-end loaders, etc.	Hard hats to be worn at all times while in work zones; maintain safe distance from construction activities and excavations	Seek medical attention as required
1.3.1 – 1.3.14	Underground/ overhead utilities	Excavation equipment, drill rig auger contacts underground object; boom touches overhead utility	"One Call" before dig; follow safe practices; confirm utility locations with contractor; wear proper PPE; maintain safe distance from construction activities and excavations	Seek medical attention as required
1.3.1 – 1.3.14	Insects (bees, wasps, hornet, mosquitoes, and spider)	Sings, bites	Insect Repellent; wear proper protective clothing (work boots, socks and light colored pants); field personnel who may have insect allergies (e.g., bee sting) should provide this information to the HSO or FSO prior to commencing work, and will have allergy medication on site.	Seek medical attention as required
1.3.1 – 1.3.14	Vehicle traffic / Heavy Equipment Operation	Vehicles unable to see workers on site, operation of heavy equipment in tight spaces, equipment failure, malfunctioning alarms	Wear proper PPE, especially visibility vest; use a buddy system to look for traffic; rope off area of work with cones and caution tape or devices at points of hazard, maintain safe distance from construction activities and equipment	Seek medical attention as required

TABLE 2
CONTAMINANT HAZARDS OF CONCERN

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	1,2,4-Trimethylbenzene	95-63-6	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	1,3,5-Trimethylbenzene Mesitylene sym-Trimethylbenzene	108-67-8	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	1,4-Dioxane 1,4-Dioxacyclohexane [1,4]Dioxane p-Dioxane [6]-crown-2 Diethylene dioxide Diethylene ether Dioxan Dioxane 1,4-Dioxane	123-91-1	PID	100 ppm 500 ppm	Groundwater Soil Vapor	Inhalation, ingestion, skin and/or eye contact	Irritant to eyes, skin, mucous membranes and respiratory system. May be harmful by ingestion, skin absorption and inhalation	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	4,4'-DDD Dichlorodiphenyldichloroethane 1,1'-(2,2-Dichloroethylidene)bis (4-chlorobenzene) p,p'-DDD	72-54-8	None	NA NA	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Acenaphthene 1,2-Dihydroacenaphthylene 1,8-Ethylenenaphthalene peri-Ethylenenaphthalene Naphthyleneethylene Tricyclododecapentaene	83-32-9	PID	NA NA	Soil	inhalation, ingestion, skin and/or eye contact,	irritation to the skin, eyes, mucous membranes and upper respiratory tract; If ingested, it can cause vomiting	Eye: Irrigate immediately Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Acenaphthylene Cycopental(de)naphthalene, Acenaphthalene	208-96-8	PID	NA NA	Soil	inhalation, ingestion, skin and/or eye contact	irritation to the skin, eyes, mucous membranes and upper respiratory tract	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately
1.3.1 – 1.3.14	Anthracene	120-12-7	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to the skin, eyes, mucous membranes and upper respiratory tract, abdominal pain if ingested.	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, Breathing: Move to fresh air, refer to medical attention; Swallow: refer to medical attention
1.3.1 – 1.3.14	Asbestos	1332-21-4	NA	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	Asbestosis (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger clubbing; irritation eyes; [potential occupational carcinogen]	Eye: Irrigate immediately Breathing: Fresh air

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Benzo(a)anthracene Benzanthracene Benzanthrene 1,2-Benzanthracene Benzo[b]phenanthrene Tetraphene	56-55-3	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Benzo(a)pyrene	50-32-8	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately, seek medical attention Skin: Soap wash immediately; Breathing: move to fresh air; Swallow: Induce vomiting if conscious, seek medical attention immediately
1.3.1 – 1.3.14	Benzo(b)fluoranthene	205-99-2	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Benzo(g,h,i)perylene Benzo(ghi)perylene	191-24-2	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	NA	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.14	Benzo(k)fluoranthene	207-08-9	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.14	BTEX Benzene, Toluene, Ethylbenzene M-Xylene, O-Xylene And P-Xylene; BTEX I; BTEX II; BTEX Mixture I; BTEX Mixture II; BTEX Stock Standard	NA	PID	3.19 mg/m^3 1,595 mg/mg^3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; lassitude (weakness, exhaustion) [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Chromium Total-	7440-47-3	None	1.0 mg/m^3 250 mg/m^3	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Chromium Hexavalent- Chromium VI	18540-29-9	None	52 µg/m^3 15 mg/m^3	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Chromium Trivalent- Chromium III	NA	None	0.50 mg/m^3 25 mg/m^3	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Coal Tar Pitch Coal Tar Pitch Volatiles	80007-45-2 65996-93-2	None	0.1 mg/m3 80 mg/m3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, respiratory system	Eye: Irrigate immediately Skin: Water flush promptly Breathing, Remove to fresh air, Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	DDE 4,4-DDE 4,4'-DDE 1,1-bis-(4-chlorophenyl)-2,2-dichloroethene Dichlorodiphenyldichloroethylene p,p'-DDE	72-55-9	None	NA NA	Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	Oral ingestion of food is the primary source of exposure for the general population. Acute and chronic ingestion may cause nausea, vomiting, diarrhea, stomach pain, headache, dizziness, disorientation, tingling sensation, kidney damage, liver damage, convulsions, coma, and death. 4,4' DDE may cross the placenta and can be excreted in breast milk	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	DDT 4,4-DDT 4,4'-DDT p,p'-DDT Dichlorodiphenyltrichloroethane 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane	50-29-3	None	1 mg/m^3 500 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Diesel Fuel automotive diesel fuel oil No. 2 distillate diesoline diesel oil diesel oil light diesel oil No. 1-D summer diesel	68334-30-5	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Ethanol Absolute alcohol Alcohol cologne spirit drinking alcohol ethane monoxide ethylic alcohol EtOH ethyl alcohol ethyl hydrate ethyl hydroxide ethylol grain alcohol hydroxyethane methylcarbinol	64-17-5	PID	1000 ppm 3300 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose; headache, drowsiness, lassitude (weakness, exhaustion), narcosis; cough; liver damage; anemia; reproductive, teratogenic effects	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.14	Ethyl benzene Ethylbenzene Ethylbenzol Phenylethane	100-41-4	PID	435 mg/m3 3,472 mg/m3	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Fluoranthene Benzo(j, k)fluorene	206-44-0	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.14	Fluorene	86-73-7	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.14	Fuel Oil No. 2	68476-30-2	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Gasoline	8006-61-9	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Helium	7440-59-7	Helium Detector	NA NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.14	Indeno(1,2,3-cd)pyrene	193-39-5	None	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eyes, skin, respiratory, and digestion [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support Swallow: Medical attention immediately, wash mouth with water
1.3.1 – 1.3.14	Lead	7439-92-1	None	0.050 mg/m^3 100 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation to the eyes; hypertension	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Methyl *tert*-butyl ether MTBE Methyl tertiary-butyl ether Methyl t-butyl ether tert-Butyl methyl ether tBME tert-BuOMe	1634-04-4	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	m-Xylenes 1,3-Dimethylbenzene m-Xylol Metaxylene	108-38-3	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Naphthalene Naphthalin Tar camphor White tar	91-20-3	PID	50 mg/m^3 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; hematuria (blood in the urine); dermatitis, optical neuritis	Eye: Irrigate immediately Skin: Molten flush immediately/solid-liquid soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Nickel	7440-02-0	None	NA 10 mg/m3	Groundwater Soil	ion, ingestion, skin and/or eye contact	sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Non-Flammable Gas Mixture CALGAS (Equipment Calibration Gas : Oxygen Methane Hydrogen Sulfide Carbon Monoxide Nitrogen	7782-44-7 74-82-8 7783-08-4 830-08-0 7727-37-9	Multi-Gas PID	NA/NA NA/NA 10/100 ppm 50/1200 ppm NA/NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.14	Non-Flammable Gas Mixture CALGAS (Equipment Calibration Gas : Oxygen Isobutylene Nitrogen	7782-44-7 115-11-7 7727-37-9	PID	NA/NA NA/NA NA/NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.14	OilScreenSoil (Indigo Blue)® non-SUDAN-based dye	17354-14-2	None	NA NA	NA	inhalation, skin absorption, ingestion, skin and/or eye contact	NA	Eye: Irrigate immediately Skin: Water flush promptly Breathing: move into fresh air, provide respiratory support , if required Swallow: Rinse with water

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	o-Xylenes 1,2-Dimethylbenzene ortho-Xylene o-Xylol	95-47-6	PID	100 ppm 900 ppm	Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Pentachlorophenol PCP; Penta; 2,3,4,5,6-Pentachlorophenol	87-86-5	PID	0.5 mg/m3 2.5 mg/m3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; sneezing, cough; lassitude (weakness, exhaustion), anorexia, weight loss; sweating; headache, dizziness; nausea, vomiting; dyspnea (breathing difficulty), chest pain; high fever; dermatitis	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	PFAS Polyfluoroalkyl Substances	355-42-0	NA	NA NA	Soil Groundwater Vapor	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Polycyclic Aromatic Hydrocarbons PAHs Dichloromethane PAH-HM16C	Assorted Numbers	NA	5 mg/m3 250 ppm	Soil Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.14	p-Xylenes 1,4-Dimethylbenzene para-Xylene p-Xylol	106-42-3	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Silica, Crystalline Silica Respiratory Dust Cristobalite Quartz Tridymite Tripoli	14808-60-7	Dust Monitoring Device	30 mg/m3/% SiO2 +2) for quartz ½ 30mg/m3/ %SiO2 +2) for amorphous silica 25 mg/m3 (Cristobalite, Tridymite) 50 mg/m3 (quartz tripoli	Soil Vapor	inhalation, skin and/or eye contact	Cough, dyspnea (breathing difficulty), wheezing; decreased pulmonary function, progressive respiratory symptoms (silicosis); irritation eyes; [potential occupational carcinogen]	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.14	Tetrachloroethylene Perchlorethylene Perchloroethylene PCE Perk Tetrachlorethylene Tetrachloroethene	127-18-4	PID	100 ppm 150 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Toluene Methyl benzene Methyl benzol Phenyl methane Toluol	108-88-3	PID	200 ppm 500 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, paresthesia; dermatitis	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Total PCBs Chlorodiphenyl (42% chlorine) Aroclor® 1242 PCB Polychlorinated biphenyl	53469-21-9	None	0.5 mg/m^3 5 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Total Petroleum Hydrocarbons TPH	CASID30220	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.14	Total Xylenes Dimethylbenzene Xylol	1330-20-7	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentratio n on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.14	Trichloroethylene Trichloroetheneylenes Ethylene trichloride TCE Trichloroethene Trilene	79-01-6	PID	100 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

EXPLANATION OF ABBREVIATIONS

PID = Photoionization Detector
PEL = Permissible Exposure Limit (8-hour Time Weighted Average)
IDLH = Immediately Dangerous to Life and Health
ppm = part per million
mg/m^3 = milligrams per cubic meter
500 mg/m^3

TABLE 3
SUMMARY OF MONITORING EQUIPMENT

Instrument	Operation Parameters
Photoionization Detector (PID)	**Hazard Monitored:** Many organic and some inorganic gases and vapors. **Application:** Detects total concentration of many organic and some inorganic gases and vapors. Some identification of compounds is possible if more than one probe is measured. **Detection Method:** Ionizes molecules using UV radiation; produces a current that is proportional to the number of ions. **General Care/Maintenance:** Recharge or replace battery. Regularly clean lamp window. Regularly clean and maintain the instrument and accessories. **Typical Operating Time:** 10 hours. 5 hours with strip chart recorder.
Oxygen Meter	**Hazard Monitored:** Oxygen (O_2). **Application:** Measures the percentage of O_2 in the air. **Detection Method:** Uses an electrochemical sensor to measure the partial pressure of O_2 in the air and converts the reading to O_2 concentration. **General Care/Maintenance:** Replace detector cell according to manufacturer's recommendations. Recharge or replace batteries prior to explanation of the specified interval. If the ambient air is less than 0.5% C O_2, replace the detector cell frequently. **Typical Operating Time:** 8 – 12 hours.
Additional equipment (if needed, based on site conditions)	
Combustible Gas Indicator (CGI)	**Hazard Monitored:** Combustible gases and vapors. **Application:** Measures the concentration of combustible gas or vapor. **Detection Method:** A filament, usually made of platinum, is heated by burning the combustible gas or vapor. The increase in heat is measured. Gases and vapors are ionized in a flame. A current is produced in proportion to the number of carbon atoms present. **General Care/Maintenance:** Recharge or replace battery. Calibrate immediately before use. **Typical Operating Time:** Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.
Flame Ionization Detector (FID) with Gas Chromatography Option *(i.e., Foxboro Organic Vapor Analyzer (OVA))*	**Hazard Monitored:** Many organic gases and vapors (approved areas only). **Application:** In survey mode, detects the concentration of many organic gases and vapors. In gas chromatography (GC) mode, identifies and measures specific compounds. In survey mode, all the organic compounds are ionized and detected at the same time. In GC mode, volatile species are separated. **General Care/Maintenance:** Recharge or replace battery. Monitor fuel and/or combustion air supply gauges. Perform routine maintenance as described in the manual. Check for leaks. **Typical Operating Time:** 8 hours; 3 hours with strip chart recorder.
Potable Infrared (IR) Spectrophotometer	**Hazard Monitored:** Many gases and vapors. **Application:** Measures concentration of many gases and vapors in air. Designed to quantify one or two component mixtures. **Detection Method:** Passes different frequencies of IR through the sample. The frequencies absorbed are specific for each compound. **General Care/Maintenance:** As specified by the manufacturer.

Instrument	Operation Parameters
Direct Reading Colorimetric Indicator Tube	**Hazard Monitored:** Specific gas and vapors. **Application:** Measures concentration of specific gases and vapors. **Detection Method:** The compound reacts with the indicator chemical in the tube, producing a stain whose length or color change is proportional to the compound's concentration. **General Care/Maintenance:** Do not use a previously opened tube even if the indicator chemical is not stained. Check pump for leaks before and after use. Refrigerate before use to maintain a shelf life of about 2 years. Check expiration dates of tubes. Calibrate pump volume at least quarterly. Avoid rough handling which may cause channeling.
Aerosol Monitor	**Hazard Monitored:** Airborne particulate (dust, mist, fume) concentrations. **Application:** Measures total concentration of semi-volatile organic compounds, PCBs, and metals. **Detection Method:** Based on light-scattering properties of particulate matter. Using an internal pump, air sample is drawn into the sensing volume where near infrared light scattering is used to detect particles. **General Care/Maintenance:** As specified by the mfr. Also, the instrument must be calibrated with particulates of a size and refractive index similar to those to be measured in the ambient air.
Monitox	**Hazard Monitored:** Gases and vapors. **Application:** Measures specific gases and vapors. **Detection Method:** Electrochemical sensor specific for the chemical species in question. **General Care/Maintenance:** Moisten sponge before use; check the function switch; change the battery when needed.
Gamma Radiation Survey Instrument	**Hazard Monitored:** Gamma Radiation. **Application:** Environmental radiation monitor. **Detection Method:** Scintillation detector. **General Care/Maintenance:** Must be calibrated annually at a specialized facility. **Typical Operating Time:** Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.

TABLE 4
INSTRUMENTATION ACTION LEVELS

Photoionization Detector Action Levels	**Action Required**
Background to 5-parts per million (ppm)[1]	No respiratory needed; no further action
>5ppm but </= 15 ppm at the perimeter of the work area	• Work temporarily halted and monitoring continues. • If instantaneous readings decrease below 5 ppm above background, work activities will resume with continued monitoring
>5ppm but </= 25 ppm at the downwind perimeter of the hot zone	• Work activities will be halted. • Source of vapors identified. • Corrective actions taken to abate emissions. • Continued monitoring. • Workers will don appropriate respirators and work can resume if vapor levels 200-feet downwind or the hot zone or half the distance to the nearest potential receptor or residential or commercial structure, whichever is less – but in no case less than 20-feet – is below 5 ppm above background for the 15-minute average
>25ppm at the parameter of the hot zone	Activities will shut down

Particulate Monitoring Action Levels	**Action Required**
Background to 100-micrograms per cubic meter ($\mu g/m^3$)[2], no dust observed	No further action
Background to 100 $\mu g/m^3$, dust observed leaving the work area	Dust suppression must be employed.
100 to 150 $\mu g/m^3$ at the downwind parameter of the hot zone	• Work activities will be halted. • Source of dust identified. • Dust suppression activities initiated. • Corrective actions taken to abate emissions. • Continued monitoring. • Workers will don appropriate respirators. • Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.
>150 $\mu g/m^3$ at the parameter of the hot zone	Activities will shut down

[1] VOC concentrations are 15-minute averages above site background (upwind parameter)
[2] Particulate concentrations are 15-minute averages above site background (upwind parameter)

TABLE 5
EMERGENCY NOTIFICATION LIST

ORGANIZATION	CONTACT	TELEPHONE
Local Police Department		911
Local Fire Department		911
Ambulance/Rescue Squad		911
Hospital	NYC Health and Hospitals/Harlem Hospital Center	911 or 212-939-1000
Langan Incident Hotline		800-952-6426 extension 4699
Medical Treatment Hotline	WorkCare™	911 or 888-449-7757
Langan Environmental Project Manager Langan Geotechnical Project Manager	Albert Tashji Sayak Sinha	551-404-5597 (cell) 979-739-1993 (cell)
Langan Health and Safety Manager (HSM)	Tony Moffa	215-756-2523 (cell)
Langan Health & Safety Officer (HSO)	William Bohrer	410-984-3068 (cell)
Langan Field Team Leader (FTL)	To Be Determined	
Client's Representative	Kevin Yaghoubi	914-874-3268
National Response Center (NRC)		800-424-8802
Chemical Transportation Emergency Center (Chemtrec)		800-424-9300
Center for Disease Control (CDC)		404-639-3534
EPA (RCRA Superfund Hotline)		800-424-9346
TSCA Hotline		202-554-1404
Poison Control Center		800-222-1222

Immediately following an injury, unless immediate emergency medical treatment is required, the injured employee must contact WorkCare - Incident Intervention® at 888-449-7787.For all other incidents or near misses, unless emergency response is required, either the employee or a coworker must contact the Langan Incident Hotline at 973-560-4699.

TABLE 6
SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORINGFOR FIT AND ACCLIMATED WORKERS[A]

Adjusted Temperature[b]	Normal Work Ensemble[c]	Impermeable Ensemble
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

a For work levels of 250 kilocalories/hour.

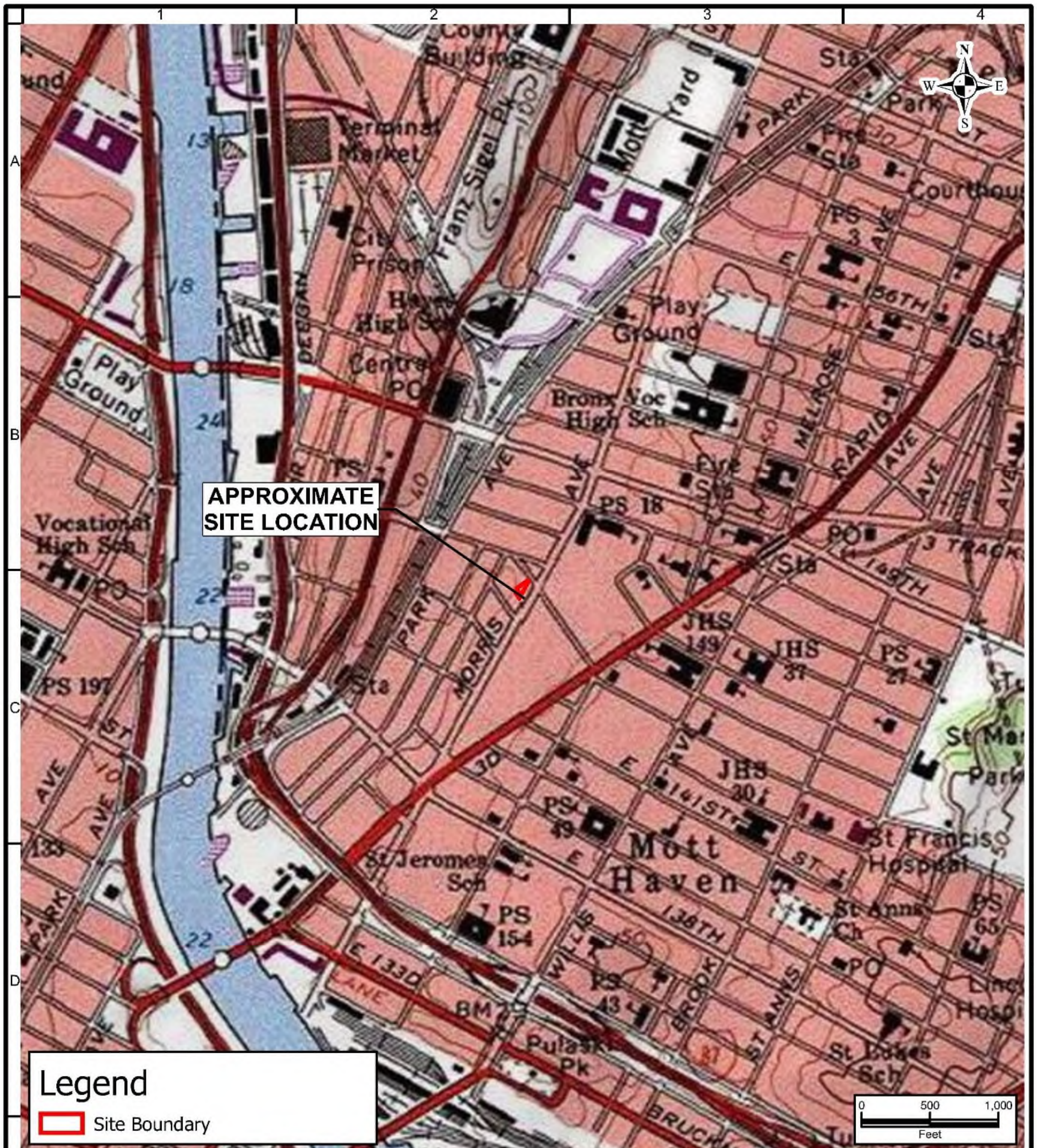
b Calculate the adjusted air temperature (ta adj) by using this equation: ta adj ^{O}F = ta ^{O}F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

c A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

TABLE 7
HEAT INDEX

FIGURES

FIGURE 1
SITE LOCATION MAP



LANGAN	Project	Drawing Title	Project No.	Figure
300 Kimball Drive Parsippany, NJ 07054 T: 973.560.4900 F: 973.560.4901 www.langan.com	383 Morris Avenue	SITE LOCATION	170790501	1
Langan Engineering & Environmental Services, Inc. Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. Langan International Collectively known as Langan	BRONX		Date 8/16/2023	
	BRONX COUNTY NEW YORK		Scale 1:1,000	
			Drawn By Site Analyzer	
			Submission Date 08/16/2023	Sheet 1 of 1

Disclaimer: This information is produced by an automated system and may not be complete. The absence of a feature is not a confirmation that the feature is not present at the subject location. Information produced is in the public domain and unless noted has not been field verified or provided for any specific use. Users are also cautioned to confirm the information shown is suitable for their intended use.
Spatial Reference: NAD 1983 StatePlane New York Long Island FIPS 3104 Feet
Warning: It is a violation of the NYS Education Law Article 145 for any person, unless acting under the direction of a licensed professional engineer, land surveyor or geologist, to alter this item in any way.

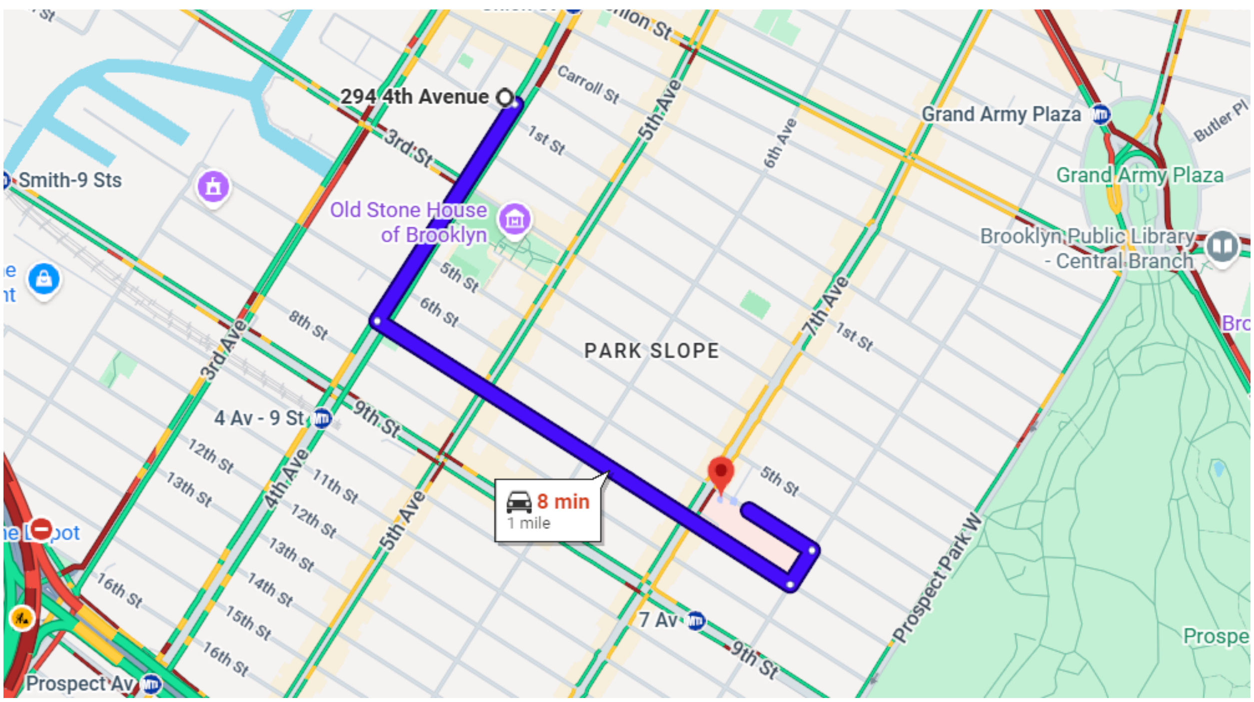
FIGURE 2
HOSPITAL ROUTE PLAN

Hospital Location:	**New York Presbyterian Brooklyn Methodist Hospital** **506 6th Street** **Brooklyn, New York** **718-780-3000**

START: 294 4th Avenue Brooklyn, NY

1. Head toward 1t Street
2. Turn left onto 7th Street
3. Turn left onto 8th Avenue
4. Turn left at the 1st cross street onto 6th street
5. Madison Ave Brg turns right and becomes E 135th St

END: New York Presbyterian Brooklyn Methodist Hospital, 506 6th Street Brooklyn, New York



ATTACHMENTS

ATTACHMENT A

STANDING ORDERS

STANDING ORDERS

GENERAL

- No smoking, eating, or drinking in this work zone.
- Upon leaving the work zone, personnel will thoroughly wash their hands and face.
- Minimize contact with contaminated materials through proper planning of work areas and decontamination areas, and by following proper procedures. Do not place equipment on the ground. Do not sit on contaminated materials.
- No open flames in the work zone.
- Only properly trained and equipped personnel are permitted to work in potentially contaminated areas.
- Always use the appropriate level of personal protective equipment (PPE).
- Maintain close contact with your buddy in the work zone.
- Contaminated material will be contained in the Exclusion Zone (EZ).
- Report any unusual conditions.
- Work areas will be kept clear and uncluttered. Debris and other slip, trip, and fall hazards will be removed as frequently as possible.
- The number of personnel and equipment in the work zone will be kept to an essential minimum.
- Be alert to the symptoms of fatigue and heat/cold stress, and their effects on the normal caution and judgment of personnel.
- Conflicting situations which may arise concerning safety requirements and working conditions must be addressed and resolved quickly by the site HSO.

TOOLS AND HEAVY EQUIPMENT

- Do not, under any circumstances, enter or ride in or on any backhoe bucket, materials hoist, or any other device not specifically designed to carry passengers.
- Loose-fitting clothing or loose long hair is prohibited around moving machinery.
- Ensure that heavy equipment operators and all other personnel in the work zone are using the same hand signals to communicate.
- Drilling/excavating within 10-feet in any direction of overhead power lines is prohibited.
- The locations of all underground utilities must be identified and marked out prior to initiating any subsurface activities.
- Check to ensure that the equipment operator has lowered all blades and buckets to the ground before shutting off the vehicle.
- If the equipment has an emergency stop device, have the operator show all personnel its location and how to activate it.
- Help the operator ensure adequate clearances when the equipment must negotiate in tight quarters; serve as a signal operator to direct backing, as necessary.
- Ensure that all heavy equipment that is used in the Exclusion Zone is kept in that zone until the job is done and that such equipment is completely decontaminated before moving it into the clean area of the work zone.
- Samplers must not reach into or get near rotating equipment such as the drill rig. If personnel must work near any tools that could rotate, the equipment operator must completely shut down the rig prior to initiating such work. It may be necessary to use a remote sampling device.

ATTACHMENT B

DECONTAMINATION PROCEDURES

PERSONNEL DECONTAMINATION

LEVEL C DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross-contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves, and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Canister or Mask Change	4. If worker leaves Exclusion Zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	Face piece Removal	6. Face piece is removed (avoid touching face with fingers). Face piece deposited on plastic sheets.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

LEVEL D DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Boot, Gloves and Outer Garment Removal	4. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 5:	Field Wash	5. Hands and face are thoroughly washed. Shower as soon as possible.

EQUIPMENT DECONTAMINATION

GENERAL:

Equipment to be decontaminated during the project may include tools, monitoring equipment, respirators, sampling containers, laboratory equipment, and drilling equipment.

All decontamination will be done by personnel in protective gear, appropriate for the level of decontamination, as determined by the site HSO. The decontamination work tasks will be split or rotated among support and work crews.

Depending on site conditions, backhoes and pumps may be decontaminated over a portable decontamination pad to contain wash water; or wash water may be allowed to run off into a storm sewer system. Equipment needed may include a steam generator with high-pressure water, empty drums, screens, screen support structures, and shovels. Drums will be used to hold contaminated wash water pumped from the lined pit. These drums will be labeled as such.

Miscellaneous tools and equipment will be dropped into a plastic bucket, tub, or other containers. They will be brushed off and rinsed with a detergent solution, and finally rinsed with clean water.

MONITORING EQUIPMENT:

Monitoring equipment will be protected as much as possible from contamination by draping, masking, or otherwise covering as many of the instruments as possible with plastic without hindering the operation of the unit. The PID, HNu, or OVA meter, for example, can be placed in a clear plastic bag, which allows reading of the scale and operation of knobs. The probes can be partially wrapped keeping the sensor tip and discharge port clear.

The contaminated equipment will be taken from the drop area and the protective coverings removed and disposed of in the appropriate containers. Any dirt or obvious contamination will be brushed or wiped with a disposable paper wipe.

RESPIRATORS:

Respirators will be cleaned and disinfected after every use. Taken from the drop area, the masks (with the cartridges removed and disposed of with other used disposable gear) will be immersed in a cleaning solution and scrubbed gently with a soft brush, followed by a rinse in plain warm water, and then allowed to air dry. In the morning, new cartridges will be installed. Personnel will inspect their own masks for serviceability prior to donning them. And, once the mask is on, the wearer will check the respirator for leakage using the negative and positive pressure fit check techniques.

ATTACHMENT C

EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT

EMPLOYEE INCIDENT/INJURY REPORT
LANGAN ENGINEERING & ENVIRONMENTAL SERVICES

(Complete and return to Tony Moffa in the Doylestown Office)

Affected Employee Name: ______________________________ Date: ______________________________

Incident type: ☐ Injury ☐ Report Only/No Injury

☐ Near Miss ☐ Other: ______________________________

______

EMPLOYEE INFORMATION (Person completing Form)

Employee Name: ______________________________ Employee No: ______________________________

Title: ______________________________ Office Location: ______________________________

Length of time employed or date of hire: ______________________________

Mailing address: ______________________________

____

Sex: M ☐ F ☐ Birth date: ______________

Business phone & extension: ______________ Residence/cell phone: ______________________________

ACCIDENT INFORMATION

Project: ______________________________ Project #: ______________________________

Date & time of incident: ______________ Time work started & ended: ______________________________

Site location: ______________________________

Incident Type: Possible Exposure ☐ Exposure ☐ Physical Injury ☐

Names of person(s) who witnessed the incident:____

____

____

Exact location incident occurred:

____

____

Describe work being done:_________________

____

____

____

Describe what affected employee was doing prior to the incident occurring:

____

____

____

Describe in detail how the incident occurred:

____

____

____

____

Nature of the incident (List the parts of the body affected):

____

____

____

____

Person(s) to whom the incident was reported (Time and Date):

____

____

List the names of other persons affected during this incident:

____

____

Possible causes of the incident (equipment, unsafe work practices, lack of PPE, etc.):

____

____

____

Weather conditions during incident: ____

MEDICAL CARE INFORMATION

Did affected employee receive medical care? Yes ☐ No ☐

If Yes, when and where was medical care received: ____________________ ____________________

Provide name of facility (hospital, clinic, etc.): ____ ________

Length of stay at the facility? ________

Did the employee miss any work time? Yes ☐ No ☐ Undetermined ☐

Date employee last worked: ____________________ Date employee returned to work: ____________________

Has the employee returned to work? Yes ☐ No ☐

Does the employee have any work limitations or restrictions from the injury? : Yes ☐ No ☐

If Yes, please describe: ____

____

Did the exposure/injury result in permanent disability? Yes ☐ No ☐ Unknown ☐

If Yes, please describe: ____

HEALTH & SAFETY INFORMATION

Was the operation being conducted under an established site-specific HEALTH AND SAFETY PLAN?
Yes ☐ No ☐ Not Applicable: ☐

Describe protective equipment and clothing used by the employee:

____

____

____

Did any limitations in safety equipment or protective clothing contribute to or affect exposure/injury? If so, explain:

____

____

____

____

Employee Signature Date

____

Langan Representative Date

ATTACHMENT D

CALIBRATION LOG

DATE:________________ **PROJECT:____________________**

CALIBRATION LOG

Date & Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calibrate . Reading	Performed By:

ATTACHMENT E

MATERIAL SAFETY DATA SHEETS
SAFETY DATA SHEETS

All Langan Field Personnel Completing This Work Plan Are To Have Real-Time Accessibility To Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDSs) Through Their Smart Phone.

The link is http://www.msds.com/
The login name is "drapehead"
The password is "2angan987"

If You Are Unable To Use the Smart Phone App, You Are To Bring Printed Copies of the MSDS/SDSs to the Site

ATTACHMENT F

JOBSITE SAFETY INSPECTION CHECKLIST

Jobsite Safety Inspection Checklist

Date: ______________________ **Inspected By:** ______________________

Location: ______________________ **Project #:** ______________________

Check one of the following: **A:** Acceptable **NA**: Not Applicable **D**: Deficiency

	A	NA	D	Remark
1. HASP available onsite for inspection?				
2. Health & Safety Compliance agreement (in HASP) appropriately signed by Langan employees and contractors?				
3. Hospital route map with directions posted on site?				
4. Emergency Notification List posted on site?				
5. First Aid kit available and properly stocked?				
6. Personnel trained in CPR/First Aid on site?				
7. MSDSs readily available, and all workers knowledgeable about the specific chemicals and compounds to which they may be exposed?				
8 Appropriate PPE being worn by Langan employees and contractors?				
9. Project site safe practices ("Standing Orders") posted?				
10. Project staff have 40-hr./8-hr./Supervisor HAZWOPER training?				
11. Project staff medically cleared to work in hazardous waste sites and fit-tested to wear respirators, if needed?				
12. Respiratory protection readily available?				
13. Health & Safety Incident Report forms available?				
14. Air monitoring instruments calibrated daily and results recorded on the Daily Instrument Calibration check sheet?				
15. Air monitoring readings recorded on the air monitoring data sheet/field log book?				
16. Subcontract workers have received 40-hr./8-hr./Spvsr. HAZWOPER training, as appropriate?				
17. Subcontract workers medically cleared to work on site, and fit-tested for respirator wear?				
18. Subcontract workers have respirators readily available?				
19. Mark outs of underground utilities done prior to initiating any subsurface activities?				

20. Decontamination procedures being followed as outlined in HASP?				
21. Are tools in good condition and properly used?				
22. Drilling performed in areas free from underground objects including utilities?				
23. Adequate size/type fire extinguisher supplied?				
24. Equipment at least 20-feet from overhead powerlines?				
25. Evidence that drilling operator is responsible for the safety of his rig.				
26. Trench sides shored, layer back, or boxed?				
27. Underground utilities located and authorities contacted before digging?				
28. Ladders in trench (25-foot spacing)?				
29. Excavated material placed more than 2-feet away from excavation edge?				
30. Public protected from exposure to open excavation?				
31. People entering the excavation regarding it as a permit-required confined space and following appropriate procedures?				
32. Confined space entry permit is completed and posted?				
33. All persons knowledgeable about the conditions and characteristics of the confined space?				
34. All persons engaged in confined space operations have been trained in safe entry and rescue (non-entry)?				
35. Full body harnesses, lifelines, and hoisting apparatus available for rescue needs?				
36. Attendant and/or supervisor certified in basic first aid and CPR?				
37. Confined space atmosphere checked before entry and continuously while the work is going on?				
38. Results of confined space atmosphere testing recorded?				
39. Evidence of coordination with off-site rescue services to perform entry rescue, if needed?				
40. Are extension cords rated for this work being used and are they properly maintained?				
41. Are GFCIs provided and being used?				

Unsafe Acts: ____

____

____

____

Notes: ____

____

____

____

ATTACHMENT G

JOB SAFETY ANALYSIS FORM

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA TITLE: **JSA NUMBER:**	**DATE CREATED:** **CREATED BY:** **REVISION DATE:** **REVISED BY:**

Langan employees must review and revise the Job Safety Analysis (JSA) as needed to address the any site specific hazards not identified. Employees must provide their signatures on the last page of the JSA indicating they have review the JSA and are aware the potential hazards associated with this work and will follow the provided preventive or corrective measures.

PERSONAL PROTECTIVE EQUIPMENT REQUIRED: (PPE): ■ Required	☒ As Needed	
☐ Steel-toed boots	☐ Nitrile gloves	☐ Dermal Protection (Specify)
☐ Long-sleeved shirt	☐ Leather/ Cut-resistant gloves	☐ High visibility vest/clothing
☐ Safety glasses	☐ Face Shield	☐ Hard hat
ADDITIONAL PERSONAL PROTECTIVE EQUIPMENT NEEDED (Provide specific type(s) or descriptions)		
☐ Air Monitoring:	☐ Respirators:	☐ Other:
☐ Dermal Protection:	☐ Cartridges:	☐ Other:

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE OR CORRECTIVE ACTION
1.	1. 2.	1a. 1b. 2a. 2b.
2.	1.	1
Additional items identified in the field.		
Additional Items.		

If additional items are identified during daily work activities, please notify all relevant personnel about the change and document on this JSA.

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: COVID-19 Awareness – Site Work
JSA Number: JSA046-00

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Boots	☐ Long Sleeves	☐ Safety Vest (Class 2)	☐ Hard Hat	☐ Hearing Protection
☐ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☐ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Alcohol-based hand sanitizer, disinfectant wipes/spray				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
1. All Activities	1. Transmittal/exposure of COVID-19	1. Ask yourself and your managers – is this work essential? Can this be done remotely? 2. Stay home if sick or showing symptoms of COVID-19 (e.g. fever, cough, etc.). 3. Carry nitrile gloves, alcohol-based hand sanitizer, face coverings and disinfectant wipes/spray during field work. 4. Check federal, state, and/or local travel restrictions **prior** to travel. Many states, counties, and cities are passing strict "shelter-in-place" or business restrictions in response to COVID-19. 5. Immediately notify Beverly Williams or Rory Johnston (Supervisor if employee chooses) if you display symptoms of COVID-19. Symptoms include fever (over 100.4 F), cough, and shortness of breath. 6. Notify Beverly Williams or Rory Johnston, Supervisor and Coronavirus Task Force if you had close contact with an individual who tested positive or displayed symptoms of COVID-19. 7. Do not touch your face, to the extent possible. 8. Wear face coverings when around other worker to minimize spread of COVID-19. (May be required in certain states or locations.)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		9. Practice social distancing, maintaining at least 6-feet of distance between yourself and others. Avoid gatherings of more than 10-people. Limit, to the extent possible, contact with public items/objects. 10. Clean your hands frequently with soap and water for at least 20 seconds especially after you have been in a public place, or after blowing your nose, coughing, sneezing, or using the rest room. 11. If soap and water are not readily available, use a hand sanitizer that contains at least 60% alcohol. Cover all surfaces of your hands and rub them together until they feel dry. 12. Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. 13. Clean and disinfect frequently touched surfaces daily, for example, cell phones, computer equipment, headsets, tables, doorknobs, light switches, countertops, handles, desks, toilets, faucets, and sinks.
2. Travel to Jobsite	1. Transmittal/exposure of COVID-19 between passengers 2. Transmittal/exposure of COVID-19 from previous occupants (rental and fleet vehicles) 3. Transmittal/exposure of COVID-19 while refueling	1. Limit the number of occupants to each vehicle to two people. Employees should sit as far away from each other as possible. 2. Disinfect high "hand-traffic" areas of the vehicle: Door handles, steering wheel, turn signal and control rods, dashboard controls, seatbelts, armrests, etc. To the extent possible, do not use recycled air for heat/AC and travel with the windows open. 3. Use hand sanitizer before and after pumping gas and only return to the inside of the vehicle after refueling is complete. 4. Wear nitrile gloves if available or disinfect the key pad, pump handle, and fuel grade button prior to use. 5. Recommend face coverings are worn to minimize spread of COVID-19.
3. Conduct Tailgate Safety Meeting & Complete H&S Paperwork	1. Transmittal/exposure of COVID-19 between meeting participants	1. Practice social distancing, maintaining at least 6-feet of distance between yourself and others. 2. Recommend face coverings are worn when around other workers to minimize spread of COVID-19, 3. Hold meetings outside and keep in mind wind direction. To the extent possible, remain cross-wind from other people. 4. Designate a single person to maintain sign-in sheets/permits throughout the day to limit the passing of pens/clipboards between people. 5. Each person should complete their own JSA, even if they are completing similar tasks as others in order to limit the passing of paper/pens/clipboards between people. 6. Include COVID-19 topics and prevention measures in safety meetings.
4. Conduct Site Work	1. Transmittal/exposure of COVID-19 between site workers and public.	1. Practice social distancing maintaining 6-feet of distance between yourself and others. 2. Recommend face coverings are worn when around other workers to minimize spread of COVID-19, 3. To the extent possible, do not interact with the public. If it is necessary, politely explain you are practicing social distance and request they stay at least 6-feet away and they do not attempt to pass objects to you. 4. Wear nitrile gloves during site work underneath the appropriate gloves for your task. Utilize appropriate decontamination procedures, securely bag all waste (including nitrile gloves) generated during site work and dispose of.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		5. Do not share tools. Each person should be equipped with the tools to complete their task or tasks should be divided to remove the need to share tools. If tools must be shared, surfaces should be disinfected. 6. Clean and disinfect surfaces of rental tools and equipment upon receipt. To the extent possible rent equipment from Langan's internal equipment reservation center, where cleaning/disinfecting procedures can be verified.
5. Use of Construction Trailers	1. Transmittal/exposure of COVID-19 between site workers and others.	1. Avoid use of shared trailers, if possible. Minimize trailer use to essential personnel. 2. Practice social distancing; maintaining 6-feet of distance between yourself and others in trailer. 3. Clean and disinfect areas including desks, phones, chairs, and other common areas, before and after use.
6. Purchasing Food from a Restaurant	1. Transmittal/exposure of COVID-19 from other customers, staff, surfaces.	1. To the extent possible, bring your own food. 2. If you must visit a restaurant, call ahead for take-out or "contactless delivery." Do not dine in. When picking up food, follow guidelines for <u>Job Step #8: Purchasing Supplies at Retail/Shipping Centers</u>. 3. Wash hands before and after eating.
7. Smoking Cigarettes	1. Transmittal/exposure of COVID-19 by touching mouth with hands	1. Cigarette smokers are at greater risk of complications arising from COVID-19. Nicotine patches/lozenges/gum, smoking cessation programs, and prescription medications may aid in "kicking the habit" if you decide to quit. 2. Wash hands thoroughly before and after smoking. 3. Discard cigarette butts properly. Do not light cigarettes from others and do not give cigarettes to others.
8. Hotel Stay	1. Transmittal/exposure of COVID-19 from previous occupants, hotel staff, common areas.	1. Verify the hotel chain/brand has modified cleaning procedures to reflect risk of COVID-19. Most hotel companies have issued statements on their websites and in email blasts reflecting these new procedures. 2. Use the front door, and not peripheral entrances. Front doors of hotels are automatic. 3. Request ground floor room to avoid elevator use and a room that has not be utilized in 48-72 hours. 4. If elevator use is required, do not directly touch elevator buttons with your hands. Do not ride elevators with other people, to the extent possible. 5. Bring disinfecting wipes or sanitizing spray. Upon arrival, disinfect high "hand-traffic" areas of the hotel room: Door handles, light switches, shower/sink faucet handles, TV remote, curtain/blind handles. Clean these surfaces daily. 6. Place the "Do Not Disturb" Sign on your door to prevent people (housekeeping) from entering your room. 7. Avoid common spaces and hotel sponsored events where crowds will be present. 8. Confirm hotel cleaning procedures have been modified to address COVID-19. Confirm no COVID-19 cases have occurred in hotel
9. Purchasing Supplies at Retail/Shipping Centers	1. Transmittal/exposure of COVID-19 from other customers, staff, surfaces.	1. Plan your travel to limit the need to visit retail/shipping centers. 2. Practice social distancing, maintaining at least 6-feet of distance between yourself and others. If the store is too crowded/small, consider visiting another store or returning at a different time. 3. Avoid high "hand-traffic" items/areas like door handles (i.e. use your shoulder, hip/butt, or open with a disposable napkin/paper towel), credit cards terminals (i.e. use Apple/Android pay if available), shopping carts/baskets (i.e. bring your own shopping bags), counter tops (i.e. ask clerk if you can hold the items while they are scanned) and bulk/buffet items (i.e. just avoid them).

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		4. Disinfect your hands before and after visiting a retail/shipping center.

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Environmental Sampling**
JSA Number: **JSA021-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

S – ***Stop***, *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☐ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☒ Fire Resistant Clothing	☐ Rubber Boots
☒ Insect/Animal Repellent	☒ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek Sleeves				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
1. Drive to sample location	1. Rough/Off Road terrain	1. Pay attention to road conditions such as road erosion, unprotected embankments, and soft road conditions.
2. Sample Collection (Walking)	1. Slip/Trips/Falls 2. Back strains 3. Wildlife (Insects, Stray animals, rodents) 4. Poisonous vegetation	1. Minimize distance to sample area/ Plan route and check surface prior to carrying heavy equipment/ Locate safest access point/ Follow good housekeeping procedures/ Mark significant below grade hazards (holes, trenches) with spray paint or cones/ Wear foot protection with ankle support and gripping soles. 2. Use proper lifting techniques/ Use wheeled transport/ Obtain assistance where and when needed/ Consider load weight when evaluating what is safe and unsafe to carry. 3. Be aware of surroundings for the presence of wildlife. Do not approach stray animals. Carry and use animal repellant when needed/ Use bug spray when needed. 4. Keep skin covered/ Identify and avoid poisonous vegetation/ Clean areas after contact with suspected vegetation.
3. Sample Collection (Water)	1. Drowning Hazards 2. Chemical burns (when adding acid preservative to sample) 3. Back Strains 4. Ergonomic issues 5. Slip/Trips/Falls	1. Use buddy system/ Wear flotation vest if water is deeper than 2-feet or swift moving/ Select working area with stable footing. Do not attempt to cross or stand in swift moving water. 2. Wear proper PPE (Nitrile gloves, Tyvek Sleeves) 3. Use proper lifting techniques/ Use wheeled transport/ Obtain assistance where and when needed/ Consider load weight when evaluating what is safe or unsafe to carry. 4. When possible avoid bending over for long periods of time/ Use a small stool for sitting or knee pad for kneeling.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		5. Minimize distance to sample area/ Plan route and check surface prior to carrying heavy equipment/ Locate safest access point/ Follow good housekeeping procedures/ Mark significant below grade hazards (holes, trenches) with spray paint or cones/ Wear foot protection with ankle support and gripping soles/ Avoid standing water or slippery terrain.
4. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts, or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 7. High Noise levels 8. Overhead hazards 9. Heat Stress/ Cold Stress 10. Eye Injuries	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 5. Wear high visibility clothing & vest / Use cones or signs to designate work area 6. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 7. Wear hearing protection 8. Wear hard hat / Avoid areas were overhead hazards exist. 9. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 10. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Subsurface Investigation
JSA Number: JSA030-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Dielectric Overshoes, Sun Block				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
5. Transport equipment to work area	2. Back/strain 3. Slip/Trip/Falls 4. Traffic 5. Cuts/abrasions/contusions from equipment 6. Accidents due to vehicle operations	1. Use proper lifting techniques/Use wheeled transport 2. Minimize distance to work area/unobstructed path to work area/follow good housekeeping procedures 3. Wear proper PPE (high visibility vest or clothing) 4. Wear proper PPE (leather gloves, long sleeves, Langan approved safety shoes) 5. Observe posted speed limits/ Wear seat belts at all times
6. Traffic	1. Hit by moving vehicle	1. Use traffic cones and signage/ Use High visibility traffic vests and clothing/ Caution tape when working near active roadways.
7. Field Work (drilling, resistivity testing, and inspection)	1. Biological Hazards: insects, rats, snakes, poisonous plants, and other animals 2. Heat stress/injuries 3. Cold Stress/injuries 4. High Energy Transmission Lines 5. Underground Utilities 6. Electrical (soil resistivity testing)	1. Inspect work area to identify biological hazards. Wear light colored long sleeve shirt and long pants/ Use insect repellant as necessary/ Beware of tall grass, bushes, woods and other areas where ticks may live/ Avoid leaving garbage on site to prevent attracting animals/ Identify and avoid contact with poisonous plants/Beware of rats, snakes, or stray animals. 2. Wear proper clothing (light colored)/ drink plenty of water/ take regular breaks/use sun block 3. Wear proper clothing/ dress in layers/ take regular breaks. 4. Avoid direct contact with high energy transmission lines/ position equipment at least 15-feet or as required by PSE&G from the transmission lines/ wear proper PPE (dielectric overshoes 15 kV minimum rating).

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		5. Call one-call service before performing intrusive field work/ Review utility mark-outs and available utility drawings (with respect to proposed work locations)/ Follow Underground Utility Guidelines 6. See AGI Sting R1 operating manual for specific concerns during operating instrument
8. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts, or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 7. High Noise levels 8. Overhead hazards 9. Heat Stress/ Cold Stress 10. Eye Injuries	7. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 8. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 9. Wear Langan approved safety shoes 10. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 11. Wear high visibility clothing & vest / Use cones or signs to designate work area 12. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 13. Wear proper hearing protection 14. Wear hard hat / Avoid areas were overhead hazards exist. 15. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 16. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Field Sampling**
JSA Number: **JSA022-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

S – Stop, *what has changed?*
T – Think *about the task*
E – Evaluate *potential hazards*
P – Plan *safe approach*
S - Start *task /* **Stop** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☐ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
9. Unpack/Transport equipment to work area.	7. Back Strains 8. Slip/Trips/Falls 9. Cuts/Abrasions from equipment 10. Contusions from dropped equipment	6. Use proper lifting techniques/Use wheeled transport 7. Minimize distance to work area/Unobstructed path to work area/follow good housekeeping procedures. Mark slip/trip/fall hazards with orange safety cones. 8. Wear proper PPE (leather gloves, long sleeves). 9. Wear proper PPE (Langan approved safety shoes).
10. Initial Site Arrival-Site Assessment	5. Traffic	5. Situational awareness (be alert of your surroundings). Secure area from through traffic.
11. Surface Water Sampling	6. Contaminated media. Skin/eye contact with biological agents and/or chemicals.	6. Wear appropriate PPE (Safety glasses, appropriate gloves). Review (M)SDS for all chemicals being.
12. Sampling from bridges	1. Struck by vehicles	1. Wear appropriate PPE (Safety Vest). Use buddy system and orange safety cones.
13. Icing of Samples/ Transporting coolers/equipment from work area.	11. Back Strains 12. Slips/Trips/Falls 13. Cuts/Abrasions from equipment 14. Pinch/Crushing Hazards.	17. Drain coolers of water. Use proper lifting techniques. Use wheeled transport. 18. Have unobstructed path from work area. Aware of surroundings. 19. Wear proper PPE (Leather gloves, long sleeves) 20. Wear proper PPE (Leather gloves, long sleeves)
14. Site Departure	1. Contaminated PPE/Vehicle	1. Contaminated PPE should be disposed of on-site. Remove boots and soiled clothing for secure storage in trunk. Wash hands promptly.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
15. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts, or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 15. Traffic 16. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 17. High Noise levels 18. Overhead hazards 19. Heat Stress/ Cold Stress 20. Eye Injuries	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 21. Wear high visibility clothing & vest / Use cones or signs to designate work area 22. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 23. Wear hearing protection 24. Wear hard hat / Avoid areas were overhead hazards exist. 25. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 26. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Equipment Transportation and Set-up**
JSA Number: **JSA012-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
16.Transport equipment to work area	11.Back Strain 12.Slips/ Trips/ Falls 13.Traffic 14.Cuts/abrasions from equipment 15.Contusions from dropped equipment	1. Use proper lifting techniques / Use wheeled transport 2. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 3. Wear proper PPE (high visibility vest or clothing) 4. Wear proper PPE (leather gloves, long sleeves) 5. Wear proper PPE (safety shoes)
17.Moving equipment to its planned location	6. Pinch Hazard 7. Slips/ Trips/ Falls	1. Wear proper PPE (leather gloves) 2. Be aware of potential trip hazards / Practice good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint
18.Equipment Set-up	7. Pinch Hazard 8. Cuts/abrasions to knuckles/hands 9. Back Strain	1. Wear proper PPE (leather gloves) 2. Wear proper PPE (leather gloves) 3. Use proper lifting techniques / Use wheeled transport
19. All activities	21. Slips/ Trips/ Falls 22. Hand injuries, cuts, or lacerations during manual handling of materials 23. Foot injuries 24. Back injuries 25. Traffic 26. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.)	27. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 28. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 29. Wear Langan approved safety shoes

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
4. All activities (cont'd)	27. High Noise levels 28. Overhead hazards 29. Heat Stress/ Cold Stress 30. Eye Injuries	30. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 31. Wear high visibility clothing & vest / Use cones or signs to designate work area 32. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 33. Wear hearing protection 34. Wear hard hat / Avoid areas were overhead hazards exist. 35. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 36. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN	Job Safety Analysis (JSA) Health and Safety
JSA Title: **55-gallon Drum Sampling** **JSA Number:** **JSA043-01**	
A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.	S – ***Stop,*** *what has changed?* T – ***Think*** *about the task* E – ***Evaluate*** *potential hazards* P – ***Plan*** *safe approach* S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☒ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: All Drums are required to be labeled. Langan employees do not open or move undocumented drums or unlabeled drums without proper project manager authorization.				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
20.Unpack/Transport equipment to work area.	16.Back Strains 17.Slip/Trips/Falls 18.Cuts/Abrasions from equipment 4. Contusions from dropped equipment	10. Use proper lifting techniques/Use wheeled transport 11. Minimize distance to work area/Unobstructed path to work area/follow good housekeeping procedures. Mark slip/trip/fall hazards with orange safety cones. 12. Wear proper PPE (leather gloves, long sleeves). 4. Wear proper PPE (Langan approved safety shoes).
21.Open Drums	1. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid. 2. Pressure from drums.	1. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches. 2. Open drum slowly to relieve pressure. Wear proper PPE: face shield and goggles; correct gloves; and over garments.
22.Collecting Soil/Fluid Sample	8. Irritation to eye from vapor, soil dust, or splashing 9. Irritation to exposed skin	6. Wear proper eye protection including safety glasses/ face shield/googles and when necessary, splash guard. If dust or vapor phase is present, wear appropriate safety breathing gear (1/2 mask or full face mask with correct filter) 7. Wear proper skin protection including nitrile gloves.
23.Closing Drums	1. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid.	7. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
24.Moving Drums	2. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid. 3. Back Strains	2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches. 3. Use proper lifting techniques/Use wheeled transport
25. All activities	31. Slips/ Trips/ Falls 32. Hand injuries, cuts, or lacerations during manual handling of materials 33. Foot injuries 34. Back injuries 35. Traffic 36. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 37. High Noise levels 38. Overhead hazards 39. Heat Stress/ Cold Stress 40. Eye Injuries	37. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 38. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 39. Wear Langan approved safety shoes 40. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 41. Wear high visibility clothing & vest / Use cones or signs to designate work area 42. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 43. Wear hearing protection 44. Wear hard hat / Avoid areas were overhead hazards exist. 45. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 46. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Direct-Push Soil Borings**
JSA Number: **JSA004-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

TAKE 5

S – ***Stop**, what has changed?*
T – ***Think** about the task*
E – ***Evaluate** potential hazards*
P – ***Plan** safe approach*
S - ***Start** task / **Stop** & regroup*

PERSONAL PROTECTIVE EQUIPMENT REQUIRED:				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Half-face respirator, dust cartridges, PID (if applicable)				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
26. Move equipment to work site	19. Back strain when lifting equipment 20. Slips/ Trips/ Falls while moving equipment 21. Traffic (if applicable) 22. Pinched fingers or running over toes during geoprobe set-up 23. Overturn drilling rig while transporting to loading dock on flat-bed tow truck	13. Use proper lifting technique (use legs for bending and lifting and not the back)/ Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle 14. Use proper lifting technique (use legs for bending and lifting and not the back) / Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle / Have unobstructed path to vehicle or collection point / Do not lift/walk with boxes that are heavy/difficult to lift 15. Wear high visibility safety vests or clothing / Exercise caution 16. Wear proper PPE (cut-resistant gloves) / Stay alert, be aware of geoprobe rig at all times 17. Drill rig should be parked in center of flat-bed tow truck / Emergency brake shall be used at all times during transport on the flat-bed truck/ All unnecessary personnel should stay away from the flat-bed truck during moving activities
27. Calibration of monitoring equipment	10. Skin or eye contact with calibration chemicals 11. Pinch fingers in monitoring equipment	8. Wear proper PPE (safety glasses/ goggles) 9. Wear proper PPE (leather gloves)
28. Set-up geoprobe rig	10. Geoprobe rig movement	8. All field personnel should stay clear of the geoprobe rig while moving / Use a spotter when backing up the geoprobe
29. Advance geoprobe rods below ground surface to desired depth	4. Underground utilities 5. High noise levels	4. Clean all subsurface soil borings to a minimum of 5 feet below grade 5. Wear proper PPE (hearing protection)
30. Remove and open acetate liner	41. Pinched fingers while removing macrocore	1. Wear proper PPE (nitrile gloves, cut-resistant or leather gloves 2. Wear proper PPE (cut-resistant or leather gloves)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
5. Remove and open acetate liner (cont'd)	42. Cuts/lacerations when cutting acetate liner open 43. Exposure to hazardous vapors 44. Skin contact with contaminated soil	3. Do not place face over acetate liner when opening / Monitor hazardous vapors in air with PID / Upgrade PPE as necessary based on levels contained in the Health and Safety Plan 4. Wear proper PPE (nitrile gloves)
31. Sample Collections a) Monitor parameters b) Prepare sample containers and labels	1. Contact with potentially contaminated soil 2. Lacerations from broken sample bottles 3. Back strain while transporting full coolers 4. Internal exposure to contaminants and metals through inhalation of dust 5. Slips/ Trips/ Falls	1. Use monitoring devices / Wear proper PPE (safety glasses, nitrile gloves) 2. Do not over-tighten bottle caps / Handle bottles safely to prevent breakage 6. Use proper lifting techniques / Do not lift heavy loads without assistance 7. Avoid creating dust / If necessary, wear a half mask respirator with applicable dust cartridge / Inspect respirator for damage and cleanliness prior to use / Clean respirator after each use and store in a clean, secure location 8. Be alert / Follow good housekeeping procedures
32. Remove excess soil from acetate liner and place in 55-gallon drum (IF NOT PERFORMED BY LANGAN, REMOVE!)	1. Cuts/lacerations from acetate liner 2. Pinched fingers/hand while opening/closing drum 3. Skin contact with contaminated soil 4. Soil debris in eyes	1. Wear proper PPE (cut-resistant or leather gloves) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Wear proper PPE (nitrile gloves) 4. Wear proper PPE (safety glasses)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
8. Transport drums to central staging location (IF NOT PERFORMED BY LANGAN, REMOVE!)	1. Back, arm or shoulder strain from moving drums 2. Pinch fingers/hand in drum cart when moving drums 3. Pinch fingers/hand when operating lift-gate on vehicle 4. Contact with potentially contaminated groundwater when moving improperly sealed drums 5. Slips when moving drums 6. Drop drum on feet/toes	47. Use drum cart for moving drums / Use proper lifting techniques / Do not lift heavy loads without assistance 48. Wear proper PPE (cut-resistant or leather gloves) 49. Wear proper PPE (cut-resistant or leather gloves) 50. Wear proper PPE (nitrile gloves underneath work gloves) 51. Follow good housekeeping procedures / Ensure route to move drum and storage space is free from obstructions 52. Wear proper PPE (safety shoes) / Work in a safe manner to prevent dropped drum
9. All activities 9. All activities (cont'd)	1. Slips/ Trips/ Falls 2. Hand injuries, cuts, or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 7. High Noise levels 8. Overhead hazards 9. Heat Stress/ Cold Stress 10. Eye Injuries	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 5. Wear high visibility clothing & vest / Use cones or signs to designate work area 6. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 7. Wear hearing protection 8. Wear hard hat / Avoid areas were overhead hazards exist. 9. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 10. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**

Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Geophysical Investigation**
JSA Number: **JSA023-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	**POTENTIAL HAZARDS**	**PREVENTATIVE / CORRECTIVE ACTION**
33. Transport equipment to work area	24. Back/strain 25. Slip/Trip/Falls 26. Traffic 27. Cuts/abrasions/contusions from equipment	18. Use proper lifting techniques/Use wheeled transport 19. Minimize distance to work area/unobstructed path to work area/follow good housekeeping procedures 20. Wear proper PPE (high visibility vest or clothing) 21. Wear proper PPE (leather gloves, long sleeves, Langan approved safety shoes)
34. Supervision of subcontractor and all other activities	12. Slip/Trips/Falls 13. Hand injuries 14. Foot injuries 15. Back injuries/Strains 16. Traffic 17. Wildlife a. Wildlife b. Mice/rats c. Vectors (i.e. mosquitoes, bees, etc.) 7. Heat/Cold Stress	10. Be aware of potential trip hazards/follow good housekeeping procedures/mark significant below-grade hazards (i.e. holes, trenches, wires, ropes) with safety cones or spray paint. 11. Wear proper PPE (leather gloves)/watch wear you place your hands/inspect material or equipment for jagged, rough, or slippery surfaces/ watch for pinch points/ wipe off slippery, wet, or dirty items prior to handling. 12. Wear proper PPE (Langan approved safety shoes)/ Be aware of uneven terrain) 13. Use proper lifting techniques/ Buddy system when lifting/ use wheeled transport. 14. Wear proper PPE (high-visibility shirts and vests)/ use cones if appropriate/ notify equipment operators of work area. 15. Be aware of surroundings at all times for the presence of wildlife. a. Do not approach stray animals b. Carry animal repellant/ use if situation arises. c. Use bug spray when needed. 7. Wear proper attire for weather conditions (sunscreen, protective clothing in

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		sunlight or layer clothing in cold weather)/ drink plenty of fluids/ take regular breaks.
35. All activities	45. Slips/ Trips/ Falls 46. Hand injuries, cuts, or lacerations during manual handling of materials 47. Foot injuries 48. Back injuries 49. Traffic 50. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 51. High Noise levels 52. Overhead hazards 53. Heat Stress/ Cold Stress 54. Eye Injuries	53. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 54. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 55. Wear Langan approved safety shoes 56. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 57. Wear high visibility clothing & vest / Use cones or signs to designate work area 58. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 59. Wear proper hearing protection 60. Wear hard hat / Avoid areas were overhead hazards exist. 61. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 62. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Sub-slab soil gas temporary point installation and sampling**
JSA Number: **JSA037-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☒ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek Sleeves				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
36. Transport equipment to work site	28. Back injuries 29. Slips/Trips/Falls 30. Traffic 31. Hand injuries	22. Use proper lifting techniques/ Use wheeled transport/ Get assistance when need with moving equipment/ Minimize distance from vehicle 23. Minimize distance from vehicle/ Have unobstructed pathway to vehicle and collection points/ Mark tripping hazards with spray paint, cones, or caution tape/ Observe good housekeeping procedures. 24. Wear proper PPE (High Visibility vest and clothing)/ Exercise caution (stay alert-stay alive) 25. Wear proper PPE (leather gloves)/ Keep finger and hands clear of pinch points.
37.Mark area for drilling	18.Slips/Trips/Falls	16. Minimize distance from vehicle/ Have unobstructed pathway to vehicle and collection points/ Mark tripping hazards with spray paint, cones, or caution tape/ Observe good housekeeping procedures
38.Drill sampling points with hammer drill	11. Eye injuries 12. Dust exposure 13. Hand injuries 14. Catch items (clothing) 15. Electric shock 16. Chemical atmosphere hazard (vapor) 17. Slips/Trips/Falls	9. Wear proper PPE (safety glasses) 10. Wear proper PPE (dust mask) 11. Wear proper PPE (leather gloves)/ Keep hands and fingers out of pinch points/ Avoid drill catching on ground and twisting wrist or hand/ Release drill grip if drill becomes caught/ Ensure drill is unplugged prior to inserting bit. 12. Tie up or tuck-in all loose clothing/ Maintain distance from drill 13. Inspect power cable for cuts or nicks before use/ Use GFCI outlet on power cord/ Do not use in wet conditions 14. Monitor air, vapors with Photo-ionization detector (PID)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		15. Minimize distance from vehicle/ Have unobstructed pathway to vehicle and collection points/ Mark tripping hazards with spray paint, cones, or caution tape/ Observe good housekeeping procedures
39.Measure vapor content and depth to bottom of hole	1. Chemical atmosphere hazard (vapors)	1. Monitor air, vapors with Photo-ionization detector (PID)/ Keep face away from opening of hole while collecting measurements
40.Set-up of shroud and sampling canister system	1. Hand injuries 2. Chemical atmosphere hazard (vapors) 3. Slips/Trips/Falls	1. Wear proper PPE (leather gloves, nitrile gloves)/ Keep fingers away from pinch points when installing pump/ Do not use open blades, use tubing cutter 2. Monitor air, vapors with Photo-ionization detector (PID)/ Keep face away from opening of hole while collecting measurements 3. Minimize distance from vehicle/ Have unobstructed pathway to vehicle and collection points/ Mark tripping hazards with spray paint, cones, or caution tape/ Observe good housekeeping procedures
41.Purge soil gas	1. Chemical atmosphere hazard (vapors)	1. Monitor air, vapors with Photo-ionization detector (PID)/ Keep face away from exhaust port of pump
42.Sample collection (opening and closing valves)	1. Hand injuries	1. Wear proper PPE (leather gloves)/ Keep fingers away from pinch points
43.Sealing sampling holes	1. Back injuries 2. Concrete dust 3. Eye injuries	1. Use proper lifting techniques for lifting of cement bags 2. Wear proper PPE (dust mask) 3. Wear proper PPE (safety glasses)
44. All activities	55. Slips/ Trips/ Falls 56. Hand injuries, cuts, or lacerations during manual handling of materials 57. Foot injuries 58. Back injuries 59. Traffic 60. Wildlife: Stray animals, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 61. High Noise levels 62. Overhead hazards 63. Heat or cold injuries 64. Eye Injuries	63. Be aware of potential trip hazards/ Follow good housekeeping procedures/ Mark significant hazards 64. Inspect for jagged/sharp edges, and rough or slippery surfaces/ Keep fingers away from pinch points/ Wipe off greasy, wet, slippery or dirty objects before handling/ Wear leather/ cut-resistant gloves Wear proper PPE (Langan approved safety shoes) 65. Use proper lifting techniques/ Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift/ Obtain assistance when possible 66. Wear high visibility clothing & vest/ Use cones or signs to designate work area 67. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray animals/ Carry and use animal repellant when needed/ Use bug spray when needed 68. Wear hearing protection 69. Wear hard hat/ Avoid areas were overhead hazards exist. 70. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather)/ Drink plenty of fluids to avoid dehydration/ Takes breaks as necessary to avoid heat/cold stress 71. Wear safety glasses

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

<u>**Print Name**</u>	<u>**Sign Name**</u>	<u>**Date**</u>
<u>***Prepared by:***</u>		
<u>***Reviewed by:***</u>		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Indoor Air Sampling**
JSA Number: **JSA007-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: PID, Respiratory Protection (if necessary)				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
45. Building walkthrough and background contaminant removal	32. Slips / Trips/ Falls 33. Exposure to substances/vapors during removal	6. Be aware of potential trip hazards / Follow good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint 7. Monitor indoor air concentrations with a PID / Wear proper PPE (nitrile gloves) / Wear proper respiratory protection if necessary
46. Transport equipment to work area	1. Back Strain 2. Slips/ Trips/ Falls 3. Traffic 4. Cuts/abrasions from equipment 5. Contusions from dropped equipment	1. Use proper lifting techniques / Use wheeled transport 2. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 3. Wear proper PPE (high visibility vest or clothing) 4. Wear proper PPE (leather gloves, long sleeves) 5. Wear proper PPE (safety shoes)
47. Mark out areas for indoor air sampling	19. Slips/ Trips/ Falls	3. Be aware of potential trip hazards / Follow good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint
48. Set-up canisters and begin indoor air sampling	18. Dropping crates or canisters 19. Pinch hazard	5. Exercise caution when moving crates and canisters / Use proper housekeeping of materials during sample events / Do not carry too many items at one time / Perform several trips, if necessary 6. Wear proper PPE (leather gloves)
49. Sample collection	1. Dropping crates or canisters 2. Pinched fingers from opening valves	1. Exercise caution when moving crates and canisters / Use proper housekeeping of materials during sample events / Do not carry too many items at one time / Perform several trips, if necessary 2. Wear proper PPE (leather gloves) / Keep fingers away from pinch points
50. Pack up equipment	1. Back strain	1. Use proper lifting techniques / Use wheeled transport

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
	2. Slips/ Trips/ Falls 3. Traffic	2. Be aware of potential trip hazards / Follow good housekeeping procedures / Minimize distance to vehicle 3. Wear proper PPE (safety vest)
51. All activities	65. Slips/ Trips/ Falls 66. Hand injuries, cuts, or lacerations during manual handling of materials 67. Foot injuries 68. Back injuries 69. Traffic 70. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 71. High Noise levels 72. Overhead hazards 73. Heat Stress/ Cold Stress 74. Eye Injuries	72. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 73. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 74. Wear Langan approved safety shoes 75. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 76. Wear high visibility clothing & vest / Use cones or signs to designate work area 77. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 78. Wear hearing protection 79. Wear hard hat / Avoid areas were overhead hazards exist. 80. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 81. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Hammer Drill**
JSA Number: **JSA049**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

S – *Stop,* *what has changed?*
T – *Think* *about the task*
E – *Evaluate* *potential hazards*
P – *Plan* *safe approach*
S - *Start* *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
52.Transport equipment to work area	34.Back Strain 35.Slips/ Trips/ Falls 36.Traffic 37.Cuts/abrasions from equipment 38.Contusions from dropped equipment	8. Use proper lifting techniques / Use wheeled transport 9. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 10. Wear proper PPE (high visibility vest or clothing) 11. Wear proper PPE (leather gloves, long sleeves) 12. Wear proper PPE (safety shoes)
53.Electrical Connection	20.Inspect electrical cord to drill 21.Inspect hammer drill 22.Inspect extension cord 23.Test GFCI	4. Check the plug, insure all connections are in place, check cord for frayed sections. If plug or cord are worn, do not use equipment until repaired 5. Inspect chuck for proper grasping and holding of bit, check that plastic housing is not cracked or missing pieces. Do not use if chuck does not work properly or housing is compromised. 6. Inspect extension cord, if worn or stripped pull from service and replace 7. Test GFCI, replace if GFCI fails
54.Drill Bit	1. Inspect drill bit	1. Replace if worn 2. Wear proper PPE (leather gloves) when installing and removing drill bit. 3. Ensure equipment is unplugged from electrical power when removing and installing drill bit.
55.Use of Hammer Drill	1. Hazards associated with using hammer drill, flying objects, heavy equipment, ground level hazards and dust 2. Slips/ Trips/ Falls 3. Hazards associated drilling into concrete slab	1. Maintain a safe distance from other site operations / Wear proper PPE (hard hat, safety glasses, safety shoes, safety vest, ear protection and leather gloves) 2. Be aware of potential trip hazards / Follow good housekeeping procedures / Mark extension chord pathway with safety cones 3. Do not push hammer drill during use.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
56. All activities 4. All activities (cont'd)	75. Slips/ Trips/ Falls 76. Hand injuries, cuts, or lacerations during manual handling of materials 77. Foot injuries 78. Back injuries 79. Traffic 80. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 81. High Noise levels 82. Overhead hazards 83. Heat Stress/ Cold Stress 84. Eye Injuries	82. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 83. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 84. Wear Langan approved safety shoes 85. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 86. Wear high visibility clothing & vest / Use cones or signs to designate work area 87. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 88. Wear hearing protection 89. Wear hard hat / Avoid areas were overhead hazards exist. 90. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 91. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Groundwater Sampling**
JSA Number: **JSA008-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

S – ***Stop***, *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☒ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek sleeves, Dermal Protection, PID				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
57.Transport equipment to work area	6. Back Strain 7. Slips/ Trips/ Falls 8. Traffic 9. Cuts/abrasions from equipment 10. Contusions from dropped equipment	6. Use proper lifting techniques / Use wheeled transport 7. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 8. Wear proper PPE (high visibility vest or clothing) 9. Wear proper PPE (leather gloves, long sleeves) 10. Wear proper PPE (safety shoes)
58. Remove well cover	24.Scrape knuckles/hand 25.Strain wrist/bruise palm 26.Pinch fingers or hand	8. Wear proper PPE (leather gloves) 9. Using a hammer, tap the end of the wrench to loosen grip of bolts 10. Wear proper PPE (leather gloves)
59. Remove well cap and lock	20. Well can pops from pressure 21. Exposure to hazardous substances through inhalation or dermal exposure 22. Scrape knuckles/hand 23. Strain write/bruise palm	7. Remove cap slowly to relieve pressure / Do not place face over well when opening / Wear proper PPE (safety glasses) 8. Use direct air monitoring/reading instrument (i.e. PID) / Be familiar with and follow actions prescribed in the HASP / Wear proper PPE (nitrile gloves) 9. Wear proper PPE (leather gloves) 10. Using hammer, tap the end of the wrench to loosen grip
60. Measure head-space vapor levels	3. Exposure to hazardous substances through inhalation	3. Do not place face over well when collecting measurement
61. Remove dedicated tubing (if necessary)	4. Exposure to hazardous substances through inhalation or dermal exposure 5. Tubing swings around after removal	4. Wear proper PPE (nitrile gloves, Tyvek sleeves) 5. Wear proper PPE (safety glasses)
62. Set-up plastic sheeting for work site around the well	1. Lacerations when cutting plastic sheeting	1. Use scissors to cut plastic sheeting / Cut motions should always be away from body and body parts

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
63. Measure depth to water	1. Exposure to hazardous substances through inhalation or dermal exposure 2. Pinch fingers or hand in water level instrument	1. Wear proper PPE (nitrile gloves) 2. Wear proper PPE (leather gloves)
64. Calibrate monitoring equipment	1. Skin or eye contact with calibration chemicals 2. Pinch fingers or hand in monitoring equipment	1. Wear proper PPE (safety glasses, nitrile gloves) 2. Wear proper PPE (leather gloves) / Avoid pinch points
65. Install sampling pump in well	1. Hand injuries during installation of pump 2. Lacerations when cutting tubing 3. Back strain during installation of pump 4. Physical hazards associated with manual lifting of heavy equipment 5. Back strain from starting generator 6. Burns from hot exhaust from generator 7. Electrical shock from improper use of generator and pump 8. Contaminated water spray from loose connections	1. Wear proper PPE (leather gloves, nitrile gloves) 2. Use safety tubing cutter 3. Use proper lifting techniques 4. Use proper lifting techniques / Use wheeled transport for heavy equipment 5. Use arm when starting generator / Do not over-strain if generator does not start 6. Do not touch generator near exhaust / Use proper handle to carry / Allow generator to cool down before moving 7. Properly plug in pump to generator / Do not allow the pump or generator to contact water / Check for breaks in the cord 8. Check all tubing connections to ensure they are tight and secure

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
10. Purge water	1. Contact with potentially contaminated groundwater 2. Back strain from lifting buckets of water 3. Tripping potential on sample discharge lines and pump electric line	1. Wear proper PPE (safety glasses, nitrile gloves) 2. Use proper lifting techniques / Use wheeled transport 3. Organize discharge of electric line to keep out of way as much as possible / Mark potential tripping hazards with caution tape or safety cones
11. Sample water collection	1. Contact with potentially contaminated groundwater through dermal exposure 2. Contact with and burns from acid used for sample preservation 3. Tripping potential on sample discharge lines and pump electric line 4. Lacerations from broken sample bottles 5. Back strain when transporting coolers full of collected samples 6. Slips/ Trips/ Falls	1. Wear proper PPE (safety glasses, nitrile gloves) 2. Wear proper PPE (safety glasses, nitrile gloves) / Ensure sample bottle lids are secure before use and after sample collection 3. Organize line to keep out of the way as much as possible / Mark potential tripping hazards with caution tape or safety cones 4. Do not over-tighten bottle caps / Handle bottles safely to prevent breakage / Wrap glass bottles in bubble wrap, if possible 5. Use proper lifting techniques / Use wheeled transport / Seek assistance if coolers weight exceeds 50lbs. / Minimize distance to vehicle 6. Have unobstructed path to vehicle or collection point / Follow good housekeeping procedures / Do not lift/walk with coolers that are too heavy/difficult to lift
12. Remove pump and pack up equipment	1. Back strain when removing pump or lifting heavy equipment	1. Use proper lifting technique / Use wheeled transport for heavy equipment
13. Replace well cap and lock	1. Scrape fingers/hand 2. Strain wrist/bruise palm	1. Wear proper PPE (leather gloves) 2. Using hammer, tap the end of the well cap to tighten grip
14. Replace well cover	1. Scrape knuckles/hand 2. Strain write/bruise palm 3. Pinch fingers or hand	1. Wear proper PPE (leather gloves) 2. Using hammer, tap the end of the wrench to tighten the grip of the bolts 3. Wear proper PPE (leather gloves)
15. Transport drums to disposal staging location	1. Back, arm or shoulder strain from moving drums 2. Pinch hazard 3. Contact with potentially contaminated groundwater when moving improperly sealed drums 4. Slips/ Trips/ Falls when moving drum 5. Drop drum on feet/toes	1. Use drum cart for moving drums / Use proper lifting techniques / Obtain assistance, if needed 2. Wear proper PPE (leather gloves) 3. Wear proper PPE (nitrile gloves under leather gloves) / Properly seal drum to prevent leak 4. Ensure route to move drum to storage space is dry and free from obstructions 5. Wear proper PPE (safety shoes)
16. Place used PPE in designated disposal drum	1. Pressure build-up inside drum 2. Pinch hazard	1. Remove cap from bung hole in drum to relieve pressure 2. Wear proper PPE (leather gloves)
17. Decontaminate equipment	1. Splashing water/soap from decontamination 2. Contact with potentially contaminated groundwater through dermal exposure 3. Electrical shock from broken electric cords	1. Wear proper PPE (safety glasses) 2. Wear proper PPE (safety glasses, dermal protection) 3. Properly plug in pump to generator / Do not allow the pump or generator to contact water / Check for breaks in the cord
18. All activities	85. Slips/ Trips/ Falls 86. Hand injuries, cuts, or lacerations during manual handling of materials 87. Foot injuries 88. Back injuries 89. Traffic 90. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.)	92. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 93. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 94. Wear Langan approved safety shoes

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
	91. High Noise levels 92. Overhead hazards 93. Heat Stress/ Cold Stress 94. Eye Injuries	95. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 96. Wear high visibility clothing & vest / Use cones or signs to designate work area 97. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 98. Wear hearing protection 99. Wear hard hat / Avoid areas were overhead hazards exist. 100. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 101. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN	**Job Safety Analysis (JSA)** **Health and Safety**

JSA Title: **Well Installation**
JSA Number: **JSA019-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.

S – ***Stop,*** *what has changed?*
T – ***Think*** *about the task*
E – ***Evaluate*** *potential hazards*
P – ***Plan*** *safe approach*
S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT REQUIRED:				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: PID, Tyvek sleeves				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
66.Move equipment to work site	39.Back strain when lifting equipment 40.Slips/ Trips/ Falls while moving equipment 41.Traffic (if applicable) 42.Pinched fingers or running over toes during geoprobe set-up 43.Overturn drilling rig while transporting to loading dock on flat-bed tow truck	26. Use proper lifting technique (use legs for bending and lifting and not the back)/ Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle 27. Use proper lifting technique (use legs for bending and lifting and not the back) / Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle / Have unobstructed path to vehicle or collection point / Do not lift/walk with boxes that are heavy/difficult to lift 28. Wear high visibility safety vests or clothing / Exercise caution 29. Wear proper PPE (cut-resistant gloves) / Stay alert, be aware of geoprobe rig at all times 30. Drill rig should be parked in center of flat-bed tow truck / Emergency brake shall be used at all times during transport on the flat-bed truck/ All unnecessary personnel should stay away from the flat-bed truck during moving activities
67.Calibration of monitoring equipment	27.Skin or eye contact with calibration chemicals 28.Pinch fingers in monitoring equipment	17. Wear proper PPE (safety glasses/ goggles) 18. Wear proper PPE (leather gloves)
19. Set-up geoprobe rig	24. Geoprobe rig movement	16. All field personnel should stay clear of the geoprobe rig while moving / Use a spotter when backing up the geoprobe
20. Advance geoprobe rods below ground surface to desired depth	6. Underground utilities 7. High noise levels	9. Clean all subsurface soil borings to a minimum of 5 feet below grade 10. Wear proper PPE (hearing protection)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
21. Remove and open acetate liner 5. Remove and open acetate liner (cont'd)	95. Pinched fingers while removing macrocore 96. Cuts/lacerations when cutting acetate liner open 97. Exposure to hazardous vapors 98. Skin contact with contaminated soil	5. Wear proper PPE (nitrile gloves, cut-resistant or leather gloves 6. Wear proper PPE (cut-resistant or leather gloves) 7. Do not place face over acetate liner when opening / Monitor hazardous vapors in air with PID / Upgrade PPE as necessary based on levels contained in the Health and Safety Plan 8. Wear proper PPE (nitrile gloves)
6. Remove excess soil from acetate liner and place in 55-gallon drum (IF NOT PERFORMED BY LANGAN, REMOVE!)	5. Cuts/lacerations from acetate liner 6. Pinched fingers/hand while opening/closing drum 7. Skin contact with contaminated soil 8. Soil debris in eyes	5. Wear proper PPE (cut-resistant or leather gloves) 6. Wear proper PPE (cut-resistant or leather gloves) 7. Wear proper PPE (nitrile gloves) 8. Wear proper PPE (safety glasses)
7. Attach hollow-stem augers to the geoprobe rig; Advance augers and attach additional augers until desired depth is reached	1. Strain wrist/bruise palm 2. Pinched fingers 3. Back Strain 4. Clothing entanglement 5. Carbon monoxide poisoning 6. Bruise toes/foot 7. High noise levels 8. Skin contact with contaminated soil	1. Wear proper PPE (cut-resistant or leather gloves) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Use proper lifting techniques 4. Wear proper work attire(no loose clothing/strings) 5. Properly ventilate work area 6. Wear proper PPE (safety shoes) 7. Wear proper PPE (hearing protection) 8. Wear proper PPE (Tyvek sleeves, nitrile gloves)
8. Install monitoring well	1. Pinched fingers 2. Lacerations/abrasions 3. Back Strain	1. Wear proper PPE (cut-resistant or leather gloves) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Use proper lifting techniques
9. Tremie-grout annulus space above bentonite seal	1. Back strain 2. Pinched fingers	1. Use proper lifting techniques 2. Wear proper PPE (cut-resistant or leather gloves)
10. Install flush-mount monitoring well pad	1. Splashed concrete 2. Pinched fingers 3. Cuts/lacerations	1. Wear proper PPE (safety glasses) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Wear proper PPE (cut-resistant or leather gloves)
11. Decontaminate equipment	1. Splashing water/soap 2. Contact with potentially contaminated groundwater/soil through dermal exposure 3. Electrical shock from broken electric cords	1. Wear proper PPE (safety glasses) 2. Wear proper PPE (safety glasses, dermal protection) 3. Properly plug in pump to generator / Do not allow the pump or generator to contact water / Check for breaks in the cord
12. Transport drums to central staging location (IF NOT PERFORMED BY LANGAN, REMOVE!)	7. Back, arm or shoulder strain from moving drums 8. Pinch fingers/hand in drum cart when moving drums 9. Pinch fingers/hand when operating lift-gate on vehicle 10. Contact with potentially contaminated groundwater when moving improperly sealed drums 11. Slips when moving drums 12. Drop drum on feet/toes	102. Use drum cart for moving drums / Use proper lifting techniques / Do not lift heavy loads without assistance 103. Wear proper PPE (cut-resistant or leather gloves) 104. Wear proper PPE (cut-resistant or leather gloves) 105. Wear proper PPE (nitrile gloves underneath work gloves) 106. Follow good housekeeping procedures / Ensure route to move drum and storage space is free from obstructions 107. Wear proper PPE (safety shoes) / Work in a safe manner to prevent dropped drum

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
13. All activities 13. All activities (cont'd)	11. Slips/ Trips/ Falls 12. Hand injuries, cuts, or lacerations during manual handling of materials 13. Foot injuries 14. Back injuries 15. Traffic 16. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 17. High Noise levels 18. Overhead hazards 19. Heat Stress/ Cold Stress 20. Eye Injuries	11. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 12. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 13. Wear Langan approved safety shoes 14. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 15. Wear high visibility clothing & vest / Use cones or signs to designate work area 16. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 17. Wear hearing protection 18. Wear hard hat / Avoid areas were overhead hazards exist. 19. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 20. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN	Job Safety Analysis (JSA) Health and Safety
JSA Title: **Monitoring Well Development** **JSA Number:** **JSA026-01**	
A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.	S – ***Stop,*** *what has changed?* T – ***Think*** *about the task* E – ***Evaluate*** *potential hazards* P – ***Plan*** *safe approach* S - ***Start*** *task /* ***Stop*** *& regroup*

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek Sleeves				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
68. Transport equipment to work area	44. Back Strains 45. Slips/Trips/Falls 46. Traffic 47. Cuts/Abrasions/Contusions from equipment	31. Use proper lifting techniques/ Use wheeled transport/ use buddy system when lifting equipment. 32. Minimize distance from work area/ unobstructed path to collection points and vehicle/ Follow good housekeeping procedures. 33. Wear high-visibility vest or clothing/Exercise caution/ Use traffic cones or signage if needed. 34. Wear proper PPE (leather gloves, long sleeves, Langan approved safety shoes).
69. Measure depth of water	29. Exposure to hazardous substances 30. Pinched fingers	22. Wear proper PPE (Nitrile gloves, Safety glasses/Face shield). 23. Wear proper PPE (cut-resistant gloves).
70. Install Tremie pipe in the monitoring well and connect to water source.	25. Hand injuries during installation (pinched fingers/hands). 26. Back strain from holding Tremie pipe. 27. High pressure water spray.	17. Wear proper PPE (Nitrile gloves/cut-resistant gloves). 18. Use proper lifting techniques/ Use two personnel when lowering pump greater than 80-feet. 19. Ensure all hose connections are tight and secure/ Use proper PPE (face shield and safety glasses).
71. Install pump in to well a. Connect pump to sample tubing. b. Lower pump to desired depth in well. c. Connect sample tubing to flow cell d. Connect pump to power source	8. Hand injuries during pump installation and sample tubing cutting. 9. Back strain 10. Electric shock 11. Exhaust gases from generator 12. Burns from hot equipment	11. Wear proper PPE when installing pump and cutting sample tubing (Nitrile and cut-resistant gloves)/ Use tubing cutter. 12. Proper lifting techniques/ Two personnel when installing pump at depths greater than 80-feet/ Use buddy when lifting heavy loads (pump, generator)/Use wheeled transport. 13. Ensure equipment is (LO/TO: locked out/tagged out) prior to preforming any electrical connections/ Inspect wires for frays or cuts/Ensure generator is properly grounded prior to starting.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
(generator) e. Turn on power source (generator)		14. Position generator so that exhaust is flowing away from work area. 15. Do not touch exhaust or any hot part of generator/ Allow equipment time to cool down prior to carrying/ Use proper PPE (long sleeves, leather gloves)
72. Develop monitoring well a. Jet water into well using Tremie pipe b. Turn pump on and adjust to desired flow rate. c. Surge pump up and down well to remove sediment from screen d. Containerize all purge water from well.	99. Hand injuries 100. Face injuries 101. Contaminated spray from water	108. Wear proper PPE (cut-resistant gloves and nitrile gloves). 109. Wear proper PPE (face shield and safety glasses)/do not stand over well opening. 110. Wear proper PPE (Face shield and safety goggles)/Tyvek over garments/ Ensure all connections are secure and tight/ Tubing outlet is contained in an overflow container.
73. Drum staging area.	1. Back, Arm, and shoulder strain. 2. Pinch points 3. Cross contamination 4. Slip/Trips/Falls	1. Use proper lifting techniques/ Use drum carts when moving drums/ use buddy system for moving of drums if needed/Move drums shortest distance needed. 2. Keep fingers and feet away from pinch points/ Use proper PPE (cut-resistant gloves, Langan approved safety shoes) 3. Use proper PPE (Nitrile gloves, Tyvek sleeves) 4. Ensure pathway is clear prior to moving equipment/ Mark all hazards/ Use additional person as a spotter if needed.
74. Equipment pack-up	1. Back Strains 2. Slips/Trips/Falls 3. Traffic 4. Cuts/Abrasions/Contusions from equipment.	1. Use proper lifting techniques/ Use wheeled transport/ use buddy system when lifting equipment. 2. Minimize distance from work area/ Unobstructed path to collection points and vehicle/ Follow good housekeeping procedures. 3. Wear high-visibility vest or clothing/Exercise caution/ Use traffic cones or signage if needed. 111. Wear proper PPE (leather gloves, long sleeves, Langan approved safety shoes).
75. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts, or lacerations during manual handling of materials 3. Foot injuries 102. Back injuries 103. Traffic 104. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 105. High Noise levels 106. Overhead hazards 107. Heat Stress/ Cold Stress 108. Eye Injuries	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery, or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 5. Wear high visibility clothing & vest / Use cones or signs to designate work area 6. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 7. Wear hearing protection 8. Wear hard hat / Avoid areas were overhead hazards exist. 9. Wear proper attire for weather conditions (sunscreen or protective clothing

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 10. Wear safety glasses.
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN	Job Safety Analysis (JSA) Health and Safety
JSA Title: **Groundwater/Product Purging/Sampling with Bailer** **JSA Number: JSA053**	***S*** **– *Stop,*** *what has changed?* ***T*** **– *Think*** *about the task* ***E*** **– *Evaluate*** *potential hazards* ***P*** **– *Plan*** *safe approach* ***S*** **- *Start*** *task /* ***Stop*** *& regroup*
A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions. Prior to the start of any work "TAKE 5" and conduct a Last Minute Risk Assessment.	TAKE 5

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☒ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☒ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Tyvek sleeves, Dermal Protection, PID, absorbent pads				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
76.Transport equipment to work area	11. Back Strain 12. Slips/ Trips/ Falls 13. Traffic 14. Cuts/abrasions from equipment 15. Contusions from dropped equipment	11. Use proper lifting techniques / Use wheeled transport 12. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 13. Wear proper PPE (high visibility vest or clothing) 14. Wear proper PPE (leather gloves, long sleeves) 15. Wear proper PPE (safety shoes)
77. Remove well cover	31.Scrape knuckles/hand 32.Strain wrist/bruise plan 33.Pinch fingers or hand	11. Wear proper PPE (leather gloves) 12. Using a hammer, tap the end of the wrench to loosen grip of bolts 13. Wear proper PPE (leather gloves)
78. Remove well cap and lock	28. Well can pops from pressure 29. Exposure to hazardous substances through inhalation or dermal exposure 30. Scrape knuckles/hand 31. Pinch points 32. Strain write/bruise palm	11. Remove cap slowly to relieve pressure / Do not place face over well when opening / Wear proper PPE (safety glasses, face shield, hand protection) 12. Use direct air monitoring/reading instrument (i.e. PID) / Be familiar with and follow actions prescribed in the HASP / Wear proper PPE (nitrile gloves) 13. Wear proper PPE (leather gloves) 14. Using hammer, tap the end of the wrench to loosen grip
79. Measure head-space vapor levels	4. Exposure to hazardous substances through inhalation	4. Do not place face over well when collecting measurement
80. Set-up plastic sheeting/absorbent pads	2. Lacerations when cutting plastic sheeting/absorbent pads	2. Use scissors to cut plastic sheeting/absorbent pads / Cut motions should always be away from body and body parts

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
for work site around the well		
81. Lower Bailer sleeve into well	7. Repetitive motion injury (pulled arm/back muscles) 8. Dehydration	7. Take breaks while lowering bailer into well/ Use a mechanical device to lower bailer into well/ Rotate employees (take turns conducting the manual labor portion) 8. Take breaks and drink water.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
7. Purge/Sample water/product collection	1. Contact with potentially contaminated groundwater or product through dermal exposure 2. Contact with and burns from acid used for sample preservation 9. Tripping potential on sampling lanyard 10. Lacerations from broken sample bottles 11. Back strain when transporting coolers full of collected samples 12. Slips/ Trips/ Falls	1. Wear proper PPE (safety glasses, nitrile gloves, safety shield, Tyvek) 2. Ensure sample bottle lids are secure before use and after sample collection 3. Organize lanyard to keep out of the way as much as possible / Mark potential tripping hazards with caution tape or safety cones 9. Do not over-tighten bottle caps / Handle bottles safely to prevent breakage / Wrap glass bottles in bubble wrap, if possible 10. Use proper lifting techniques / Use wheeled transport / Seek assistance if coolers weight exceeds 50lbs. / Minimize distance to vehicle 11. Have unobstructed path to vehicle or collection point / Follow good housekeeping procedures / Do not lift/walk with coolers that are too heavy/difficult to lift
8. Retrieval of bailer	9. Repetitive motion injury (pulled arm/back muscles) 10. Dehydration	9. Take breaks while retrieving bailer out of the well/ Use a mechanical device to raise bailer out of well/ Rotate employees (take turns conducting the manual labor portion) 10. Take breaks and drink water.
9. Pack-up equipment	2. Back strain when removing or lifting heavy equipment	2. Use proper lifting technique / Use wheeled transport for heavy equipment
10. Replace well cap and lock	3. Scrape fingers/hand 4. Strain wrist/bruise palm	3. Wear proper PPE (leather gloves) 4. Using hammer, tap the end of the well cap to tighten grip
11. Replace well cover	4. Scrape knuckles/hand 5. Strain write/bruise palm 6. Pinch fingers or hand	4. Wear proper PPE (leather gloves) 5. Using hammer, tap the end of the wrench to tighten the grip of the bolts 6. Wear proper PPE (leather gloves)
12. Place used PPE in designated disposal drum	3. Pressure build-up inside drum 4. Pinch hazard	3. Remove cap from bung hole in drum to relieve pressure 4. Wear proper PPE (leather gloves) 5. Product drums may require additional spill protection/electrical grounding, check local regulations
13. Decontaminate equipment	4. Splashing water/soap from decontamination 5. Contact with potentially contaminated groundwater through dermal exposure	4. Wear proper PPE (safety glasses) 5. Wear proper PPE (safety glasses, dermal protection)

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
14. All activities	109.Slips/ Trips/ Falls 110.Hand injuries, cuts, or lacerations during manual handling of materials 111.Foot injuries 112.Back injuries 113.Traffic 114.Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 115.High Noise levels 116.Overhead hazards 117.Heat Stress/ Cold Stress 118.Eye Injuries	112.Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 113.Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 114.Wear Langan approved safety shoes 115.Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 116.Wear high visibility clothing & vest / Use cones or signs to designate work area 117. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 118.Wear hearing protection 119.Wear hard hat / Avoid areas were overhead hazards exist. 120.Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 121. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

ATTACHMENT H

TAILGATE SAFETY BRIEFING FORM

LANGAN TAILGATE SAFETY BRIEFING

Date:__________________________ Time: ______________________________________

Leader:_______________________________ Location:____________________________________

Work Task:

SAFETY TOPICS (*provide some detail of discussion points*)

Chemical Exposure Hazards and Control:

Physical Hazards and Control:

Air Monitoring:

PPE:

Communications:

Safe Work Practices:

Emergency Response:

Hospital/Medical Center Location:

Phone Nos.:

Other:

FOR FOLLOW-UP (the issues, responsibilities, due dates, etc.)

ATTENDEES

PRINT NAME	COMPANY	SIGNATURE

ATTACHMENT I

THE CITY OF NEW YORKEXECUTIVE ORDER NO. 74

Langan employees and their direct hire contractors will comply with all provisions of the New York City Executive Order No. 74 as signed by the Mayor on July 31, 2021. Specifically, effective August 2, 2021

- Will don face masks while on-site at all times; and
- Provide proof upon demand of full vaccination status.

A copy of the New York City Executive Order No. 74 is provided on the following pages.

Attachment B Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN

for

294 4th Avenue
Brooklyn, New York 11215

Prepared for:

294 LLC
478 Albany Avenue
Brooklyn, New York 11203

Prepared by:

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
360 West 31st Street, 8th Floor
New York, New York 10001

David Winslow, PG
Associate Principal

LANGAN

May 11, 2026
Langan Project No.: 190140901

TABLE OF CONTENTS

FIGURES

Attachments

1.0 PROJECT DESCRIPTION

1.1 Introduction

This Quality Assurance Project Plan (QAPP) was prepared for the property located at 294 4th Avenue in Brooklyn, NY (the "site"). Additional site information, including site maps, is provided in the Remedial Investigation Work Plan (RIWP). This QAPP specifies analytical methods to be used to ensure that data collected during the Remedial Investigation (RI) are precise, accurate, representative, comparable, complete, and meet the sensitivity requirements of this project.

1.2 Project Objectives

The objective of the RI is to investigate and characterize the nature and extent of on-site environmental impacts associated with potential areas of concern (AOC) and historical uses of the site and to assess the presence of emerging contaminants, including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane, in soil and groundwater. This QAPP addresses sampling and analytical methods that may be necessary in support of the RIWP. These objectives have been established in order to meet standards that will protect public health and the environment.

1.3 Scope of Work

The scope of work covered in this QAPP is detailed in the RIWP. In general, the RIWP proposes soil boring installation and sampling, groundwater monitoring well installation and sampling, soil vapor sampling, and ambient air sampling. A dust, odor, and organic vapor control and monitoring plan will be implemented during ground intrusive activities.

The following investigation activities will be performed as part of the RIWP:

<u>Soil Borings and Sampling</u>

- Advance at least 12 soil borings below the observed terminus of historic fill, which is assumed to be between 20 and 25 feet bgs. Soil borings to be converted to groundwater monitoring wells will be advanced to at least 5 feet below the observed groundwater interface.
- Collect up to three soil samples from each boring location (plus quality assurance/quality control [QA/QC] samples) for laboratory analysis.

<u>Monitoring Well Installation and Sampling</u>

- Install and develop three monitoring wells.
- Collect one groundwater sample from each newly installed monitoring well (plus QA/QC samples) for laboratory analysis.
- Two groundwater samples will be collected from targeted intervals using SP-16 methods via geoprobe. Intervals to be targeted will be from 5-10 feet into the groundwater table

and 15-20 feet into the groundwater table. Analysis of the targeted intervals will consist of CVOCs/VOCs.

- Survey and gauge newly installed monitoring wells to evaluate groundwater elevation and establish flow direction.

Soil Vapor and Ambient Air Sampling

- Install five soil vapor sampling points to 5 feet bgs or 2 feet above the groundwater table, whichever is shallower.
- Collect one soil vapor sample from each soil vapor point and one outdoor ambient air sample for laboratory analysis.
- If the building is not demolished prior to the remedial investigation, Langan will instead collect three sub slab samples and two soil vapor samples.

2.0 DATA QUALITY OBJECTIVES AND PROCESS

Data Quality Objectives (DQO) are qualitative and quantitative statements to help ensure that data of known and appropriate quality are obtained during the project. The overall project objective is to investigate subsurface conditions associated with AOCs for the site. The sampling program will provide for collection of soil, groundwater and vapor samples as part of the RIWP. DQOs for sampling activities are determined by evaluating five factors:

- Data needs and uses: The types of data required and how the data will be used after it is obtained.
- Parameters of Interest: The types of chemical or physical parameters required for the intended use.
- Level of Concern: Levels of constituents, which may require remedial actions or further investigations.
- Required Analytical Level: The level of data quality, data precision, and QA/QC documentation required for chemical analysis.
- Required Detection Limits: The detection limits necessary based on the above information.

The quality assurance and quality control objectives for all measurement data include:

- **Precision** – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal quality control (QC) duplicates and/or matrix spike duplicates.
- **Accuracy** – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. 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. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), internal standards, laboratory method blanks, instrument calibration, and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. For soil vapor or air samples, analytical accuracy will be assessed by examining the percent recoveries that are added to each sample, internal standards, laboratory method blanks, and instrument calibration.
- **Representativeness** – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope

of work is followed and that specified sampling and analysis techniques are used. Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is accomplished by following all applicable methods, laboratory-issued standard operating procedures (SOP), the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

- **Completeness** – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.
- **Comparability** – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis as documented in the QAPP, using standard reporting units and reporting formats, and data validation.
- **Sensitivity** – the ability of the instrument or method to detect target analytes at the levels of interest. The project manager will select, with input from the laboratory and quality assurance (QA) personnel, sampling and analytical procedures that achieve the required levels of detection.

3.0 PROJECT ORGANIZATION

All work included with implementing the NYSDEC-approved RIWP will be overseen by Langan, on behalf of the Volunteer. Langan will collect media samples and will subcontract with a qualified driller and a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory. Data validation services will be performed by an approved data validator.

For the scope of work described in the RIWP, sampling will be conducted by Langan, and the analytical services will be performed by York Analytical Laboratories, Inc. of Stratford, Connecticut (NYSDOH ELAP certification number 10854). Data validation services will be performed by Joe Conboy; résumé attached (Attachment A).

Key contacts for this project are as follows:

294 LLC:	Mr. Zvi Boymelgreen Telephone: (347) 414-4221
Langan Project Manager*:	Mr. David Winslow Telephone: (347) 242-7107
Langan Project Leader*:	Mr. Matthew Del Balzo Telephone: (914) 635-0973
Program Quality Assurance Officer (QAO)*:	Mr. Gerald Nicholls, QEP Telephone: (212) 479-5404
Health & Safety Officer (HSO)*:	Mr. Tony Moffa, CHMM Telephone: (215) 491-6500
Data Validator*:	Mr. Joe Conboy Telephone: (609) 282-8055
Laboratory Representative:	Mr. Ben Rao Telephone: (201) 812-2633

*résumés provided in Attachment A

4.0 QUALITY ASSURANCE OBJECTIVES FOR COLLECTION OF DATA

The overall quality assurance and quality control objectives for all measurement data include precision, accuracy, representativeness, completeness, comparability, and sensitivity. These objectives are defined in following subsections. Variances from the quality assurance objectives at any stage of the investigation will result in the implementation of appropriate corrective measures and an assessment of the impact of corrective measures on the usability of the data.

4.1 Precision

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates. Laboratory precision and sample heterogeneity also contribute to the uncertainty of field duplicate measurements. This uncertainty is taken into account during the data assessment process. For field duplicates, results less than 2× the reporting limit (RL) meet the precision criteria if the absolute difference is less than ±2× the RL and acceptable based on professional judgment. For results greater than 2× the RL, the acceptance criteria is a relative percent difference (RPD) of ≤50% (soil and air), <30% (water). RLs and method detection limits (MDL) are provided in Attachment B.

4.2 Accuracy

Accuracy is the measurement of the reproducibility of the sampling and analytical methodology. It should be noted that precise data may not be accurate data. For the purpose of this QAPP, bias is defined as the constant or systematic distortion of a measurement process, which manifests itself as a persistent positive or negative deviation from the known or true value. This may be due to (but not limited to) improper sample collection, sample matrix, poorly calibrated analytical or sampling equipment, or limitations or errors in analytical methods and techniques.

Accuracy in the field is assessed through the use of equipment blanks and through compliance to all sample handling, preservation, and holding time requirements. All equipment blanks should be non-detect when analyzed by the laboratory. Any contaminant detected in an associated equipment blank will be evaluated against laboratory blanks (preparation or method) and evaluated against field samples collected on the same day to determine potential for bias. Trip blanks are not required for non-aqueous matrices but are planned for non-aqueous matrices where high concentrations of volatile organic compounds (VOC) are anticipated.

Laboratory accuracy is assessed by evaluating the percent recoveries of matrix spike/matrix spike duplicate (MS/MSD) samples, laboratory control samples (LCS), surrogate compound recoveries, and the results of method preparation blanks. MS/MSD, LCS, and surrogate percent recoveries will be compared to either method-specific control limits or laboratory-derived control limits.

Sample volume permitting, samples displaying outliers should be reanalyzed. All associated method blanks should be non-detect when analyzed by the laboratory.

4.3 Completeness

Laboratory completeness is the ratio of total number of samples analyzed and verified as acceptable compared to the number of samples submitted to the fixed-base laboratory for analysis, expressed as a percent. Three measures of completeness are defined:

- Sampling completeness, defined as the number of valid samples collected relative to the number of samples planned for collection;
- Analytical completeness, defined as the number of valid sample measurements relative to the number of valid samples collected; and
- Overall completeness, defined as the number of valid sample measurements relative to the number of samples planned for collection.

Air, soil vapor, soil, and groundwater data will meet a 90% completeness criterion. If the criterion is not met, sample results will be evaluated for trends in rejected and unusable data. The effect of unusable data required for a determination of compliance will also be evaluated.

4.4 Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. This is performed by following applicable SOPs and this QAPP. All field technicians will be given copies of appropriate documents prior to sampling events and are required to read, understand, and follow each document as it pertains to the tasks at hand.

Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is performed by following all applicable United States Environmental Protection Agency (USEPA) methods, laboratory-issued SOPs, the laboratory’s Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

4.5 Comparability

Comparability is an expression of the confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Requiring traceability of all analytical standards and/or source materials to the USEPA or National Institute of Standards and Technology (NIST);
- Requiring that all calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable);
- Using standard reporting units and reporting formats including the reporting of QC data;
- Performing a complete data validation on a representative fraction of the analytical results, including the use of data qualifiers in all cases where appropriate; and
- Requiring that all validation qualifiers be used any time an analytical result is used for any purpose.

These steps will ensure all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

4.6 Sensitivity

Sensitivity is the ability of the instrument or method to detect target analytes at the levels of interest. The project director will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection and QC acceptance limits that meet established performance criteria. Concurrently, the project director will select the level of data assessment to ensure that only data meeting the project DQOs are used in decision-making.

Field equipment will be used that can achieve the required levels of detection for analytical measurements in the field. In addition, the field sampling staff will collect and submit full volumes of samples as required by the laboratory for analysis, whenever possible. Full volume aliquots will help ensure achievement of the required limits of detection and allow for reanalysis if necessary. The concentration of the lowest level check standard in a multi-point calibration curve will represent the reporting limit.

Analytical methods and quality assurance parameters associated with the sampling program are presented in Attachment C. The frequency of associated field blanks and duplicate samples will be based on the recommendations listed in NYSDEC Division of Environmental Remediation (DER)-10, and as described in Section 5.3.

Site-specific MS/MSD samples will be prepared and analyzed by the analytical laboratory by spiking an aliquot of submitted sample volume with analytes of interest. Additional sample volume is not required by the laboratory for this purpose, so long as the full volume required for the sample analysis is collected. An MS/MSD analysis will be analyzed at a rate of 1 out of every

20 samples, or one per analytical batch. MS/MSD samples are only required for soil and groundwater samples.

5.0 SAMPLE COLLECTION AND FIELD DATA ACQUISITION PROCEDURES

Soil and groundwater sampling will be conducted in accordance with the established NYSDEC protocols contained in DER-10/Technical Guidance for Site Investigation and Remediation (May 2010) and the NYSDEC's "Guidance for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs" (November 2022). Air sampling will be conducted in accordance with the established NYSDOH protocols contained in the Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006, updated May 2017). The following sections describe procedures to be followed for specific tasks.

5.1 Field Documentation Procedures

Field documentation procedures will include summarizing field observations in field books, logging soil borings and monitoring well construction, completing forms for groundwater and soil vapor sampling, and proper sample labeling. These procedures are described in the following sections.

5.1.1 Field Data and Notes

Field notebooks contain the documentary evidence regarding procedures conducted by field personnel. Hard cover, bound field notebooks will be used because of their compact size, durability, and secure page binding. The pages of the notebook will not be removed.

Entries will be made in waterproof, permanent blue or black ink. No erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and the change initialed and dated by the team member making the change. Each entry will be dated. Entries will be legible and contain accurate and complete documentation of the individual or sampling team's activities or observations made. The level of detail will be sufficient to explain and reconstruct the activity conducted. Each entry will be signed by the person(s) making the entry.

The following types of information will be provided for each sampling task, as appropriate:

- Project name and number
- Reasons for being on-site or taking the sample
- Date and time of activity
- Sample identification numbers
- Geographical location of sampling points with references to the site, other facilities or a map coordinate system. Sketches will be made in the field logbook when appropriate
- Physical location of sampling locations such as depth below ground surface
- Description of the method of sampling including procedures followed, equipment used and any departure from the specified procedures

- Description of the sample including physical characteristics, odor, etc.
- Readings obtained from health and safety equipment
- Weather conditions at the time of sampling and previous meteorological events that may affect the representative nature of a sample
- Photographic information including a brief description of what was photographed, the date and time, the compass direction of the picture and the number of the picture on the camera
- Other pertinent observations such as the presence of other persons on the site, actions by others that may affect performance of site tasks, etc.
- Names of sampling personnel and signature of persons making entries

Field records will also be collected on field data sheets including boring logs, which will be used for geologic and drilling data during soil boring activities. Field data sheets will include the project-specific number and stored in the field project files when not in use. At the completion of the field activities, the field data sheets will be maintained in the central project file.

5.1.2 Sample Labeling

Each sample collected will be assigned a unique identification number in accordance with the sample nomenclature guidance included in Attachment D and placed in an appropriate sample container. Each sample container will have a sample label affixed to the outside with the date and time of sample collection and project name. In addition, the label will contain the sample identification number, analysis required, and chemical preservatives added, if any. All documentation will be completed in waterproof ink.

5.2 Equipment Calibration and Preventative Maintenance

A photoionization detector (PID) will be used during the sampling activities to evaluate work zone action levels and screen soil samples. Field calibration and/or field checking of the PID will be the responsibility of the field team leader and the site HSO and will be accomplished by following the procedures outlined in the operating manual for the instrument. At a minimum, field calibration and/or field equipment checking will be performed once daily, prior to use. Field calibration will be documented in the field notebook. Entries made into the logbook regarding the status of field equipment will include the following information:

- Date and time of calibration
- Type of equipment serviced and identification number (such as serial number)
- Reference standard used for calibration
- Calibration and/or maintenance procedure used

- Other pertinent information

A water quality meter (Horiba U-52 or similar) will be used during purging of groundwater to measure pH, specific conductance, temperature, dissolved oxygen, turbidity and oxidation-reduction-potential (ORP), every five minutes. Water-quality meters should be calibrated, and the results documented before use each day using standardized field calibration procedures and calibration checks.

Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent utilization. The equipment will be properly tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated to the manufacturer's specifications by qualified personnel. Equipment that cannot be repaired will be replaced.

Off-site calibration and maintenance of field instruments will be conducted as appropriate throughout the duration of project activities. All field instrumentation, sampling equipment and accessories will be maintained in accordance with the manufacturer's recommendations and specifications and established field equipment practice. Off-site calibration and maintenance will be performed by qualified personnel. A logbook will be kept to document that established calibration and maintenance procedures have been followed. Documentation will include both scheduled and unscheduled maintenance.

5.3 Sample Collection

5.3.1 Soil Samples

Soil samples will be visually classified and field screened using a PID to assess potential impacts from VOCs and for health and safety monitoring. Soil samples collected for analysis of VOCs will be collected using either EnCore® or Terra Core® sampling equipment. For analysis of non-volatile parameters, samples will be homogenized and placed into glass jars. After collection, all sample jars will be capped and securely tightened, and placed in iced coolers and maintained at 4°C ±2°C until they are transferred to the laboratory for analysis, in accordance with the procedures outlined in Section 5.4. Analysis and/or extraction and digestion of collected soil samples will meet the holding times required for each analyte as specified in Attachment C. In addition, analysis of collected soil sample will meet all quality assurance criteria set forth by this QAPP and DER-10.

5.3.2 Groundwater Samples

Groundwater sampling will be conducted using low-flow sampling procedures following USEPA guidance ("Low Stress [low flow] Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells", EQASOP-GW4, September 19, 2017). Groundwater samples collected for PFAS will be collected in accordance with the protocols established in NYSDEC's "Guidance for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs" (November 2022), which is provided in Attachment E.

During purging, field parameters should be measured, including: water level drawdown, purge rate, pH, specific conductance, temperature, dissolved oxygen, turbidity and ORP, every five minutes using a water quality meter (Horiba U-52 or similar) and a depth-to-water oil-water interface probe that should be decontaminated between wells. For wells being sampled with PFAS, monitoring wells will be gauged for depth to water following sample collection. Samples should generally not be collected until the field parameters have stabilized. Field parameters will be considered stable once three sets of measurements are within ±0.1 standard units for pH, ±3% for conductivity and temperature, ±10 millivolts for ORP, and ±10% for turbidity and dissolved oxygen. Purge rates should be adjusted to keep the drawdown in the well to less than 0.3 feet, as practical. Additionally, an attempt should be made to achieve a stable turbidity reading of less than 10 Nephelometric Turbidity Units (NTU) prior to sampling. If the turbidity reading does not stabilize at reading of less than 10 NTU for a given well, then both filtered and unfiltered samples should be collected from that well. If necessary, field filtration should be performed using a 0.45-micron disposable in-line filter. Groundwater samples should be collected after parameters have stabilized as noted above or the readings are within the precision of the meter. Deviations from the stabilization and drawdown criteria, if any, should be noted on the sampling logs.

Samples should be collected directly into pre-cleaned laboratory-supplied jars. Samples collected for PFAS analysis will be collected into HDPE containers. After collection, sample jars will be capped and securely tightened, and placed in iced coolers to attempt to maintain a temperature of 4°C ±2°C until they are transferred to the laboratory for analysis, in accordance with the procedures outlined in Section 5.4. Analysis and/or extraction and digestion of collected groundwater samples will meet the holding times required for each analyte as specified in Attachment C. In addition, analysis of collected groundwater samples will meet all quality assurance criteria set forth by this QAPP and DER-10.

5.3.3 Soil Vapor Samples

Soil vapor points will be installed by advancing a vapor probe to about 5 feet below grade surface or two feet above groundwater, whichever is shallower. The soil vapor collection points will consist of inert sample tubing attached to a 1.875-inch polyethylene implant, to be installed at the sampling depth. Samples will be collected in accordance with the NYSDOH Soil Vapor Guidance. Before collecting vapor samples, a minimum of three vapor probe volumes (i.e., the volume of the sample implant and tubing) will be purged from each sample point at a rate of less than 0.2 liters per minute using a RAE Systems MultiRAE meter. Purged soil vapor will be monitored for VOCs with the MultiRAE during this process.

A helium tracer gas will be used in accordance with the NYSDOH protocols to serve as a QA/QC technique to document the integrity of each soil vapor point seal before and after sampling. The tracer gas will be introduced into a container, which will shroud the soil vapor point and seal.

Helium will be measured from the sampling tube and inside the container. If the sample tubing contains more than 10% of the tracer gas concentration that was introduced into the container, then the seal will be considered compromised and will be enhanced or reconstructed to reduce outdoor air infiltration.

After the integrity of each seal is confirmed, soil vapor samples will be collected into laboratory-supplied batch-certified clean 6-liter Summa canisters with calibrated flow controllers. Soil vapor samples will be collected over an 8-hour sampling period and analyzed for VOCs by USEPA Method TO-15.

5.3.4 Ambient Air Samples

One outdoor ambient air sample will be collected for laboratory analysis. The ambient air sample will be collected at a height above the ground representative of the breathing zone (about 3 to 5 feet). A product inventory will be completed for the immediate area prior to sampling and will document all petroleum, solvent, cleaners, and other volatile chemicals that may influence the sample results. Ambient air samples will be collected into laboratory-supplied batch-certified clean 6-liter Summa canisters with calibrated flow controllers and will be collected simultaneously with soil vapor points over a 2-hour sampling period and analyzed for VOCs via USEPA Method TO-15. The ambient air sample will be collected to evaluate potential outdoor air interferences with sampling apparatus.

5.3.5 Sample Equipment Blanks and Duplicates

Field blanks will be collected for quality assurance purposes at a rate of one per day per matrix for soil and groundwater emerging contaminant samples. Field blanks will be obtained by pouring laboratory-demonstrated analyte-free water on or through a decontaminated sampling device following use and implementation of decontamination protocols. The water will be collected off of the sampling device into a laboratory-provided sample container for analysis. Field blank samples will be analyzed for the complete list of analytes on the day of sampling.

Duplicate soil and groundwater samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative soil samples per analysis and will be submitted to the laboratory as “blind” samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

5.4 Sample Containers and Handling

Certified, commercially clean sample containers will be obtained from the analytical laboratory. For soil and groundwater samples, the laboratory will also prepare and supply the required trip blanks and equipment blank sample containers and reagent preservatives. Sample bottle containers, including the field blank containers, will be placed into plastic coolers by the laboratory. These coolers will be received by the field sampling team within 24 hours of their preparation in the laboratory. Prior to the commencement of field work, Langan field personnel will fill the plastic coolers with ice in Ziploc® bags (or equivalent) to attempt to maintain a temperature of 4° ±2° C.

Soil, groundwater and soil vapor samples collected in the field for laboratory analysis will be placed directly into the laboratory-supplied sample containers. Soil and groundwater samples will then be placed and stored on-ice in laboratory provided coolers until shipment to the laboratory. Blue ice will not be used to cool PFAS samples.

Possession of samples collected in the field will be traceable from the time of collection until they are analyzed by the analytical laboratory or are properly disposed. Chain-of-custody procedures, described in Section 5.10, will be followed to maintain and document sample possession. Samples will be packaged and shipped as described in Section 5.7.

5.5 Special Considerations for Emerging Contaminant Sample Collection

The following special considerations apply to the collection of soil and groundwater samples for PFAS analysis to prevent cross-contamination:

- Field equipment will not contain Teflon®
- All sampling material will be made from stainless steel, HDPE, acetate, silicon, or polypropylene
- No waterproof field books will be used
- No plastic clipboards, binders, or spiral hard cover notebooks will be used
- No adhesives will be used
- No sharpies or permanent markers will be used; ball point pens are acceptable
- Aluminum foil will not be used
- PFAS samples will be kept in a separate cooler from other sampling containers
- Coolers will be filled only with regular ice

PFAS will be analyzed by USEPA Method 1633 for the PFAS target analyte list developed by the DER. At minimum, the laboratory will report the following PFAS target compounds:

Target Analyte Name	**Abbreviation**	**CAS #**
Perfluoroalkyl carboxylic acids		
Perfluorobutanoic acid	PFBA	375-22-4
Perfluoropentanoic acid	PFPeA	2706-90-3
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorononanoic acid	PFNA	375-95-1

Target Analyte Name	Abbreviation	CAS #
Perfluorodecanoic acid	PFDA	335-76-2
Perfluoroundecanoic acid	PFUnA	2058-94-8
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluorotetradecanoic acid	PFTeDA	376-06-7
Perfluoroalkyl sulfonic acids		
Acid Form		
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluoropentanesulfonic acid	PFPeS	2706-91-4
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluoroheptanesulfonic acid	PFHpS	375-92-8
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorononanesulfonic acid	PFNS	68259-12-1
Perfluorodecanesulfonic acid *	PFDS	335-77-3
Perfluorododecanesulfonic acid *	PFDoS	79780-39-5
Fluorotelomer sulfonic acids		
1*H*,1*H*, 2*H*, 2*H*-Perfluorohexane sulfonic acid	4:2FTS	757124-72-4
1*H*,1*H*, 2*H*, 2*H*-Perfluorooctane sulfonic acid	6:2FTS	27619-97-2
1*H*,1*H*, 2*H*, 2*H*-Perfluorodecane sulfonic acid	8:2FTS	39108-34-4
Perfluorooctane sulfonamides		
Perfluorooctanesulfonamide	PFOSA	754-91-6
N-methyl perfluorooctanesulfonamide	NMeFOSA	31506-32-8
N-ethyl perfluorooctanesulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids		
N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA	2355-31-9
N-ethyl perfluorooctanesulfonamidoacetic acid	NEtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols		
N-methyl perfluorooctanesulfonamidoethanol	NMeFOSE	24448-09-7
N-ethyl perfluorooctanesulfonamidoethanol	NEtFOSE	1691-99-2
Per- and Polyfluoroether carboxylic acids		
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
4,8-Dioxa-3*H*-perfluorononanoic acid	ADONA	919005-14-4
Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Ether sulfonic acids		
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid *	11Cl-PF3OUdS	763051-92-9
Perfluoro(2-ethoxyethane)sulfonic acid	PFEESA	113507-82-7
Fluorotelomer carboxylic acids		
3-Perfluoropropyl propanoic acid	3:3FTCA	356-02-5

Target Analyte Name	Abbreviation	CAS #
2*H*,2*H*,3*H*,3*H*-Perfluorooctanoic acid	5:3FTCA	914637-49-3
3-Perfluoroheptyl propanoic acid	7:3FTCA	812-70-4

The laboratory reporting limits for PFAS are 2 nanograms per liter (ng/L) in aqueous samples and 1 microgram per kilogram (µg/kg) in soil samples. The laboratory SOP for PFAS analysis and PFAS compound sampling protocol are provided in Attachment E.

Soil samples analyzed for 1,4-dioxane will be analyzed via USEPA method 8270, and groundwater samples will be analyzed by USEPA Method 8270 SIM. The laboratory reporting limits for 1,4-dioxane are 0.15 micrograms per liter (µg/L) in aqueous samples and 0.08 milligrams per kilogram (mg/kg) in soil samples.

5.6 Sample Preservation

Sample preservation measures will be used in an attempt to prevent sample decomposition by contamination, degradation, biological transformation, chemical interactions and other factors during the time between sample collection and analysis. Preservation will commence at the time of sample collection and will continue until analyses are performed. Should chemical preservation be required, the analytical laboratory will add the preservatives to the appropriate sample containers before shipment to the office or field. Samples will be preserved according to the requirements of the specific analytical method selected, as shown in Attachment C.

5.7 Sample Shipment

5.7.1 Packaging

Soil and groundwater sample containers will be placed in plastic coolers. Ice in Ziploc bags (or equivalent) will be placed around sample containers. PFAS samples will be stored in separate coolers, and blue ice will not be used to cool PFAS samples. Cushioning material will be added around the sample containers if necessary. Chains-of-custody and other paperwork will be placed in a Ziploc bag (or equivalent) and placed inside the cooler. The cooler will be taped closed and custody seals will be affixed to one side of the cooler at a minimum. If the samples are being shipped by an express delivery company (e.g., FedEx) then laboratory address labels will be placed on top of the cooler.

5.7.2 Shipping

Standard procedures to be followed for shipping environmental samples to the analytical laboratory are outlined below.

All environmental samples will be transported to the laboratory by a laboratory-provided courier under the chain-of-custody protocols described in Section 5.10.

Prior notice will be provided to the laboratory regarding when to expect shipped samples. If the number, type or date of shipment changes due to site constraints or program changes, the laboratory will be informed.

5.8 Decontamination Procedures

Decontamination procedures will be used for non-dedicated sampling equipment. Decontamination of field personnel is discussed in the site-specific Health and Safety Plan (HASP) included in Appendix A of the RIWP. Field sampling equipment that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
2. Generous tap water rinse
3. Distilled/de-ionized water rinse

Sample equipment used to collect PFAS samples will be decontaminated via a standard two step decontamination procedure using PFAS-free water. Decontamination water will be verified to be PFAS-free via laboratory analysis or certification in accordance with NYSDEC's "Guidance for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs" (January 2020).

5.9 Residuals Management

Debris (e.g., paper, plastic and disposable personal protective equipment [PPE]) will be collected in plastic garbage bags and disposed of as non-hazardous industrial waste. Debris is expected to be transported to a local municipal landfill for disposal. If applicable, residual solids (e.g., leftover soil cuttings) will be placed back in the borehole from which it was sampled. If gross contamination is observed, soil will be collected and stored in Department of Transportation (DOT)-approved 55-gallon drums in a designated storage area at the site. The residual materials stored in a designated storage area at the site for further characterization, treatment or disposal.

Residual fluids (such as purge water) will be collected and stored in DOT-approved (or equivalent) 55-gallon drums in a designated storage area at the site. The residual fluids will be transported to the on-site wastewater treatment plant or analyzed, characterized and disposed off-site in accordance with applicable federal and state regulations. Residual fluids such as decontamination water may be discharged to the ground surface, however, if gross contamination is observed, the residual fluids will be collected, stored, and transported similar purge water or other residual fluids.

5.10 Chain of Custody Procedures

A chain-of-custody protocol has been established for collected samples that will be followed during sample handling activities in both field and laboratory operations. The primary purpose of the chain-of-custody procedures is to document the possession of the samples from collection through shipping, storage and analysis to data reporting and disposal. Chain-of-custody refers to actual possession of the samples. Samples are considered to be in custody if they are within sight of the individual responsible for their security or locked in a secure location. Each person who takes possession of the samples, except the shipping courier, is responsible for sample integrity and safe keeping. Chain-of-custody procedures are provided below:

Chain-of-custody will be initiated by the laboratory supplying the pre-cleaned and prepared sample containers. Chain-of-custody forms will accompany the sample containers.

Following sample collection, the chain-of-custody form will be completed for the sample collected. The sample identification number, date and time of sample collection, analysis requested and other pertinent information (e.g., preservatives) will be recorded on the form. All entries will be made in waterproof, permanent blue or black ink.

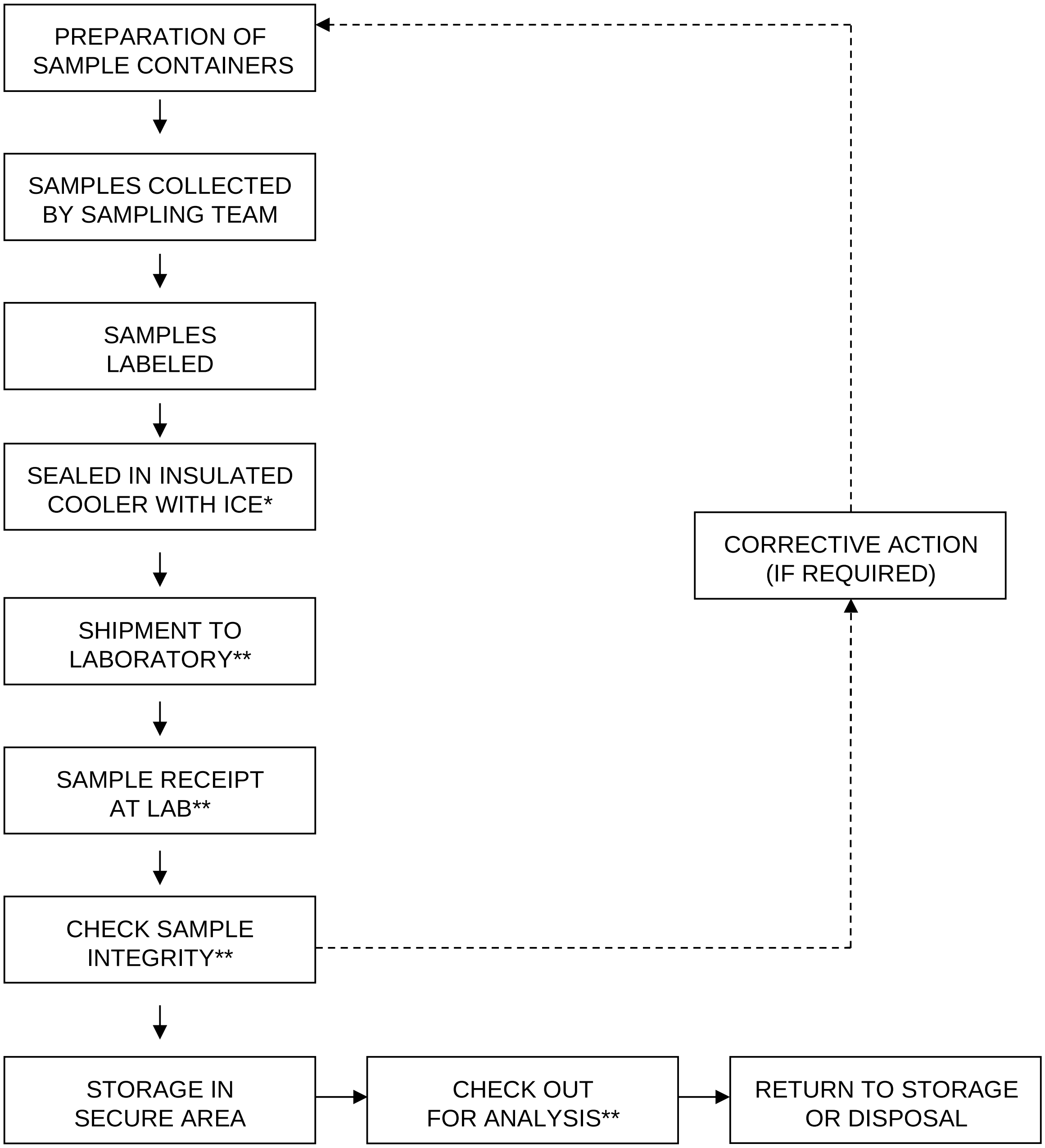
Langan field personnel will be responsible for the care and custody of the samples collected until the samples are transferred to another party, dispatched to the laboratory, or disposed. The sampling team leader will be responsible for enforcing chain-of-custody procedures during field work.

When the form is full or when all samples have been collected that will fit in a single cooler, the sampling team leader will check the form for possible errors and sign the chain-of-custody form. Any necessary corrections will be made to the record with a single strike mark, dated, and initialed.

Sample coolers will be accompanied by the chain-of-custody form, sealed in a Ziploc® bag (or equivalent) and placed on top of the samples or taped to the inside of the cooler lid. If applicable, a shipping bill will be completed for each cooler and the shipping bill number recorded on the chain-of-custody form.

Samples will be packaged for shipment to the laboratory with the appropriate chain-of-custody form. A copy of the form will be retained by the sampling team for the project file and the original will be sent to the laboratory with the samples. Bills of lading will also be retained as part of the documentation for the chain-of-custody records, if applicable. When transferring custody of the samples, the individuals relinquishing and receiving custody of the samples will verify sample numbers and condition and will document the sample acquisition and transfer by signing and dating the chain-of-custody form. This process documents sample custody transfer from the sampler to the analytical laboratory. A flow chart showing a sample custody process is included as Figure 5.1. Blank chain-of-custody forms from York Analytical Laboratories, Inc. are included as Figures 5.2 and 5.3.

Figure 5.1 Sample Custody



*SUMMA CANISTERS SHOULD NOT BE ICED
**REQUIRES SIGN-OFF ON CHAIN-OF-CUSTODY FORM

Figure 5.2 Sample Chain-of-Custody Form – Air Sample

Pace® Location Requested (City/State):

Air CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here

Scan QR code for instructions

Company Name: | Contact/Report To:
Street Address: | Phone #: | E-Mail:
City, State Zip: | Cc E-Mail:
Customer Project #: | Invoice to:
Project Name: | Invoice E-Mail:
Site Collection Info/Facility ID (as applicable): | Purchase Order # (if applicable): | Quote #:
Time Zone Collected: [ ] AK [ ] PT [ ] MT [ ] CT [ ] ET | State origin of sample(s):

Data Deliverables: [ ] Level II [ ] Level III [ ] Level IV [ ] EQUIS [ ] Other ______

Regulatory Program (CAA, RCRA, etc.) as applicable:

Rush (Pre-approval required): [ ] Same Day [ ] 1 Day [ ] 2 Day [ ] 3 Day Other ____

Date Results Requested:

Permit # as applicable:

Units for Reporting: ug/m³ PPBV mg/m³ PPMV

* Matrix Codes (Insert in Matrix box below): Ambient (A), Indoor (I), Soil Vapor (SV), Other (O)

Field Information

Analyses Requested

Lab Use Only: Proj. Manager: | AcctNum / Client ID: | Table #: | Profile / Template: | Prelog / Bottle Ord. ID:

Customer Sample ID	Matrix *	Summa Canister ID	Flow Controller ID	Begin Collection Date	Begin Collection Time	End Collection Date	End Collection Time	Canister Pressure / Vacuum: Start Pressure / Vacuum (in Hg)	Canister Pressure / Vacuum: End Pressure / Vacuum (in Hg)	PUF / FILTER: Duration (minutes)	PUF / FILTER: Flow Rate m³/min or L/min	PUF / FILTER: Total Volume Sampled m³ or L	Analyses Requested				Sample Comment

Additional Instructions from Pace®:

Collected By: | Printed Name: | Signature:

Customer Remarks / Special Conditions / Possible Hazards:

Coolers: | Thermometer ID: | Correction Factor (°C): | Obs. Temp. (°C): | Corrected Temp. (°C):

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Tracking Number:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Delivered by: In-Person Courier
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	FedEX UPS Other
				Page: ____ of: ____

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace® Terms and Conditions found at https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

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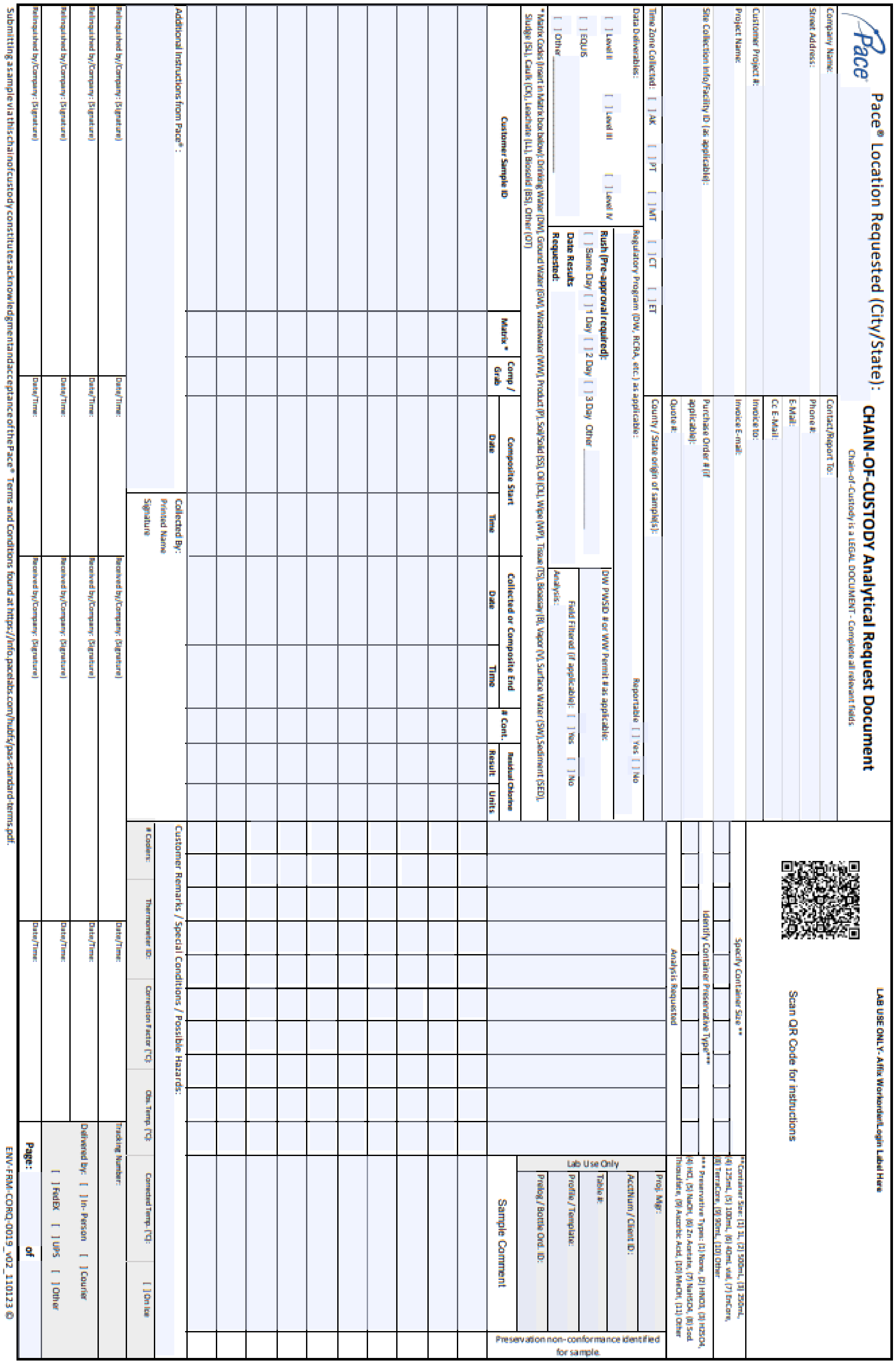
Figure 5.3 Sample Chain-of-Custody Form – Soil and Groundwater



Pace® Location Requested (City/State):

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here

Scan QR Code for instructions

Company Name: | Contact/Report To:
Street Address: | Phone #:
E-Mail:
Cc E-Mail:
Customer Project #: | Invoice to:
Project Name: | Invoice E-mail:
Site Collection Info/Facility ID (as applicable): | Purchase Order # (if applicable):
Quote #:
Time Zone Collected: [ ] AK [ ] PT [ ] MT [ ] CT [ ] ET | County / State origin of sample(s):
Data Deliverables: [ ] Level II [ ] Level III [ ] Level IV [ ] EQUIS [ ] Other
Regulatory Program (DW, RCRA, etc.) as applicable: Reportable [ ] Yes [ ] No
Rush (Pre-approval required): [ ] Same Day [ ] 1 Day [ ] 2 Day [ ] 3 Day Other
Date Results Requested:
DW PWSID # or WW Permit # as applicable:
Field Filtered (if applicable): [ ] Yes [ ] No
Analysis:

Specify Container Size **
Identify Container Preservative Type***
Analysis Requested

**Container Size: (1) 1L, (2) 500mL, (3) 250mL, (4) 125mL, (5) 100mL, (6) 40mL vial, (7) EnCore, (8) TerraCore, (9) 90mL, (10) Other

*** Preservative Types: (1) None, (2) HNO3, (3) H2SO4, (4) HCl, (5) NaOH, (6) Zn Acetate, (7) NaHSO4, (8) Sod. Thiosulfate, (9) Ascorbic Acid, (10) MeOH, (11) Other

Lab Use Only: Proj. Mgr: | AcctNum / Client ID: | Table #: | Profile / Template: | Prelog / Bottle Ord. ID:

* Matrix Codes (insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SS), Oil (OL), Wipe (WP), Tissue (TS), Bioassay (B), Vapor (V), Surface Water (SW), Sediment (SED), Sludge (SL), Caulk (CK), Leachate (LL), Biosolid (BS), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Composite Start		Collected or Composite End		# Cont.	Residual Chlorine		Sample Comment	Preservation non-conformance identified for sample.
			Date	Time	Date	Time		Result	Units		

Additional Instructions from Pace® :

Collected By: Printed Name Signature

Customer Remarks / Special Conditions / Possible Hazards:

Coolers: | Thermometer ID: | Correction Factor (°C): | Obs. Temp. (°C): | Corrected Temp. (°C): | [ ] On Ice

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Tracking Number:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Delivered by: [ ] In- Person [ ] Courier [ ] FedEX [ ] UPS [ ] Other
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Page: of

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace® Terms and Conditions found at https://info.pacelabs.com/hubfs/pas-standard-terms.pdf.

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Laboratory chain-of-custody will be maintained throughout the analytical processes as described in the laboratory's QA Manual. The analytical laboratory will provide a copy of the chain-of-custody in the analytical data deliverable package. The chain-of-custody becomes the permanent record of sample handling and shipment.

5.11 Laboratory Sample Storage Procedures

The subcontracted laboratory will use a laboratory information management system (LIMS) to track and schedule samples upon receipt by the analytical laboratories. Any sample anomalies identified during sample log-in must be evaluated on individual merit for the impact upon the results and the data quality objectives of the project. When irregularities do exist, the environmental consultant must be notified to discuss recommended courses of action and documentation of the issue must be included in the project file.

For samples requiring thermal preservation, the temperature of each cooler will be immediately recorded. Each sample and container will be assigned a unique laboratory identification number and secured within the custody room walk-in coolers designated for new samples. Samples will be, as soon as practical, disbursed in a manner that is functional for the operational team. The temperature of all coolers and freezers will be monitored and recorded using a certified temperature sensor. Any temperature excursions outside of acceptance criteria (i.e., below 2°C or above 6°C) will initiate an investigation to determine whether any samples may have been affected. Samples for VOCs will be maintained in satellite storage areas within the VOC laboratory. Following analysis, the laboratory's specific procedures for retention and disposal will be followed as specified in the laboratory's SOPs and/or QA manual.

6.0 DATA REDUCTION, VALIDATION, AND REPORTING

6.1 Introduction

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed and be reported in standard format.

The completed copies of the chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

6.2 Data Reduction

The Analytical Services Protocol (ASP) Category B data packages and an electronic data deliverable (EDD) will be provided by the laboratory after receipt of a complete sample delivery group. The Project Manager will immediately arrange for archiving the results and preparation of result tables. These tables will form the database for assessment of the site contamination condition.

Each EDD deliverable must be formatted using a Microsoft Windows operating system and the NYSDEC data deliverable format for EQuIS. To avoid transcription errors, data will be loaded directly into the American Standard Code for Information Interchange (ASCII) format from the LIMS. If this cannot be accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All EDDs must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

6.3 Data Validation

Data validation will be performed in accordance with the USEPA Region 2 SOPs for data validation and USEPA's National Functional Guidelines for Organic and Inorganic Data Review. Tier 1 data validation (the equivalent of USEPA's Stage 2A validation) will be performed to evaluate data quality. Tier 1 data validation is based on completeness and compliance checks of sample-related QC results including:

- Holding times;
- Sample preservation;
- Blank results (method, trip, and field blanks);
- Surrogate recovery compounds and extracted internal standards (as applicable);
- LCS and LCSD recoveries and RPDs;
- MS and MSD recoveries and RPDs;
- Laboratory duplicate RPDs; and
- Field duplicate RPDs

A DUSR will be prepared by the data validator and reviewed by the QAM before issuance. The DUSR will present the results of 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 for each analytical method.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected. The associated number indicates the approximate sample concentration necessary to be detected significantly greater than the level of the highest associated blank;
- "UJ" - Not detected. Quantitation limit may be inaccurate or imprecise;
- "J" - Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the analytical method;
- "R" – Unreliable result; data is rejected or unusable. Analyte may or may not be present in the sample; and
- No Flag - Result accepted without qualification.

6.4 Reporting

Upon receipt of validated analytical results, NYSDEC format EDDs, compatible with EQuIS, will be prepared and submitted to the NYSDEC.

7.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

7.1 Introduction

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the QAO. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning as an independent body and reporting directly to corporate quality assurance management, the QAO may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

7.2 System Audits

System audits may be performed by the QAO or designated auditors and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may be performed.

7.3 Performance Audits

The laboratory may be required to conduct an analysis of Performance Evaluation samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

7.4 Formal Audits

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Non-compliances will be logged, and documented through audit findings, which are attached to and are a part of the integral audit report. These audit-finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

8.0 CORRECTIVE ACTION

8.1 Introduction

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

8.2 Procedure Description

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined, and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 8.1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

FIGURE 8.1

CORRECTIVE ACTION REQUEST Number: ____________________________ Date: _____________
TO: ____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by ________________
CONDITION:
REFERENCE DOCUMENTS:
RECOMMENDED CORRECTIVE ACTIONS:
___________ ______ ___________ _________ ____________ _________ Originator Date Approval Date Approval Date
RESPONSE
CAUSE OF CONDITION
CORRECTIVE ACTION (A) RESOLUTION (B) PREVENTION (C) AFFECTED DOCUMENTS
C.A. FOLLOW UP: CORRECTIVE ACTION VERIFIED BY: ______________________________ DATE:______________

9.0 REFERENCES

1. NYSDEC. Division of Environmental Remediation. DER-10/Technical Guidance for Site Investigation and Remediation, dated May 3, 2010.
2. NYSDEC. Guidance for Sampling and Analysis for Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs, dated November 2022.
3. NYSDOH. Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006, updated May 2017.
4. Taylor, J. K., 1987. Quality Assurance of Chemical Measurements. Lewis Publishers, Inc., Chelsea, Michigan
5. USEPA, 2014. "Test Method for Evaluating Solid Waste," Update V dated July 2014 U.S. Environmental Protection Agency, Washington, D.C.
6. USEPA, 2016. Region II Standard Operating Procedure (SOP) #HW-34, "Trace Volatile Data Validation" (July 2015, Revision 0), USEPA Hazardous Waste Support Section. USEPA Region II
7. USEPA, 2016. Region II SOP #HW-35A, "Semivolatile Data Validation" (June 2015, Revision 0), USEPA Hazardous Waste Support Section. USEPA Region II
8. USEPA, 2016. Region II SOP #HW-36A, "Pesticide Data Validation" (June 2015, Revision 0), USEPA Hazardous Waste Support Section. USEPA Region II
9. USEPA, 2015. Region II SOP #HW-37A, "PCB Aroclor Data Validation" (June 2015, Revision 0), USEPA Hazardous Waste Support Section. USEPA Region II
10. USEPA 2016. Region II SOP #HW-3a, "ICP-AES Data Validation" (July 2015, Revision 0), USEPA Hazardous Waste Support Section. USEPA Region II
11. USEPA 2014. Hazardous Waste Support Section. Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15. SOP No. HW-31, Revision 6, dated June 2014.
12. USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review, Office of Superfund Remediation and Technology Innovation, EPA-540-R-2017-002, January 2017.
13. USEPA 2017b. National Functional Guidelines for Superfund Inorganic Methods Data Review, Office of Superfund Remediation and Technology Innovation, EPA-540-R-201 7-001, January 2017.

ATTACHMENT A

RESUMES

DAVID M. WINSLOW, Ph.D, P.G.

ASSOCIATE PRINCIPAL

ENVIRONMENTAL ENGINEERING

Dr. Winslow is a geologist with 29 years of experience in bedrock, soil, and groundwater investigation and remedial design; project development and implementation; design and construction; regulatory compliance; and regulatory negotiation. He has a proven ability to work on multidisciplinary teams at all levels providing value added solutions for client problems and has an established record of leadership.

SELECTED PROJECTS

DATA CENTERS

JPMorgan Chase Data Center, Brownfields Redevelopment, Orangeburg, NY – Principal for $4M+ investigation/remediation oversight project at a 90+ year old State hospital campus slated for redevelopment as a database center. The 61-acre Site consisted of 32 abandoned and derelict buildings, walkways, roads and significantly overgrown landscape areas. The Site was entered into the New York State Brownfield Cleanup Program. The remediation and redevelopment were completed in 2020. Addition expansions were conducted un the Site Management Plan from 2021 to 2026.

428 Seiberling Rd - Data Center, Environmental Due Diligence, Akron OH – Principal for environmental due diligence for the expansion of an existing data center on a former manufacturing site in Akron Ohio. Conducted environmental document reviews and a Phase II Environmental Site Investigation in tight timeframe to support client's decision making.

IBM POK Quantum Data Center, Environmental Due Diligence, Poughkeepsie, NY – Principal for environmental due diligence for the proposed redevelopment of a portion of the IBM Poughkeepsie facility to support data centers or chip fabrication.

Park 84 (former IBM Campus), Environmental Due Diligence, East Fishkill, NY – Principal responsible for environmental due diligence for purchase of the facility by National Resources in 2017. Continued due diligence support for subsequent use changes and redevelopment for various uses including data centers, warehouse distribution, brewery, and chip fabrication. Prepared work plans in accordance with the hazardous waste facility permit and conducted vapor intrusion investigations and vapor intrusion mitigation designs.

BROWNFIELDS

i.Park 87 (former IBM Campus), Environmental Due Diligence, Kingston, NY – Principal responsible for environmental due diligence for purchase of the facility by National Resources. Continued due diligence support for subsequent use changes and redevelopment and sale.

EDUCATION

Ph.D., Geological Sciences
Lehigh University

M.S., Geological Sciences
Virginia Tech

B.S., Geological Sciences
Binghamton University

PROFESSIONAL REGISTRATION

Professional Geologist (P.G.) in NY

AFFILIATIONS

National Groundwater Association

Geoprofessional Business Association

Urban Land Institute

National Association of Indoor Office Parks

7 x 24 Exchange

**Projects represent experience with a previous firm*

95-115 Woodworth Avenue, Former MGP Redevelopment, Yonkers, NY – Principal responsible for environmental investigations in support of redevelopment of this former MGP site in Yonkers, NY.

50 COMMERCIAL STREET, Brownfield Redevelopment, Brooklyn, NY – Principal responsible for environmental remediation on seven-story building redevelopment project through the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) and New York City E Designation process. Project included site investigation, remedial design, remediation, and construction. The site contained petroleum and chlorinated solvent impacted soils and groundwater. Source material was excavated to meet NYSDEC Track 4 requirements. Groundwater was addressed through chemical injections of persulfate for petroleum and emulsified zero-valent iron (EZVI) for chlorinated. In addition, a permeable reactive barrier consisting of EZVI was installed to address migration of impacted groundwater onto the site. Responsible for Operation Maintenance and Monitoring program.

294 4th Avenue Metal Smelting & Auto Repair Site, Brownfield Redevelopment, Brooklyn, NY – Principal responsible for brownfield redevelopment of a former metal smelting facility and auto-repair facility. Work included entering the site in the Brownfield Cleanup Program, preparing a remedial investigation work plan, conducting the remedial investigation and preparing a remedial action work plan.

21 Denton Place, Consent Order, Brooklyn, NY – Principal responsible for environmental investigation, remedial design, and remedial design and regulatory negotiation to support redevelopment of a former manufacturing site in Brooklyn.

292 Nevins Street, Consent Order, Brooklyn, NY – Principal responsible for regulatory negotiation for a former dry cleaner site in the Gowanus Canal neighborhood suspected of being a source of areawide solvent contamination. Negotiated with NYSDEC and prepared a site characterization work plan to evaluate the property as a potential source.

11 Spencer Street, Brownfields Redevelopment, Brooklyn, NY – Principal responsible for regulatory negotiation, conducting remedial pilot tests and preparing remedial design documents for Brownfield Site where the previously approved remedy was found to be ineffective.

205 Park Avenue, Brownfield Redevelopment, Brooklyn, NY* – Principal. Prepared NYSDEC Brownfield Cleanup Application (BCA), conducted remedial investigation for chlorinated solvents and metals in soil and groundwater, conducted soil gas and soil vapor investigations. Prepared Remedial Investigation/Remedial Action Work Plan, Final Engineering Report, and Site Management Plan. Responsible for Operation Maintenance and Monitoring program.

Former BH Aircraft Site, Brownfield Redevelopment, Farmingdale, NY – Principal. Prepared NYSDEC Brownfield Cleanup Application (BCA), conducted remedial investigation for chlorinated solvents and metals in soil and groundwater, conducted soil gas and soil vapor investigations, closed out sanitary and industrial leaching pools, prepared remedial investigation and remedial action work plan. Constructed soil vapor extraction system.

Prepared FER and SMP. Responsible for Operation Maintenance and Monitoring program.

Bay Park Brownfield Redevelopment, Coney Island, NY – Principal. Providing environmental services during rehabilitation and expansion of 1970s-era mixed use complex, which covers an area equivalent to three city blocks. Facilitated the Brownfield Cleanup Program (BCP) applications for two adjacent parcels within the complex: the first for an existing retail space formerly occupied by a dry cleaner; the second application is for an adjacent "historic" dry cleaner lot that had been razed as part of urban renewal in the 1960s. Previous site investigations had documented the presence of tetrachlorethene (PCE) in soil gas; Remedial Investigation Work Plan (RIWP) outlined work required to delineate the vertical and horizontal extent of the impacted soils, soil vapor and groundwater at both BCP sites. A Remedial Action Work Plan was developed to address contaminated media. A subslab depressurization system was designed to protect residential and retail tenants, in conjunction with source area treatments. Responsible for ongoing OM&M.

222 Morgan Avenue, Bulkhead Replacement and Brownfield Services, Brooklyn NY – Principal responsible for environmental support of a bulkhead replacement project. Work included waste characterization, sediment investigation and self-implemented cleanup plan for PCBs. In addition, responsible for site management under the NYSDEC Brownfield Cleanup Program.

Woodworth Avenue Paint, Brownfields Redevelopment, Yonkers, NY – Principal responsible for regulatory negotiation, entering the site into the Brownfield Cleanup Program, projecting tax credits, and preparing the Remedial Investigation Work Plan.

Former Cascade Laundry, Brownfield Redevelopment, Brooklyn, NY* – Principal-in-Charge. Responsible for environmental and construction management services required to successfully navigate seven-building redevelopment project through the New York City Office of Environmental Remediation's (NYCOER's) E-Designation and Voluntary Cleanup Programs, as well as the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). Project included site investigation, design, remediation, and construction. Remedy consisted of source removal and in-situ chemical oxidation to address groundwater. Responsible for Operation Maintenance and Monitoring program.

National Resources Brownfield Development, Edgewater, NJ* – Principal-in-Charge. Provided environmental consulting services during the purchase and redevelopment of a brownfield site contaminated with coal tar and arsenic. The site was the former location of Unilever, Inc.'s research and development facility and had housed industrial operations since 1910. It was found to be contaminated with tar, deposited on site by an adjacent roofing tar manufacturer. Designed and implemented a Phase I ESA, prepared a site conceptual model, and developed a remedial cost estimate in order to secure cost cap insurance and financing. Following the real estate transaction, Completed remediation of the site under NJ's Industrial Site Recovery Act (ISRA). Prepared and submitted a Remedial Investigation and Interim Remedial Measures Plan for review by the NJDEP. Negotiated site-specific cleanup standards for arsenic and for pitch material. Pitch material remediation was limited to soft fractions of pitch that were impacting groundwater. The arsenic standard of 600 ppm was derived imperially by comparing soil concentrations to groundwater. The approved remedial strategy consisted of institutional and engineered controls to limit exposure to contaminants, excavation and off-site removal of arsenic-impacted soils greater than 600 ppm, in-situ solidification and stabilization of pitch impacting groundwater, installation of a groundwater barrier wall to protect the Hudson River, and stabilization of a rip rap embankment to prevent pitch accumulation on the shoreline.

City of Schenectady, Brownfield Pilot Assessment Program, Schenectady, NY* – Senior Project Manager. Prepared a proposal to perform Brownfield Assessment Services for the City of Schenectady. The work was awarded in May 2000. The services were as follows: create a forum for the expanded and interactive community involvement in the Brownfield initiative; review existing planning information, community needs, and private interests for the site; review ownership and site use histories to identify potential environmental concerns; secure all necessary permits and file appropriate applications; determine all sources of alternative funding and apply for grants; and conduct environmental investigations and create remedial action plans.

New York City Department of Housing Preservation and Development, NYSDEC Brownfield Program, Bronx, NY* – Senior Project Manager. Managed the remedial investigations on 11 brownfield sites undergoing redevelopment as affordable housing, known as Melrose Commons. The remedial investigations consisted of geophysical surveys, test pit excavations, soil gas surveys, soil and groundwater sampling, and monitoring well installation and sampling. Eleven remedial investigation reports/qualitative risk assessments were completed at these properties in a three-month period. This data was used to produce remedial alternative analysis for each of the 11 sites.

Silver Star Mercedes Brownfield Redevelopment, Long Island City, NY* – Principal-in-Charge. Member of design team for the redevelopment of a former automobile services station/car dealership. Six-story building will house a Mercedes dealership, parking and affordable housing. Responsible for bringing the site through the Brownfield Cleanup Program.

Meridian Development Partners, LLC, Former Ideal Forging, Southington, CT* – Senior Project Manager. Designed and managed the investigation, conceptual remedial approach, and remedial cost estimate for a former forging plant, adjacent to a municipal drinking water well, to be redeveloped as a mixed-use residential and retail complex. The site's soil and groundwater were impacted by fuel oil and cutting oil releases. In addition, a portion of the site was located within the floodplain, and a large retention basin was required in order to develop the site. Due to the large amount of earthwork required to accommodate civil engineering designs, the site civil construction and the remedial construction were combined to eliminate issues related to handling contaminated material. The remedial approach consisted of a combination of excavation, on-site treatment of soils, placing contaminated soils under building pads and roads to render them inaccessible, using treated soils as asphalt road-base, constructing a retaining wall that would also act as a barrier to free product migration, capping, installation of sub-slab depressurization systems beneath new buildings, and monitored natural attenuation. Assisted client with presentations to the planning board and wetlands commission.

Nine Mall Investors, LLC – Nine Mall Plaza – Dry Cleaner, Wappingers Falls, NY* – Senior Project Manager. Designed and managed the investigation and remediation of tetrachloroethylene-impacted soils and groundwater associated with a dry cleaner. Performed due diligence investigations, prepared a NYSDEC Brownfield Cleanup Program (BCP) application, and aided the developer in successfully completing the BCP application process. Following some additional assessment, negotiated with the NYSDEC to submit a Remedial Investigation Report/Remedial Action Plan, thereby saving time and money associated with preparation and public comment related to a remedial investigation work plan. A remedial approach of enhanced bioremediation was proposed to complete the remedial actions already undertaken at the site, realizing further cost savings for client.

Meridian Development Partners, LLC, Brownfields, NC* – Senior Project Manager. Provided environmental consulting services during a proposed property transaction of a former electronics manufacturing site utilized by Channel Master to produce satellite dishes. Services consisted of reviewing previous environmental reports, conducting a Phase II Environmental Site Investigation, conducting a Supplemental Phase II Environmental Site Investigation, and preparing remedial cost estimates to be used by the client during contract negotiation. During the course of the document review it became apparent that the site had been impacted by releases of chlorinated solvents. While previous consultants had indicated that the release had resulted in minor impacts to soil and groundwater, review of available documents and local hydrogeologic conditions indicated that borings had not been properly located. Recommended a Phase II Site Investigation. Designed a rapid turnaround and cost-effective study to assess the vertical and horizontal extent of contamination within the timeframe of the due diligence period in order to apply cost certainty to estimated remediation figures.

INDUSTRIAL

Pennick ISRA Investigation and Remediation, Newark, NJ – Principal responsible for final delineation and development of conceptual site model for a chlorinated solvent plume migrating through glacial till and lacustrine deposits as well as bedrock. Complicated bedrock weathering and glaciation resulting in influencing groundwater flow direction and plume migration. A zero valent iron permeable barrier was installed to help mitigate migration of solvents in the overburden. Hydraulic fracturing was employed to increase permeability in the permeable reactive barrier.

Safeguard Chemical, Former Contact Industries, Elizabeth, NJ – **Senior Associate.** Responsible for remedial investigation, remedial design, and remedial implementation at former chemical mixing/packaging facility in Elizabeth, NJ. The property was characterized by chlorinated solvent and pesticide impacts to soil, groundwater, soil gas and sediments. DNAPL was present at 18 feet below grade on top of silty clays. The remedial approach included excavation of DNAPL using 36” caissons, mixing of backfilled soils with emulsified zero valent iron within caisson, in-situ chemical oxidation followed by injection of zero valent iron to address groundwater. Sediments were investigated to evaluate the vertical and horizontal limits of impacts form the site and establish regional backgrounds. Limited dredging along the drainage canal and embankment is planned to address sediment impacts.

Former Standard Motor Products, Long Island City, NY – Principal. Responsible operation maintenance and monitoring of soil vapor extraction system, air sparge system, and subslab depressurization system at a site contaminated with chlorinated solvents. Conducted rebound testing for the air sparge and vapor extraction systems and negotiated with NYSDEC to show we had achieved remedial goals. Groundwater was addressed through monitored natural attenuation, although evaluation of an inaccessible source areas is planned.

Mountain Development, Ramapo Plaza, Wayne, NJ* – Principal-in-Charge**.** Responsible for remedial investigation, at former dry cleaner facility in Wayne, NJ. The property was characterized by chlorinated solvent impacts to soil, groundwater and soil gas. Concentrations of solvents above DNAPL saturation were present in the overburden water bearing unit. Solvents were also identified within the fractured bedrock water bearing unit. Geophysical techniques including seismic reflection and downhole well logging with optical/acoustic televiewer and heat pile flow meter were used to evaluate water bearing fracture orientation and flow. Groundwater modeling was used to evaluate likely fate and transport properties for DNAPL and dissolved contamination.

Preferred Freezer, Former Reichert Chemical, Elizabeth, NJ* – Principal-In-Charge. Responsible for post development groundwater investigation/remediation and sediment investigation at the former Reicher Chemical site. The site was characterized by petroleum, solvent, 1-4 Dioxane and metals impacts to groundwater in overburden and bedrock. The remedial investigation was completed and the final remedy for groundwater was monitored natural attenuation after source area treatments with chemical oxidation. Sediment was investigated to establish impacts from operations and regional background. Limited areas of PCB, petroleum and polyaromatic hydrocarbon contaminated was defined and delineated.

PUBLIC SECTOR

Former Monarch Site, City of Hoboken, Hoboken, NJ* – Principal-in-Charge for two projects at the site: environmental and geotechnical engineering review completed in support of the City's acquisition of the waterfront site and design of waterfront walkway to connect the existing waterfront walkway to the northwest and southeast of the site to provide better public access and improved pedestrian safety.

NJSDA, Demarest School Flood Vulnerability Study and Environmental Site Closure, Hoboken, NJ* – Principal-in-Charge. Conducted feasibility study prior to New Jersey Schools Development Authority's commitment to renovate existing educational spaces at the school; particular focus on FEMA floodplain designations and the impact on proposed site development. Prepared an Environmental Screening Report and Preliminary Assessment.

NJSDA, Orange High School Addition and Renovation, Orange, NJ* – Principal-in-Charge. Provided both environmental and geotechnical engineering services for interior and exterior renovations of existing school, and construction of 50,000 square foot addition and pedestrian bridge. Expedited project and saved costs by coordinating drilling required for geotechnical and environmental tasks. Subsequently, LSRP services provided and issued RAOs for four AOCs.

Bergen Community College, Paramus, NJ – Principal-in-Charge. Oversaw task-order contract providing environmental health and safety compliance services including an audit; employee training; stormwater compliance; chemical compliance; and radon sampling for a children's day-care center.

PANYNJ On-Call Asbestos Material and Lead Paint Consulting Services Contract, various locations in NY and NJ* – Principal-in-Charge. Responsible for numerous, on-going projects involving investigation and remediation at operating ports, airports, and river crossings in the NY metropolitan area, addressing lead and asbestos issues.

PANYNJ On-Call Environmental Engineering Contract, various locations in NY and NJ* – Principal-in-Charge. Designed and managed site assessments, site investigations and remedial design/implementation at PANYNJ facilities in New York and New Jersey such as a Phase I ESA on a 40-acre portion of Port Elizabeth, UST removals at JFK Airport and Newark Airport, and remedial investigations and remedial design specifications at LaGuardia Airport.

General Service Administration (GSA)/Peter W. Rodino Federal Building Modernization, Newark, NJ* – Principal-in-Charge. Responsible for team that provided asbestos consulting services for $146 million modernization of largest federal building in New Jersey, including asbestos abatement design, preparation of drawings and specifications; inspection services, and determining worker exposure to potential airborne asbestos and lead contamination.

NJDEP Sandy-Blue Acres Program, Various Locations, NJ* – Principal-in-Charge. Responsible for team that performed pre-demolition environmental testing services (for asbestos-containing materials, lead-based paint, universal wastes, and PCBs) at single-family private homes damaged by Superstorm Sandy in 2012, acquired by the state through FEMA/NJOEM grant programs, and slated for demolition. The rapidly-paced project involved approximately 300-500 homes throughout New Jersey.

New York City School Construction Authority (NYC SCA) IEH Hazardous Materials Consulting Services Contract, New York, NY* – Principal-in-Charge. Served as the Principal-in-Charge and Program Manager for the NYCSCA IEH Hazardous Materials Consulting Contract. Under this Contract, Responsible for client management, technical quality and financial success of work related to site assessments, site investigations and remedial design/implementation at existing and proposed New York City Schools throughout the five boroughs.

DASNY Environmental Contract, New York, NY* – Principal-in-Charge. Oversaw numerous environmental investigations, remedial design and remediation oversight projects at construction projects managed by the Dormitory Authority of the State of New York (DASNY) at New York City hospitals and educational facilities.

NYCDDC, Corridor Investigations, Five Boroughs, NY* – Senior Project Manager. As part of the Environmental Term Contract with the New York City Department of Design and Construction (NYCDDC), designed and implemented subsurface investigations at areas targeted for infrastructure (storm water and sanitary sewers) improvement and installation. Designed and managed Corridor Assessments and Investigation to identify potential environmentally impacted soil and groundwater as part of the design-phase of the infrastructure project. The results of the investigations were incorporated into the design bid specifications. Helped develop the NYCDDC's approach toward Corridor Investigations within the City of New York as well as the NYCDDC's standard contaminated materials handling, transportation and disposal specification package. Managed more than 20 Corridor Investigations on behalf of the NYCDDC.

Fort Washington Park EIS (with Stantec), New York, NY* – Principal-in-Charge. As part of the NYC Environmental Quality Review (CEQR) Act, oversaw the hazardous materials assessment portion of the Environmental Impact Assessment for the 160-acre Fort Washington Park. This NYC Department of Parks and Recreation parkland is located adjacent to the east bank of the Hudson River on the far Upper West Side of Manhattan from 135th Street in the south to Spuyten Duyvil in the north. Evaluated the potential for contaminated materials in the soil, groundwater or building materials to be disturbed during reconstruction and excavation activities. The preliminary contaminated materials assessment identified 73 potential sources of contamination and recommended additional investigations at 14 of these areas. Designed and oversaw the subsurface investigations to assess the potential sources of contamination in areas associated with proposed construction. The contamination was found to be consistent with urban fill; a combination of existing vegetative caps and proposed impervious caps were recommended as the remedial strategy.

Soundview Park (with MKW Architects), Bronx, NY* – Principal-in-Charge. Responsible for the subsurface investigation of the areas of park that would be impacted by a proposed bicycle and pedestrian greenway path, connecting inland areas to the Greenway Path Project along the Bronx River's edge. Previous environmental assessments and investigations within Soundview Park, which is built on a former landfill, indicated the presence of contaminated soils and buried wastes. Dr. Winslow designed and oversaw the investigation of shallow soils that would be impacted by the project, evaluating composite soils samples for assessment of health and safety concerns for workers, the community and for disposal purposes during construction. Discreet interval shallow soil samples were collected to evaluate impacts to public health associated with soils to remain in place. As part of the investigation, the suitability of the existing vegetative cover was evaluated as a potential soil cap. Soils contamination was found to be consistent with urban fill and construction and demolition material. Recommendations were provided concerning handling, management, disposal, and capping of this material during construction.

Beacon Station Transit Oriented Development (with AECOM), Beacon, NY* – Principal-in-Charge. Designed and oversaw the environmental assessment, site investigations and conceptual remedial approach in support of the proposed Transit Oriented Development (TOD) at Metro-North Railroad's (MNR) Beacon Station. MNR was preparing a preliminary design for a TOD for inclusion in a request for proposals to developers. Designed a Site Assessment program to identify and quantify the environmental liabilities associated with the development. The study included compilation of existing environmental data on five parcels (including a coal tar impacted parcel), a Phase I Environmental Site Assessment on five parcels, a Site Investigation to evaluate data gaps, preparation of a conceptual remedial approach, and preparation of remedial cost estimates. The information was designed to be used in the RFP process to reduce uncertainties in the development proposal process.

CONTACTOR SUPPORT/DESIGN BUILD

Tappan Zee Bridge Replacement Project, NY* – As part of design build team for the new Tappan Zee Bridge, Managed the land side environmental and compliance portions of the project for the contractor. The project consisted of the development of waste management plans, asbestos and lead pain management plans, conducting waste characterization sampling programs, conducting asbestos abatement monitoring, preparing Phase I and Phase II reports for properties acquired by the design build team for construction of the bridge.

Hudson River Resiliency Project, Contaminated Soil Management, Hoboken, NJ – Principal responsible for contaminated soil management and support during construction of the Hudson River Resiliency project in Hoboken NJ.

NYCSCA PS 312, Queens, NY* – Principal-in-Charge. Managed construction support services related to soil management and community air monitoring associated with the construction of a New York City school complex and associated utility corridors on a high-profile NYSDEC Brownfield Site. The site had a long industrial history, was contaminated with petroleum products and historic fill, and the redevelopment was being closely scrutinized by the community and NYSDEC. Prepared Excavated Material Disposal Plans, reviewed potential disposal facilities, conducted waste characterization soil sampling, prepared a Community Air Monitoring Plan, and conducted community air monitoring using three stations that continuously monitored volatile organic compounds and particulates.

NYCSCA Metropolitan High School, New York, NY* – Principal-in-Charge. Managed construction support services related to soil management and community air monitoring associated with the construction of a New York City school complex and associated utility corridors. The site was a former Inactive Hazardous Waste Site contaminated with chlorinated solvents and historic fill. Prepared Excavated Material Disposal Plans, reviewed potential disposal facilities, conducted waste characterization soil sampling, prepared a Community Air Monitoring Plan, and conducted community air monitoring using three stations that continuously monitored volatile organic compounds and particulates.

NYCDEP Catskill Delaware Ultra Violet Light Disinfection Facility Site Preparation Contract, NY* – Senior Project Manager. As part of one of the largest Water Treatment construction projects in the country, Managed the environmental and compliance portions of the project for the contractor. The project involved the excavation of a shaft to a depth of 90 feet below ground surface in order to access the Catskill Aqueduct. Services included preparation and implementation of an In-Situ Soil Sampling and Analysis Plan, preparation of an Excavation, Transportation and Disposal Plan, preparation of a Storm Water Pollution Prevention Plan and Erosion Control Plan, and preparation of a Construction Waste Management Plan. The project was canceled prior to investigation activities.

NJTA TransHudson Express Tunnel-Manhattan Segments (Judlau-Halcrow Joint Venture), Civil Construction Support Services, New York, NY* – Senior Project Manager. As part of the design-build project for the Manhattan Tunnels Project, designed and oversaw the soil and rock characterization of the soils and rock within the shaft and starter tunnels at 29th Street and 12th Avenue. The project involved the excavation of a shaft to a depth of 130 feet below ground surface in order to allow access by the tunnel boring machine. Services included preparation of an In-Situ Soil Sampling and Analysis Plan, a Field Sampling Plan, collection of 190 composite soils samples representing 500 cubic yard cells at five-foot lifts, preparation of a field summary report, and recommendations to the contractor on materials disposal. The project was canceled prior to investigation activities.

ENERGY PROJECTS

Cultivate Power, Due Diligence for Solar Portfolio, Various Location, NJ – Principal responsible for environmental due diligence on a portfolio of renewable solar projects planed for former surface mines, landfills, and brownfield sites.

Ravenswood Power Generating Station, L.I.C., NU* – Designed and oversaw the spill response investigation following the discovery of a 25,000-gallon kerosene release from an underground fuel oil line connecting a gas turbine generator with the 6,000,000-gallon aboveground storage tank. Within one week of notification of the release, on-site conducting a subsurface investigation to delineate the vertical and horizontal extent of kerosene associated with the release. In addition, installed several recovery sumps to initiate product recovery during the investigation period. Developed a Conceptual Site Model (CSM) that was continuously revised and updated as data became available. The initial CSM projected that kerosene would migrate vertically to the water table and then flow west towards the East River. However, once investigative activities and data review commenced it became evident that anthropogenic features (old foundation elements and utility conduits) were complicating kerosene migration. In addition, shallow bedrock at the release area resulted in migration of kerosene to the north, south, and west from the release area. The investigation IRM was completed within three months of mobilization to the Site and included the installation of over 30 soil borings, 14 monitoring wells and four recovery sumps, and design of an interim product recovery system. Within the first four months of the release 5,000 gallons of kerosene were recovered. A product recovery system was designed and installed to continue product recovery past the emergency response stage. In a subsequent project at the site, oversaw team responsible for asbestos surveys and sampling of suspect materials throughout the power plant, including the 10-story boilers and roof.

Indian Point Energy Center, Buchanan, NY* – Designed and implemented a site investigation to delineate and determine the source of tritium, strontium and cesium detected in groundwater as a result of a leak in spent fuel storage pool and process piping at the Indian Point Nuclear Plant. The investigation consisted of a thorough review of construction drawings, historic hydrogeologic data and historic groundwater chemistry data to prepare a conceptual site model for the release. In order to verify the conceptual site model, Advanced 42 bedrock and overburden borings at the site to supplement the site's existing 18 groundwater monitoring wells. The borings were advanced using a combination of drive and wash techniques and rotary coring techniques. Rock cores were characterized for the presence of water bearing fractures as well as lithology. All bedrock borings were subject to downhole geophysical borehole logging consisting of acoustic televiewer, optical televiewer, temperature, conductivity, and heat pulse flow meter. Hydraulic conductivity was evaluated using a combination of extraction packer testing and sustain yield pump tests. Wells were completed using multilevel sampling systems resulting in 127 sample intervals. Completed an organic dye tracer test to confirm contaminant flow paths and groundwater velocities. Able to delineate the extent of horizontal and vertical groundwater contamination, determine the sources of the contamination and the post release flow paths. Recommended a long-term monitoring plan to be implemented at the site to assess long-term plume reductions as well as monitor potential releases from other SSCs.

Hudson High Voltage Direct Current (HVDC) Converter Station/Siemens AG, Ridgefield, NJ* – Senior Project Manager. Evaluated the impacts to construction associated with contaminated soils and groundwater at the site in order for Siemens to determine that the developer completed all necessary environmental remediation in accordance with NJDEP regulations prior to construction of the facility. The site is being developed as part of a transmission project intended to convert the power between New Jersey's Public Service Electric & Gas (PSEG) 230 kV grid and New York's Con Edison 345 kVgrid.

SUEZ Energy Generation NA, LLC, Astoria, NY* – Principal-in-Charge. Designed and managed an environmental investigation to characterize soils and groundwater as part of the pre-construction design phase of the Astoria Energy Phase II project. The proposed power plant was situated on a former major oil storage facility and was characterized by approximately 10 feet of historic fill material and petroleum contaminated soils and groundwater. The investigation consisted of collecting soils samples in a grid fashion in areas proposed for grubbing, excavation of structures and overhead and subsurface transmission lines in order to characterize soils for proper handling and disposal. In addition, groundwater samples were collected to evaluate the necessity for treatment of dewatering effluent. Then prepared a Site Investigation Report and a Construction Contaminant Management Plan to be used by the contractor for proper health and safety, handling, transportation and disposal of contaminated media. During construction, Conducted waste characterization soil sampling for disposal of contaminated material.

EXPERT TESTIMONY

Avis Budget Car Rental, JFK International Airport, Queens, NY* – Principal. Provided expert testimony with regards to an underground utility damaged during replacement of an underground storage tank when a contractor drove sheeting through an 18-inch sewer line located 18 feet bgs. Provided an opinion on whether proper procedures had been followed to identify utilities during design and construction.

New York State Attorney General Office, Bronx, NY* – Principal. Provided hydrogeologic and fate and transport analysis for an MTBE release associated with co-mingled plumes to establish the likelihood of the release occurring from an upgradient property. Prepared an expert opinion report that incorporated multiple lines of evidence, including geology, topography, hydrogeology, historic information, historic use of MTBE and fate transport modeling, to conclude that the release most likely occurred at the downgradient property and there was little contribution from the upgradient property. The report was used by the Attorney General Office to recover costs expended under the NYSDEC Spill Fund to investigate and remediate the MTBE release.

Proposed Rosedale Cemetery, Readington Township, NJ* – Principal. Provided expert opinion and testimony for citizens group opposed to the development of a cemetery which was out of character land use for the area. Provided an opinion letter on the potential for groundwater contamination due to land use related to cemeteries. The white paper also evaluated the geology and hydrogeology of the area and discussed contaminant fate and transport of potential contaminants and their impact on the environment and human health.

NYCSCA, Corona, NY* – Senior Project Manager. Provided expert testimony in a condemnation case regarding impacts to the site from lead contamination associated with historic fill at the site. In some instances, lead concentrations were sufficient to classify soils as hazardous waste. Provided testimony concerning the nature and extent of the contamination, as well as typical remedial solutions to this issue and costs associated with the remediation. Remediation costs were estimated for residential usage vs. usage as a public school in order to determine what the environmental remediation costs would be under the highest and best use of the site.

Medi-Ray Inc., Tuckahoe, NY* – Senior Project Manager. Provided expert testimony concerning contaminant fate transport of lead in the environment in conjunction with a “whistle blower” case. The former employee charged that he was fired because he intended to report to the authorities the mismanagement and dumping of lead into the environment. Dr. Winslow provided testimony concerning background concentration of lead in the environment, contaminant fate and transport properties of lead, the potential to create a substantial and material threat to public health and the environment, and critique of the conclusions of the opposing witnesses.

Toys-R-Us, Yonkers, NY* – Senior Project Manager. Provided factual testimony concerning site investigation and remediation efforts during the development of a Babies "R" Us store on a site that had been previously filled in the 1950s. During excavation to construct the store, evidence of commercial and industrial waste was detected in the fill material. This included fill with chemical odors, buried drums, and cinders. Once this material was identified it could no longer be disposed of as construction and demolition debris. Laboratory analysis indicated that the fill material contained metals and organic compounds above standards. Babies "R" Us sent the site owner a bill for the remedial efforts. The site owner disputed whether the fill material required special handling and whether the remediation was conducted in accordance with industry standards and state regulations.

SELECTED PUBLICATIONS, REPORTS, AND PRESENTATIONS

Winslow, D., "A Comprehensive Remedial Design Approach to a Multicontaminant Multireceptor Site", Environmental Services Association of Alberta (ESAA)/Remediation Technologies Symposium 2023 (RemTech 2023), Banff, Alberta, October 2023

Parekh, B., and Winslow, D.: Innovative Treatment Train Approach for DNAPL Remediation and Cost Optimization at a Former Chemical Manufacturing Facility; Battelle Chlorinated Conference Spring 2026, Fort Worth Texas

Hayes, M., Huber, S., Winslow., Beach, R., and Briggs, T., "Addressing Sediment Contamination under the LSRP Program in New Jersey: Challenges and Potential Improvements", Battelle Sediment Conference, Nashville, Tennessey, January 2023

Winslow, D., "Rapid Vapor Intrusion Assessment and Mitigation at a Hurricane Sandy-Impacted Brownfield Site, Battelle Chlorinated Conference, Monterey, California, May 2014"

Winslow, D., Arsenic Speciation, Mobility and Treatability at a Former Industrial Site in Edgewater, New Jersey, Environmental Services Association of Alberta (ESAA)/Remediation Technologies Symposium 2013 (RemTech 2013), Banff, Alberta, October 2013

Winslow, D., Green Remediation at a LEED Silver Brownfield Site, The Environmental Institute, Green Remediation Conference, Amherst, MA, June 2010

Winslow, D., Characterization of Tritium and Strontium Releases and Hydrogeology at the Indian Point Nuclear Power Plant, Buchanan, New York, Northeast Geological Society of America, March 2007

MATTHEW DEL BALZO

PROJECT MANAGER

ENVIRONMENTAL ENGINEERING

Mr. Del Balzo is a project manager with over 14 years of experience in the environmental investigation and remediation of sites in New York, New Jersey, and Connecticut. Mr. Del Balzo's experience includes conducting field investigations of contaminated media (i.e. groundwater/soil/air monitoring and sampling), Phase I and Phase II Environmental Site Assessments and Investigations, community air monitoring, drilling, and health & safety oversight. He also has experience with reports writing for projects under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program, the New York City office of Environmental Remediation (NYCOER) Voluntary Cleanup, E-designation sites, and general due diligence reports for developers.

SELECTED PROJECTS

- St. John's University Basketball Facility, Jamaica, NY
- Project Sycamore Mad III Cap Disturbance, Orangeburg, NY
- Standard Motor Products Annual Operation Monitoring and Maintenance, Long Island City, NY
- 441 Eastern Parkway, Farmingdale, NY
- 222 Morgan Avenue, Brooklyn, NY
- Bay Park II Site Management, Affordable Housing, Brooklyn, NY
- 21 Denton Place Remediation, Brooklyn, NY
- 282 Nevins Street Consultation, Brooklyn, NY
- iPark 84, Phase I ESA, Hopewell Junction, NY
- 4313 Middle Country Road, Phase I ESA, Calverton, NY
- 140-150 Warburton Avenue, Due Diligence, Yonkers, NY
- Catskill/Delaware Ultraviolet Lights Disinfection Facility, Waste Characterization, Valhalla, NY
- Remeeder Housing Brownfield Cleanup Project, Brooklyn, NY
- 37-18 Northern Blvd., Operation Monitoring and Maintenance Services, Long Island City, NY
- 75 Third Avenue, Cap Disturbance Oversight Services, Orangeburg, NY
- Kensico Eastview Soil Characterization, Valhalla, NY
- 205 Park Avenue, Operation Monitoring and Maintenance Services, Brooklyn, NY
- 141 3rd Avenue Brownfield Site Management, Brooklyn, NY
- 4314 County Road Phase I/II ESI, Calverton NY
- 292 Ellery Street, Phase II ESI, Brooklyn, NY
- Warburton North Studios, Phase I ESA, Yonkers, NY
- 641 Dowd Avenue, In-Situ Chemical Oxidation (ISCO) Remediation, Elizabeth, NJ
- Nenninger Lane Redevelopment, Waste Disposal Support and Remedial Investigation, East Brunswick, NJ

EDUCATION

B.S., Environmental Science
State University of New York at Oneonta

PROFESSIONAL REGISTRATION

40-Hour OSHA HAZWOPER

TSA Transportation Worker Identification Credentials

Gold Certified Brownfield Professional

NYSDEC Stormwater Qualified Inspector Certification

NYC Site Safety Training Certified

CPR/First Aid Certified

AFFILIATIONS

New York Water Environmental Associations (NYWEA)

NAIOP Commercial Real Estate NYC Member

New York State Council of Professional Geologists

**Projects represent experience with a previous firm*

GERALD F. NICHOLLS, PE, CHMM

PRINCIPAL

ENVIRONMENTAL ENGINEERING & HAZARDOUS MATERIALS MANAGMENT

Mr. Nicholls' 20 years of expertise includes management of remediation and site investigations, litigation support, expert services, brownfield cleanups, remedial design, and industrial hygiene for projects throughout New York and New Jersey. He works closely with various private, state, commercial, industrial, and municipal clients, acting as a liaison between the client and project team.

In 2019, Real Estate Weekly named Mr. Nicholls one of the Rising Stars of Real Estate.

SELECTED PROJECTS

Whitehead Realty, Acme Sites, Brooklyn, NY – Senior Project Manager. Managed and oversaw a complex remedial investigation and report of multiple areas of concern and commingled sources of chlorinated solvents under New York State Department of Environmental Conservation oversight in the Inactive Hazardous Waste Sites Program. These two sites are also now regulated under the U.S. EPA superfund program as the Meeker Ave Plume is undergoing NPL listing. Responsible for development of a complex conceptual site model and technical review of reports. Lead design for SVE system and three SSD systems.

Katrina Response Support to U.S. EPA START, Weston Solutions, New Orleans, LA: Field Observer and data quality reviewer responsible for reconciling data gaps in the EPA Scribe database that they operated and maintained. Also served as a Field Observer by coordinating with remote field locations to assess information needs and directly reported to the EPA.

Willets Point Development, Flushing, NY – Executive Associate. Remediation lead for cleanup of 22-acre BCP site. Handled community engagement regarding environmental components, lead investigation and remedial design effort for the two operable units. Remediation was an expansive multi-year effort covering building demolition, site excavation of 200,000+ tons of contaminated materials, groundwater containment structures, three in situ groundwater treatment areas using PetroFix and ORC Advanced. Collaborated with geotechnical and civil team to remedial future infrastructure as well as building areas. Coordinated dewatering discharge permitting with DEP and DEC.

New York City School Construction Authority On-Call Contract for Hazmat Consulting Services, Various Locations throughout the Five Boroughs – Senior Project Manager for 3-year, $2,000,000 term contract for environmental due diligence, site investigations, boiler conversions, construction administration, and design services. Directed multiple Phase II Environmental Site Investigations, indoor air quality assessments, and ASHRAE outdoor air assessments, for proposed public school facility extensions and acquisitions; oversaw soil, groundwater and soil vapor

EDUCATION

M.S., Environmental Engineering
New Jersey Institute of Technology

B.S., Chemistry and Environmental Studies (Double Major)
Ursinus College

PROFESSIONAL REGISTRATION

Professional Engineer (PE) in NY

Certified Hazardous Materials Manager (CHMM)

AFFILIATIONS

Real Estate Board New York

City of Jersey City Environmental Commission, Former Commissioner, Vice Chair and Chair

Alliance of Hazardous Materials Professionals

American Chemical Society

New York League of Conservation Voters

New York City Brownfield Partnership

LANGAN

sampling in accordance with an NYCSCA-approved scope of work; maintained a record of daily activities in a field book and through a photographic record and communicated daily field activities to the project team through email; assisted in tabulating sample analytical results for the report. Provided senior engineering direction vapor mitigation system design (gas vapor barriers and subslab depressurization systems).

491 Wortman Ave, Brooklyn, NY – Senior Project Manager. Managed the design and implementation of an air sparge/soil vapor extraction system, including pilot testing and alternatives analysis. Directed all activities related to the New York State Brownfield Cleanup Program, developed and reviewed bid documents and construction specifications. Technical lead for an off-site groundwater investigation, evaluated conceptual site model, and conducted fate and transport of off-site chlorinated solvent impacts. Performed QA/QC review of work plans and reports.

West 17th Street Development, New York, NY – Senior Project Manager. Managed and lead investigation and remediation of this manufactured gas plant site Track 4 cleanup under the New York State Brownfield Cleanup Program. Managed and directed recovery well installation, Dense Non-Aqueous Phase Liquid (DNAPL) extraction, lead the remedial design, and oversaw remedial construction. Design and remediation consisted of shallow excavation, in situ stabilization, containment wall installation, air monitoring, and community relations. Following successful remediation, provided litigation support for cost recovery by the owner from the former utility (responsible party).

459 Smith Street and Gowanus Green, Brooklyn, NY - Executive Associate. Remediation lead for cleanup of these two multi-acre BCP sites along the Gowanus Canal. Remediation challenges included coordination with responsible party (NationalGrid), shallow and deep coal tar DNAPL, former structures, and community opposition. Evaluated in situ remedial alternatives, including in situ stabilization and in situ geochemical stabilization.

2 Ingraham Street, Brooklyn, NY – Senior Project Manager. Lead investigation and remediation of this property under the New York State Brownfield Cleanup Program. Technical lead for remedial alternatives analysis to address chromium-impacted groundwater and saturated and unsaturated soils. Developed specialized monitoring and testing for mercury-impacted shallow soils to delineate impacts and protect on-site workers/community. Oversaw bench-scale treatability testing and field implementation for in situ solidification/stabilization of hexavalent chromium impacts. Property also impacted by chlorinated solvents—lead off-site investigation to determine off-site source and development vapor mitigation options for redevelopment.

250 Water Street, New York, NY – Remedial Engineer. Howard Hughes Corporation will be constructing a residential and commercial building on this full block site in lower Manhattan. Langan is providing survey, environmental and geotechnical services. Environmental services include site investigation and remediation under the NYS Brownfield Cleanup Program. The site has a varied environmental history including four thermometer factories/workshops. The remedial investigation included sampling for mercury in soil, groundwater, soil vapor and ambient air, as well as speciation of mercury in soil samples. Because the site is adjoined by two K-

Gowanus Canal Conservancy, Board of Directors

12 schools (one public, one private) extensive public participation including multiple community meetings, briefings to elected officials establishment of a project website, and media interviews.

Confidential Client, Former School, Brooklyn, NY – Remedial Engineer. Representing the building owner in a full building remediation for mercury resultant from historic releases associated with past industrial use. Mercury has been demonstrated to have impacted the indoor building materials and the soil beneath the concrete building slab. The scope of work includes indoor air screening, review of existing sample data, preparation of a remedial plan, contractor scoping and bid support, remedial oversight, documentation sampling and preparation of post-remediation documentation. Completion and implementation of the remedial plan is anticipated to occur in 2023.

Gowanus Canal Northside, Brooklyn, NY – Senior Project Manager. Managing redevelopment of this former fuel depot from due diligence through development. Directing project team for oversight of demolition and decommissioning of Major Oil Storage Facility (MOSF), scoping of remediation investigation, and compliance with New York State Brownfield Cleanup Program. Scoped and QA/QC reviewed technical bid package for implementation of an interim remedial measures work plan. Engineer of record for subslab depressurization system, in situ ground water treatment with PetroFix, and remedial excavation. Coordinated among various regulatory units within NYSDEC to close out the 1.5 million gallon bunkered ASTs and various other ASTs and USTs discovered onsite.

1772 Shore Parkway, Brooklyn, NY – Associate. Supported the potential acquisition of this Major Oil Storage Facility (MOSF). Prepared MOSF decommissioning cost estimates and closure strategy. Coordinated permitting and civil requirements (NYSDEC Jurisdiction of Tidal Wetland Adjacent Area, NYSDEC Coastal Erosion Hazard Area, Shore Public Walkway and zoning requirements, Flood Plain Elevations).

1400 Ferris Place, Bronx, NY – Associate. Senior support for closure of NYSDEC) Major Oil Storage Facility (MOSF) Site No. 2-1060 at 1400 Ferris Place, which underwent real estate transfer and redevelopment. Provided environmental due diligence services, MOSF Decommissioning Work Plan, spill cleanup, environmental monitoring, field documentation, coordination with the project team and NYSDEC, vacuum enhanced fluid recovery, and spill closure.

Staten Island Ballpark – Associate. Oversaw compliance with the Site Management Plan for the replacement of the natural grass baseball field with synthetic turf. Coordinated with NYSDEC and project team to integrate environmental requirements in contractor scope.

DonJon Marine, 2345 Arthur Kill Road, Staten Island, NY – Associate. Managed the owner-directed environmental due diligence for this multi-acre active marine salvage and wrecking facility. Prepared a Phase I Environmental Site Assessment and developed acquisition and compliance strategy.

G4 Capital Third Party Due Diligence Reviews and Environmental Risk Evaluations, Various Locations, New York, NY – Senior Project Manager for on-call contract to review lender’s potential new loan sites.

140 6th Avenue, New York, NY – Project Engineer. Directed design of subslab monitoring and remediation well system, remedial excavation, ORC Advanced application, and submembrane depressurization system. Managed remediation of gasoline-impacted soils and groundwater in support of the spill cleanup and redevelopment project. Coordinated compliance with separate NYSDEC and NYCDEP work plans relating to the spill and BSA action, respectively. Managed budget and cost control efforts in accordance with a remediation funding agreement with the form responsible party.

23-01 42nd Road, Queens, NY – Project Engineer. Managed design and Track 4 remediation of petroleum-impacted and historic fill site under the New York State Brownfield Cleanup Program through closure. Oversaw design and construction of submembrane depressurization system. Responsible for construction field oversight, reporting to NYSDEC, review of technical reports, and compliance with regulations. Provided budget progress reports for client and lender/investment team.

23-10 Queens Plaza South, Queens, NY – Project Engineer. Managed design and Track 4 remediation of petroleum-impacted, chlorinated solvent, and historic fill site under the New York State Brownfield Cleanup Program.

163 6th Street, Brooklyn, NY – Project Engineer. Responsible for leading due diligence effort (Phase I and Phase II) and scoping spill response activities and remedial action work plan. Led project team and performed QC review of work plan and reports.

170 Amsterdam Avenue, New York, NY – Project Engineer. Managed brownfield cleanup of this historic fill site under the New York City Voluntary Cleanup Program from due diligence through remediation and obtained a Track 1 cleanup and Notice of Completion.

Urban Health Plan, 1095 Southern Boulevard, Bronx, NY – Project Engineer. Managed and lead remedial design for this proposed Track 1 cleanup of chlorinated solvents (former dry cleaner) under the New York State Brownfield Cleanup Program. Managed budget, design effort, investigation program, and team coordination.

Second Avenue Subway, New York, NY – Project Engineer. Managed a Community Air Monitoring Program and designed subgrade air treatment system for the cut-and-cover tunnel excavation through a former manufactured gas plant site.

New York University Spill Sites for 4 Washington Square Village, 7-13 Washington Square North, and 251 Mercer Street, New York, NY – Project Engineer. Managing the portfolio of spill sites for NYU. Responsible for overseeing field staff, working as technical lead for report preparation, and leading NYSDEC coordination efforts. Obtained the closure of a Fuel Oil #6 spill at 251 Mercer and 4 Washington Square Village. Performed cost-benefit analyses for future action. Reviewed quality and semi-annual progress reports and oversaw field staff performing product recovery and sampling activities. Led evaluation for scale back and shutdown of SVE system. Responsible for project financials and progress reporting to NYU.

Dormitory Authority of New York (DASNY), City College of New York, Fuel Protection and Leak Detection System Repair and Upgrades, New York, NY

– Project Engineer. Prepared bid and construction documents for cathodic protection replacement. Evaluated compliance options for system repair versus tank replacement. Reviewed contractor submittals and performed quality control review of project documents and specifications.

45 Broad Street, New York, NY – Senior Project Manager. Directing multi-discipline design team for a planned super tower. Managing budget and coordinating personnel of all Langan disciplines (environmental, geotechnical, site/civil, and planning). Maintains cross-discipline communication with design and ownership team. Scoped waste characterization and construction documents and oversaw the project team for implementation of field sampling. Performed technical and QA/QC review of reports.

241 West 28th Street, New York, NY – Senior Project Manager. Directed investigation and remediation of this property under the New York State Brownfield Cleanup Program. Closure anticipated in December 2021. Managed multidisciplinary design and construction oversight effort for environmental, site/civil, geotechnical engineering and surveying.

Surfactant Remediation Project, Margate City, NJ – Project Engineer. Designed and implemented an in-situ chemical oxidation project and achieved a letter of No Further Action form the New Jersey Department of Environmental Protection.

Koppers Site, Trans-Hudson Express Project, Kearny, NJ – Project Engineer. Implemented a remedial investigation to investigate impacts from chromate-ore processing residue and coal tar DNAPL. Conducted a triad-based laser-induced fluorescence delineation of DNAPL extents.

Former Cornell Manufacturing Site, Orangeburg, NY – Staff Scientist. Performed groundwater sampling, analyzed chlorinated solvent degradation, evaluated reductive dechlorination, and oversee implementation of Hydrogen Release Compound advanced injection with pneumatic fracturing into weathered bedrock to remediate chlorinated solvent DNAPL.

Horse Pasture Site, Robins Air Force Base, GA – Staff Scientist. Supported design of in-situ chemical oxidation of chlorinated solvent and petroleum-impacted confined aquifer and oversaw installation of injection well array.

Williams Air Force Base, Thermal Enhanced Extraction, Mesa, AZ – Staff Scientist. Analyzed pumping test data, oversight of injection and monitoring installation, and analyzed remedial performance data.

New Jersey Transit, 32nd Street Station Stop (former Hicor Site), Bayonne, NJ – Staff Scientist. Conducted an NJDEP-compliant site investigation of soil and groundwater.

Nikolski Radio Relay Station, Umnak Island, AK – Staff Scientist. Lead field activities for the demolition of a former remote fuel supply system, delineated fuel oil impacts, oversaw contaminated soil removal and underground storage tank remediation. Conducted triad-based delineation sampling for fuel oil contamination using field tests kits.

Middletown Post Office, Middletown, NY– Staff Scientist. Performed due diligence investigation of part of a former manufactured gas plant.

Lower Manhattan Construction Command Center, Environmental Services Contract, New York, NY – Project Scientist. Managed and implemented a neighborhood scale real-time air monitoring program that used a custom data transmission system. Management field staff and maintained project budgets. Primary client interface and coordinated with multiple projects stakeholders. Coordinated and reviewed a multi-site vehicle emission compliance database.

Da Nang International Airport, Da Nang, Vietnam– Staff Scientist. Supported a remedial alternatives analysis for remediation of herbicide and dioxin-impacted areas of former U.S. airbases.

22nd to 8th Street Station Light Rail Extension, Bayonne, NJ – Staff Scientist. Conducted an NJDEP-compliant site investigation of soil and groundwater.

69th Street Grade Separation Project, North Bergen, NJ – Staff Scientist. Conducted an NJDEP-compliant site investigation of soil and groundwater.

Dukes Parkway Landfill, Hillsboro/Manville, NJ – Staff Scientist. Performed field investigations activities and analyzed quality of groundwater from bedrock fractures using well packers in support of this brownfield to greenfield project.

SELECTED PUBLICATIONS, REPORTS, AND PRESENTATIONS

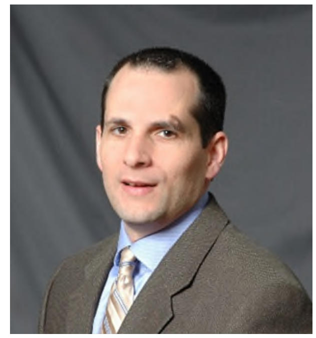
Burke, M., Ciambruschini, S., Nicholls, G., Tashji, A., Vaidya, S., “Redeveloping a Remediated MGP Site”, MGP Symposium 2019, Atlantic City, NJ.

”Biodegradation Pathways and End Products of Sodium Dioctyl Sulfosuccinate/Sodium Hexadecyl Diphenyl Oxide Disulfonate Surfactant Solution.” Florida Remediation Conference, Orlando, Florida, November 2005.

ANTHONY MOFFA, JR., ASP, CHMM, COSS, CSP

ASSOCIATE
CORPORATE HEALTH AND SAFETY MANAGER

Anthony is Langan's Corporate Health & Safety Manager and is responsible for managing health and safety compliance in all Langan office locations. He has 29 years of experience in the health and safety field. He is responsible for ensuring compliance with all federal and state occupational health and safety laws and development and implementation of corporate health and safety policies. His responsibilities include reviewing and updating Langan's Corporate Health and Safety Program and assisting employees in the development of site specific Health & Safety Plans. He maintains and manages health and safety records for employees in all Langan office locations including medical evaluations, respirator fit testing, and Hazardous Waste Operations and Emergency Response training. He is also responsible for documentation and investigation of work-related injuries and incidents and sharing this information with employees to assist in the prevention of future incidents. He is also the chairman of the Corporate Health & Safety Committee and Health & Safety Leadership Team that meet periodically throughout the year. He is responsible for coordinating and providing health and safe training to Langan employees. He was formerly the Environmental, Health and Safety Coordinator at a chemical manufacturer. His experience included employee hazard communications, development of material safety data sheets for developed products, respirator fit testing and conducting required Occupational Health & Safety Association and Department of Transportation training.



EDUCATION

B.S., Physics
West Chester University

PROFESSIONAL REGISTRATION

Associate Safety Professional (ASP)

Certified Hazardous Material Manager (CHMM)

Certified Occupational Safety Specialist (COSS)

Certified Safety Professional (CSP)

AFFILIATIONS

Pennsylvania Chamber of Business & Industry

Chemical Council of New Jersey

New Jersey Business & Industry Association

American Society of Safety Professionals

JOSEPH CONBOY

SENIOR STAFF CHEMIST

ENVIRONMENTAL ENGINEERING

Joseph has 7 years of experience in environmental consulting, specializing in chemical data validation, data quality assessments, data usability evaluations, and EQuIS database management.

SELECTED PROJECTS

- 23-30 Borden Avenue, Long Island City, NY
- 25-01 Queens Plaza North, Long Island City, NY
- 37-11 30th Street, Long Island City, NY
- 266 West 96th Street, New York, NY
- 414 Gerard Avenue, Bronx, NY
- 445 Gerard Avenue, Bronx, NY
- 475 Bay Street, Staten Island,
- 538-544 Hudson Street, New York, NY
- 805-825 Atlantic Avenue, Brooklyn, NY
- 1400 Ferris Place, Bronx, NY
- 1607 Surf Avenue, Coney Island, NY
- 1900 River Road, Burlington, NJ
- 2447 Third Avenue, New York, NY
- ABC - Block 27, Long Island City, NY
- American Dream Meadowlands, East Rutherford, NJ
- Bedford Armory, Brooklyn, NY
- Former Ballantine Brewery, Newark, NJ
- Former Curtiss-Wright Facility, Wood-Ridge, NJ
- Former Duane Marine Site, Perth Amboy, NJ
- Former Perth Amboy Gas Works, Perth Amboy, NJ
- Former Plessey Dynamics Site, Hillside, NJ
- Former MGP Site, Wildwood, NJ
- Gowanus Canal Northside, Brooklyn, NY
- JCP&L Union Beach District Office, Keyport, NJ
- K-8 School, New Brunswick, NJ
- Linden Terminal, Linden, NJ
- Paulsboro Packaging Site, Paulsboro, NJ
- President Street Properties, New York, NY
- Suffolk Street, New York, NY
- Willets Point, Queens, NY

EDUCATION

B.S., Chemistry
Rowan University

ATTACHMENT B

RL AND MDLS

APPENDIX B
LABORATORY REPORTING LIMITS AND METHOD DETECTION LIMITS

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Volatile Organic Compounds						
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,1,1,2-Tetrachloroethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,1,1-Trichloroethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,1,2,2-Tetrachloroethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,1,2-Trichloroethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,1-Dichloroethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,1-Dichloroethylene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,1-Dichloropropylene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,2,3-Trichlorobenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,2,3-Trichloropropane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,2,4,5-Tetramethylbenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,2,4-Trichlorobenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,2,4-Trimethylbenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,2-Dibromo-3-chloropropane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,2-Dibromoethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,2-Dichlorobenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,2-Dichloroethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,2-Dichloropropane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,3,5-Trimethylbenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,3-Dichlorobenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,3-Dichloropropane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,4-Dichlorobenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	1,4-Dioxane	50	100	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	2,2-Dichloropropane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	2-Butanone	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	2-Chlorotoluene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	2-Hexanone	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	4-Chlorotoluene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	4-Methyl-2-pentanone	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Acetone	5	10	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Acrolein	5	10	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Acrylonitrile	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Benzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Bromobenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Bromochloromethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Bromodichloromethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Bromoform	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Bromomethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Carbon disulfide	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Carbon tetrachloride	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Chlorobenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Chloroethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Chloroform	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Chloromethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	cis-1,2-Dichloroethylene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	cis-1,3-Dichloropropylene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Cyclohexane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Dibromochloromethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Dibromomethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Dichlorodifluoromethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Ethyl Benzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Hexachlorobutadiene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Isopropylbenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Methyl acetate	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Methyl tert-butyl ether (MTBE)	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Methylcyclohexane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Methylene chloride	5	10	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Naphthalene	2.5	10	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	n-Butylbenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	n-Propylbenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	o-Xylene	2.5	5	ug/kg

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Volatile Organic Compounds						
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	p- & m- Xylenes	5	10	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	p-Diethylbenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	p-Ethyltoluene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	p-Isopropyltoluene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	sec-Butylbenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Styrene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	tert-Butyl alcohol (TBA)	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	tert-Butylbenzene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Tetrachloroethylene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Toluene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	trans-1,2-Dichloroethylene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	trans-1,3-Dichloropropylene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	trans-1,4-dichloro-2-butene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Trichloroethylene	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Trichlorofluoromethane	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Vinyl acetate	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Vinyl Chloride	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Xylenes, Total	7.5	15	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Soil	Chlorodifluoromethane (Freon 22)	2.5	5	ug/kg
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,1,1,2-Tetrachloroethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,1,1-Trichloroethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,1,2,2-Tetrachloroethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,1,2-Trichloroethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,1-Dichloroethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,1-Dichloroethylene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,1-Dichloropropylene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,2,3-Trichlorobenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,2,3-Trichloropropane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,2,4,5-Tetramethylbenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,2,4-Trichlorobenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,2,4-Trimethylbenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,2-Dibromo-3-chloropropane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,2-Dibromoethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,2-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,2-Dichloroethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,2-Dichloropropane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,3,5-Trimethylbenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,3-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,3-Dichloropropane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,4-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	1,4-Dioxane	40	40	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	2,2-Dichloropropane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	2-Butanone	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	2-Chlorotoluene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	2-Hexanone	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	4-Chlorotoluene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	4-Methyl-2-pentanone	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Acetone	1	2	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Acrolein	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Acrylonitrile	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Benzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Bromobenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Bromochloromethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Bromodichloromethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Bromoform	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Bromomethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Carbon disulfide	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Carbon tetrachloride	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Chlorobenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Chloroethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Chloroform	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Chloromethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	cis-1,2-Dichloroethylene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	cis-1,3-Dichloropropylene	0.2	0.5	ug/L

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Volatile Organic Compounds						
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Cyclohexane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Dibromochloromethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Dibromomethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Dichlorodifluoromethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Ethyl Benzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Hexachlorobutadiene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Isopropylbenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Methyl acetate	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Methyl tert-butyl ether (MTBE)	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Methylcyclohexane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Methylene chloride	1	2	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Naphthalene	1	2	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	n-Butylbenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	n-Propylbenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	o-Xylene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	p- & m- Xylenes	0.5	1	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	p-Diethylbenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	p-Ethyltoluene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	p-Isopropyltoluene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	sec-Butylbenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Styrene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	tert-Butyl alcohol (TBA)	0.5	1	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	tert-Butylbenzene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Tetrachloroethylene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Toluene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	trans-1,2-Dichloroethylene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	trans-1,3-Dichloropropylene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	trans-1,4-dichloro-2-butene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Trichloroethylene	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Trichlorofluoromethane	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Vinyl acetate	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Vinyl Chloride	0.2	0.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Xylenes, Total	0.6	1.5	ug/L
EPA 8260D	Volatile Organics, 8260 - Comprehensive	Water	Chlorodifluoromethane (Freon 22)	0.2	0.5	ug/L

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Semivolatile Organic Compounds						
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	1,1-Biphenyl	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	1,2,4,5-Tetrachlorobenzene	41.7	83.3	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	1,2,4-Trichlorobenzene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	1,2-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	1,2-Diphenylhydrazine (as Azobenzene)	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	1,3-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	1,4-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2,3,4,6-Tetrachlorophenol	41.7	83.3	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2,4,5-Trichlorophenol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2,4,6-Trichlorophenol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2,4-Dichlorophenol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2,4-Dimethylphenol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2,4-Dinitrophenol	41.7	83.3	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2,4-Dinitrotoluene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2,6-Dinitrotoluene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2-Chloronaphthalene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2-Chlorophenol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2-Methylnaphthalene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2-Methylphenol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2-Nitroaniline	41.7	83.3	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	2-Nitrophenol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	3- & 4-Methylphenols	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	3,3-Dichlorobenzidine	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	3-Nitroaniline	41.7	83.3	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	4,6-Dinitro-2-methylphenol	41.7	83.3	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	4-Bromophenyl phenyl ether	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	4-Chloro-3-methylphenol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	4-Chloroaniline	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	4-Chlorophenyl phenyl ether	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	4-Nitroaniline	41.7	83.3	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	4-Nitrophenol	41.7	83.3	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Acenaphthene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Acenaphthylene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Acetophenone	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Aniline	83.5	167	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Anthracene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Atrazine	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzaldehyde	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzidine	83.5	167	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzo(a)anthracene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzo(a)pyrene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzo(b)fluoranthene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzo(g,h,i)perylene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzo(k)fluoranthene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzoic acid	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzyl alcohol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzyl butyl phthalate	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Bis(2-chloroethoxy)methane	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Bis(2-chloroethyl)ether	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Bis(2-chloroisopropyl)ether	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Bis(2-ethylhexyl)phthalate	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Caprolactam	41.7	83.3	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Carbazole	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Chrysene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Dibenzo(a,h)anthracene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Dibenzofuran	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Diethyl phthalate	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Dimethyl phthalate	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Di-n-butyl phthalate	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Di-n-octyl phthalate	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Diphenylamine	41.7	83.3	ug/kg

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Semivolatile Organic Compounds						
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Fluoranthene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Fluorene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Hexachlorobenzene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Hexachlorobutadiene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Hexachlorocyclopentadiene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Hexachloroethane	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Indeno(1,2,3-cd)pyrene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Isophorone	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Naphthalene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Nitrobenzene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	N-Nitrosodimethylamine	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	N-nitroso-di-n-propylamine	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	N-Nitrosodiphenylamine	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Pentachlorophenol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Phenanthrene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Phenol	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Pyrene	20.9	41.7	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Pyridine	83.5	167	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Soil	Benzo(a)pyrene (BAP) Equivalent-BAPE	146	292	ug/kg
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	1,1-Biphenyl	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	1,2,4,5-Tetrachlorobenzene	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	1,2,4-Trichlorobenzene	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	1,2-Dichlorobenzene	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	1,2-Diphenylhydrazine (as Azobenzene)	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	1,3-Dichlorobenzene	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	1,4-Dichlorobenzene	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2,3,4,6-Tetrachlorophenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2,4,5-Trichlorophenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2,4,6-Trichlorophenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2,4-Dichlorophenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2,4-Dimethylphenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2,4-Dinitrophenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2,4-Dinitrotoluene	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2,6-Dinitrotoluene	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2-Chloronaphthalene	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2-Chlorophenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2-Methylnaphthalene	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2-Methylphenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2-Nitroaniline	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	2-Nitrophenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	3- & 4-Methylphenols	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	3,3-Dichlorobenzidine	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	3-Nitroaniline	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	4,6-Dinitro-2-methylphenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	4-Bromophenyl phenyl ether	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	4-Chloro-3-methylphenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	4-Chloroaniline	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	4-Chlorophenyl phenyl ether	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	4-Nitroaniline	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	4-Nitrophenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Acenaphthene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Acenaphthylene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Acetophenone	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Aniline	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Anthracene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Atrazine	0.5	0.5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Benzaldehyde	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Benzidine	10	20	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Benzo(a)anthracene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Benzo(a)pyrene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Benzo(b)fluoranthene	0.05	0.05	ug/L

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Semivolatile Organic Compounds						
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Benzo(g,h,i)perylene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Benzo(k)fluoranthene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Benzoic acid	25	50	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Benzyl alcohol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Benzyl butyl phthalate	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Bis(2-chloroethoxy)methane	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Bis(2-chloroethyl)ether	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Bis(2-chloroisopropyl)ether	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Bis(2-ethylhexyl)phthalate	0.5	0.5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Caprolactam	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Carbazole	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Chrysene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Dibenzo(a,h)anthracene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Dibenzofuran	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Diethyl phthalate	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Dimethyl phthalate	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Di-n-butyl phthalate	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Di-n-octyl phthalate	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Diphenylamine	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Fluoranthene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Fluorene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Hexachlorobenzene	0.02	0.02	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Hexachlorobutadiene	0.5	0.5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Hexachlorocyclopentadiene	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Hexachloroethane	0.5	0.5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Indeno(1,2,3-cd)pyrene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Isophorone	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Naphthalene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Nitrobenzene	0.25	0.25	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	N-Nitrosodimethylamine	0.5	0.5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	N-nitroso-di-n-propylamine	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	N-Nitrosodiphenylamine	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Pentachlorophenol	0.25	0.25	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Phenanthrene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Phenol	2.5	5	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Pyrene	0.05	0.05	ug/L
EPA 8270E	Semi-Volatiles, 8270 - Comprehensive	Water	Pyridine	2.5	5	ug/L

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Pesticides						
EPA 8081B	Pesticides, 8081 target list	Soil	4,4'-DDD	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	4,4'-DDD [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	4,4'-DDE	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	4,4'-DDE [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	4,4'-DDT	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	4,4'-DDT [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Aldrin	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Aldrin [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	alpha-BHC	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	alpha-BHC [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	alpha-Chlordane	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	alpha-Chlordane [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	beta-BHC	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	beta-BHC [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Chlordane, total	6.6	6.6	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Chlordane, total [2C]	6.6	6.6	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	delta-BHC	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	delta-BHC [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Dieldrin	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Dieldrin [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endosulfan I	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endosulfan I [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endosulfan II	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endosulfan II [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endosulfan sulfate	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endosulfan sulfate [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endrin	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endrin [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endrin aldehyde	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endrin aldehyde [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endrin ketone	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Endrin ketone [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	gamma-BHC (Lindane)	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	gamma-BHC (Lindane) [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	gamma-Chlordane	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	gamma-Chlordane [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Heptachlor	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Heptachlor [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Heptachlor epoxide	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Heptachlor epoxide [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Methoxychlor	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Methoxychlor [2C]	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Toxaphene	33	33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Toxaphene [2C]	33	33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Soil	Mirex	0.33	0.33	ug/kg
EPA 8081B	Pesticides, 8081 target list	Water	4,4'-DDD	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	4,4'-DDD [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	4,4'-DDE	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	4,4'-DDE [2C]	0.004	0.004	ug/L

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Pesticides						
EPA 8081B	Pesticides, 8081 target list	Water	4,4'-DDT	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	4,4'-DDT [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Aldrin	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Aldrin [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	alpha-BHC	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	alpha-BHC [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	alpha-Chlordane	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	alpha-Chlordane [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	beta-BHC	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	beta-BHC [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Chlordane, total	0.02	0.02	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Chlordane, total [2C]	0.02	0.02	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	delta-BHC	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	delta-BHC [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Dieldrin	0.002	0.002	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Dieldrin [2C]	0.002	0.002	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endosulfan I	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endosulfan I [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endosulfan II	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endosulfan II [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endosulfan sulfate	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endosulfan sulfate [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endrin	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endrin [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endrin aldehyde	0.01	0.01	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endrin aldehyde [2C]	0.01	0.01	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endrin ketone	0.01	0.01	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Endrin ketone [2C]	0.01	0.01	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	gamma-BHC (Lindane)	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	gamma-BHC (Lindane) [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	gamma-Chlordane	0.01	0.01	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	gamma-Chlordane [2C]	0.01	0.01	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Heptachlor	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Heptachlor [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Heptachlor epoxide	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Heptachlor epoxide [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Methoxychlor	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Methoxychlor [2C]	0.004	0.004	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Toxaphene	0.1	0.1	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Toxaphene [2C]	0.1	0.1	ug/L
EPA 8081B	Pesticides, 8081 target list	Water	Mirex	0.004	0.004	ug/L

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Polychlorinated Biphenyls						
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1016	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1016 [2C]	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1221	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1221 [2C]	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1232	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1232 [2C]	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1242	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1242 [2C]	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1248	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1248 [2C]	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1254	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1254 [2C]	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1260	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1260 [2C]	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1262	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1262 [2C]	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1268	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Aroclor 1268 [2C]	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Total PCBs	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Soil	Total PCBs [2C]	0.0167	0.0167	mg/kg
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1016	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1016 [2C]	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1221	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1221 [2C]	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1232	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1232 [2C]	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1242	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1242 [2C]	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1248	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1248 [2C]	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1254	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1254 [2C]	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1260	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1260 [2C]	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1262	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1262 [2C]	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1268	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Aroclor 1268 [2C]	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Total PCBs	0.05	0.05	ug/L
EPA 8082A	Polychlorinated Biphenyls (PCB)	Water	Total PCBs [2C]	0.05	0.05	ug/L

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Herbicides						
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4,5-T	20	20	ug/kg
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4,5-T [2C]	20	20	ug/kg
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4,5-TP (Silvex)	20	20	ug/kg
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4,5-TP (Silvex) [2C]	20	20	ug/kg
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4-D	20	20	ug/kg
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Soil	2,4-D [2C]	20	20	ug/kg
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Water	2,4,5-T	5	5	ug/L
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Water	2,4,5-T [2C]	5	5	ug/L
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Water	2,4,5-TP (Silvex)	5	5	ug/L
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Water	2,4,5-TP (Silvex) [2C]	5	5	ug/L
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Water	2,4-D	5	5	ug/L
EPA 8151A	Herbicides, NYSDEC Part 375 Target List	Water	2,4-D [2C]	5	5	ug/L

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
			Metals			
EPA 6010D	Metals, Target Analyte	Soil	Aluminum	4.17	4.17	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Antimony	2.08	2.08	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Arsenic	1.25	1.25	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Barium	2.08	2.08	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Beryllium	0.042	0.042	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Cadmium	0.25	0.25	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Calcium	4.17	4.17	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Chromium	0.417	0.417	mg/kg
EPA 7196A	Metals, Target Analyte	Soil	Hexavalent Chromium	0.35	0.5	mg/kg
EPA 7196A	Metals, Target Analyte	Soil	Trivalent Chromium	0.25	0.5	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Cobalt	0.333	0.333	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Copper	1.67	1.67	mg/kg
EPA 9013A	Metals, Target Analyte	Soil	Cyanide	0.5	0.5	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Iron	20.8	20.8	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Lead	0.417	0.417	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Magnesium	4.17	4.17	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Manganese	0.417	0.417	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Nickel	0.83	0.83	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Potassium	4.17	4.17	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Selenium	2.08	2.08	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Silver	0.42	0.42	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Sodium	41.7	41.7	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Thallium	2.08	2.08	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Vanadium	0.83	0.83	mg/kg
EPA 6010D	Metals, Target Analyte	Soil	Zinc	2.08	2.08	mg/kg
EPA 6010D	Metals, Target Analyte	Water	Aluminum	0.05	0.05	mg/L
EPA 6010D	Metals, Target Analyte	Water	Antimony	0.025	0.025	mg/L
EPA 6010D	Metals, Target Analyte	Water	Arsenic	0.015	0.015	mg/L
EPA 6010D	Metals, Target Analyte	Water	Barium	0.025	0.025	mg/L
EPA 6010D	Metals, Target Analyte	Water	Beryllium	0.0005	0.0005	mg/L
EPA 6010D	Metals, Target Analyte	Water	Cadmium	0.003	0.003	mg/L
EPA 6010D	Metals, Target Analyte	Water	Calcium	0.05	0.05	mg/L
EPA 6010D	Metals, Target Analyte	Water	Chromium	0.005	0.005	mg/L
EPA 7196A	Metals, Target Analyte	Water	Hexavalent Chromium	0.01	0.01	mg/L
EPA 7196A	Metals, Target Analyte	Water	Trivalent Chromium	0.008	0.01	mg/L
EPA 6010D	Metals, Target Analyte	Water	Cobalt	0.004	0.004	mg/L
EPA 6010D	Metals, Target Analyte	Water	Copper	0.02	0.02	mg/L
EPA 9013A	Metals, Target Analyte	Water	Cyanide	0.01	0.01	mg/L
EPA 6010D	Metals, Target Analyte	Water	Iron	0.25	0.25	mg/L
EPA 6010D	Metals, Target Analyte	Water	Lead	0.005	0.005	mg/L
EPA 6010D	Metals, Target Analyte	Water	Magnesium	0.05	0.05	mg/L
EPA 6010D	Metals, Target Analyte	Water	Manganese	0.005	0.005	mg/L
EPA 6010D	Metals, Target Analyte	Water	Nickel	0.01	0.01	mg/L
EPA 6010D	Metals, Target Analyte	Water	Potassium	0.05	0.05	mg/L
EPA 6010D	Metals, Target Analyte	Water	Selenium	0.025	0.025	mg/L
EPA 6010D	Metals, Target Analyte	Water	Silver	0.005	0.005	mg/L

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Metals						
EPA 6010D	Metals, Target Analyte	Water	Sodium	0.5	0.5	mg/L
EPA 6010D	Metals, Target Analyte	Water	Thallium	0.025	0.025	mg/L
EPA 6010D	Metals, Target Analyte	Water	Vanadium	0.01	0.01	mg/L
EPA 6010D	Metals, Target Analyte	Water	Zinc	0.025	0.025	mg/L

Analysis	Matrix	Analyte	MDL	RL	Units
PFAS Compounds					
PFAS, EPA 1633 Target List	Soil	Perfluorobutanesulfonic acid (PFBS)	0.111	0.177	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluorohexanoic acid (PFHxA)	0.053	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoroheptanoic acid (PFHpA)	0.105	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluorohexanesulfonic acid (PFHxS)	0.179	0.183	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluorooctanoic acid (PFOA)	0.172	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluorooctanesulfonic acid (PFOS)	0.167	0.186	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluorononanoic acid (PFNA)	0.189	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluorodecanoic acid (PFDA)	0.191	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoroundecanoic acid (PFUnA)	0.198	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluorododecanoic acid (PFDoA)	0.163	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluorotridecanoic acid (PFTrDA)	0.125	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluorotetradecanoic acid (PFTA)	0.103	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	N-MeFOSAA	0.148	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	N-EtFOSAA	0.194	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoropentanoic acid (PFPeA)	0.109	0.4	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoro-1-octanesulfonamide (FOSA)	0.146	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoro-1-heptanesulfonic acid (PFHpS)	0.155	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoro-1-decanesulfonic acid (PFDS)	0.191	0.193	ug/kg
PFAS, EPA 1633 Target List	Soil	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.595	0.76	ug/kg
PFAS, EPA 1633 Target List	Soil	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.755	0.768	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoro-n-butanoic acid (PFBA)	0.109	0.8	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	0.139	0.356	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	0.193	0.4	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoro-4-oxapentanoic acid (PFMPA)	0.062	0.4	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoro-5-oxahexanoic acid (PFMBA)	0.096	0.4	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoro-1-pentanesulfonate (PFPeS)	0.157	0.188	ug/kg
PFAS, EPA 1633 Target List	Soil	1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	0.595	0.75	ug/kg
PFAS, EPA 1633 Target List	Soil	HFPO-DA (Gen-X)	0.608	0.8	ug/kg
PFAS, EPA 1633 Target List	Soil	11CL-PF3OUdS	0.311	0.756	ug/kg
PFAS, EPA 1633 Target List	Soil	9CL-PF3ONS	0.246	0.748	ug/kg
PFAS, EPA 1633 Target List	Soil	ADONA	0.174	0.756	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluorododecanesulfonic acid (PFDoS)	0.169	0.194	ug/kg
PFAS, EPA 1633 Target List	Soil	Perfluoro-1-nonanesulfonic acid (PFNS)	0.124	0.192	ug/kg
PFAS, EPA 1633 Target List	Soil	3-Perfluoropropyl propanoic acid (FPrPA)	0.634	1	ug/kg
PFAS, EPA 1633 Target List	Soil	3-Perfluoropentyl propanoic acid (FPePA)	2.1	5	ug/kg
PFAS, EPA 1633 Target List	Soil	3-Perfluoroheptyl propanoic acid (FHpPA)	1.5	5	ug/kg
PFAS, EPA 1633 Target List	Soil	N-MeFOSE	0.611	2	ug/kg
PFAS, EPA 1633 Target List	Soil	N-MeFOSA	0.18	0.2	ug/kg
PFAS, EPA 1633 Target List	Soil	N-EtFOSE	0.697	2	ug/kg
PFAS, EPA 1633 Target List	Soil	N-EtFOSA	0.198	0.2	ug/kg
PFAS, EPA 1633 Target List	Water	Perfluorobutanesulfonic acid (PFBS)	0.47	1.77	ng/L
PFAS, EPA 1633 Target List	Water	Perfluorohexanoic acid (PFHxA)	0.35	2	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoroheptanoic acid (PFHpA)	0.71	2	ng/L
PFAS, EPA 1633 Target List	Water	Perfluorohexanesulfonic acid (PFHxS)	0.68	1.83	ng/L
PFAS, EPA 1633 Target List	Water	Perfluorooctanoic acid (PFOA)	0.42	2	ng/L
PFAS, EPA 1633 Target List	Water	Perfluorooctanesulfonic acid (PFOS)	0.82	1.86	ng/L
PFAS, EPA 1633 Target List	Water	Perfluorononanoic acid (PFNA)	0.52	2	ng/L
PFAS, EPA 1633 Target List	Water	Perfluorodecanoic acid (PFDA)	0.75	2	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoroundecanoic acid (PFUnA)	1.13	2	ng/L
PFAS, EPA 1633 Target List	Water	Perfluorododecanoic acid (PFDoA)	0.88	2	ng/L
PFAS, EPA 1633 Target List	Water	Perfluorotridecanoic acid (PFTrDA)	0.74	2	ng/L
PFAS, EPA 1633 Target List	Water	Perfluorotetradecanoic acid (PFTA)	0.69	2	ng/L

Analysis	Matrix	Analyte	MDL	RL	Units
PFAS Compounds					
PFAS, EPA 1633 Target List	Water	N-MeFOSAA	0.79	2	ng/L
PFAS, EPA 1633 Target List	Water	N-EtFOSAA	1.03	2	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoropentanoic acid (PFPeA)	0.23	4	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoro-1-octanesulfonamide (FOSA)	0.88	2	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoro-1-heptanesulfonic acid (PFHpS)	0.91	1.91	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoro-1-decanesulfonic acid (PFDS)	1.32	1.93	ng/L
PFAS, EPA 1633 Target List	Water	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	1.06	7.6	ng/L
PFAS, EPA 1633 Target List	Water	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	2.05	7.68	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoro-n-butanoic acid (PFBA)	0.33	8	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	0.5	3.56	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoro-3,6-dioxaheptanoic acid (NFDHA)	2.14	4	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoro-4-oxapentanoic acid (PFMPA)	0.25	4	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoro-5-oxahexanoic acid (PFMBA)	0.37	4	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoro-1-pentanesulfonate (PFPeS)	0.76	1.88	ng/L
PFAS, EPA 1633 Target List	Water	1H,1H,2H,2H-Perfluorohexanesulfonic acid (4:2 FTS)	1.79	7.5	ng/L
PFAS, EPA 1633 Target List	Water	HFPO-DA (Gen-X)	3.23	8	ng/L
PFAS, EPA 1633 Target List	Water	11CL-PF3OUdS	1.38	7.56	ng/L
PFAS, EPA 1633 Target List	Water	9CL-PF3ONS	0.7	7.48	ng/L
PFAS, EPA 1633 Target List	Water	ADONA	0.53	7.56	ng/L
PFAS, EPA 1633 Target List	Water	Perfluorododecanesulfonic acid (PFDoS)	0.93	1.94	ng/L
PFAS, EPA 1633 Target List	Water	Perfluoro-1-nonanesulfonic acid (PFNS)	0.86	1.92	ng/L
PFAS, EPA 1633 Target List	Water	3-Perfluoropropyl propanoic acid (FPrPA)	2.03	5	ng/L
PFAS, EPA 1633 Target List	Water	3-Perfluoropentyl propanoic acid (FPePA)	7.33	25	ng/L
PFAS, EPA 1633 Target List	Water	3-Perfluoroheptyl propanoic acid (FHpPA)	9.47	25	ng/L
PFAS, EPA 1633 Target List	Water	N-MeFOSE	3.99	20	ng/L
PFAS, EPA 1633 Target List	Water	N-MeFOSA	1.58	2	ng/L
PFAS, EPA 1633 Target List	Water	N-EtFOSE	3.99	20	ng/L
PFAS, EPA 1633 Target List	Water	N-EtFOSA	1.8	2	ng/L

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Volatile Organic Compounds						
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,1,1,2-Tetrachloroethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,1,1-Trichloroethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,1,2,2-Tetrachloroethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,1,2-Trichloroethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,1-Dichloroethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,1-Dichloroethylene	0.025	0.025	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,2,4-Trichlorobenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,2,4-Trimethylbenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,2-Dibromoethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,2-Dichlorobenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,2-Dichloroethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,2-Dichloropropane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,2-Dichlorotetrafluoroethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,3,5-Trimethylbenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,3-Butadiene	0.3	0.3	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,3-Dichlorobenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,3-Dichloropropane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,4-Dichlorobenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	1,4-Dioxane	0.2	0.2	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	2-Butanone	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	2-Hexanone	0.2	0.2	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	3-Chloropropene	0.5	0.5	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	4-Methyl-2-pentanone	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Acetone	0.2	0.2	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Acrolein	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Acrylonitrile	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Benzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Benzyl chloride	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Bromodichloromethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Bromoform	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Bromomethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Carbon disulfide	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Carbon tetrachloride	0.025	0.025	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Chlorobenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Chloroethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Chloroform	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Chloromethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	cis-1,2-Dichloroethylene	0.025	0.025	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	cis-1,3-Dichloropropylene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Cyclohexane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Dibromochloromethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Dichlorodifluoromethane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Ethanol	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Ethyl acetate	0.2	0.2	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Ethyl Benzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Hexachlorobutadiene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Isopropanol	0.2	0.2	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Isopropylbenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Methyl Methacrylate	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Methyl tert-butyl ether (MTBE)	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Methylene chloride	0.2	0.2	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Naphthalene	0.2	0.2	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	n-Butylbenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	n-Heptane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	n-Hexane	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	n-Propylbenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	o-Xylene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	p- & m- Xylenes	0.2	0.2	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	p-Ethyltoluene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	p-Isopropyltoluene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Propylene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	sec-Butylbenzene	0.1	0.1	ppbv

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Volatile Organic Compounds						
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Styrene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	tert-Butylbenzene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Tetrachloroethylene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Tetrahydrofuran	0.2	0.2	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Toluene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	trans-1,2-Dichloroethylene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	trans-1,3-Dichloropropylene	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Trichloroethylene	0.025	0.025	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Trichlorofluoromethane (Freon 11)	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Vinyl acetate	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Vinyl bromide	0.1	0.1	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Vinyl Chloride	0.05	0.05	ppbv
EPA TO-15	Volatile Organics, EPA TO15 Full List	Air	Xylenes, Total	0.3	0.3	ppbv

Specific Method	Analysis	Matrix	Analyte	MDL	RL	Units
Volatile Organic Compounds						
EPA TO-15	VOA, TO15 Isooctane (2,2,4-TMP) Add On	Air	2,2,4-Trimethylpentane	0.025	0.05	ppbv

ATTACHMENT C

ANALYTICAL METHODS

ATTACHMENT C
ANALYTICAL METHODS/QUALITY ASSURANCE SUMMARY TABLE

Matrix Type	Field Parameters	Laboratory Parameters	Analytical Methods	Sample Preservation	Sample Container Volume and Type	Sample Hold Time	Field Duplicate Samples	Equipment Blank Samples	Trip Blank Samples	Ambient Air Samples	MS/MSD Samples
Groundwater	Temperature, Turbidity, pH, ORP, Conductivity, Dissolved Oxygen	Part 375 and TCL VOCs	EPA 8260C	Cool to 4°C; HCl to pH <2; no headspace	Three 40-mL VOC vials with Teflon® -lined cap	Analyze within 14 days of collection	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	1 per Shipment of VOC samples	NA	1 per 20 samples
		Part 375 and TCL SVOCs	EPA 8270D and 8270D with SIM	Cool to 4°C	Two 1-Liter Amber Glass	7 days to extract; 40 days after extraction to analyze			NA		
		Part 375 and TCL Pesticides	EPA 8081B	Cool to 4°C	Two 1-Liter Amber Glass	7 days to extract; 40 days after extraction to analyze					
		PCBs	EPA 8082A	Cool to 4°C							
		Part 375 and TAL Metals	EPA 6010C, 6020A, 7470A	Cool to 4°C; HNO_3 to pH <2	250 mL plastic	6 months, except Mercury 28 days					
		Hexavalent Chromium	EPA 7196A	Cool to 4°C	250 mL plastic	24 Hours					
		Cyanide	EPA 9012B/SM4500 C/E	NaOH plus 0.6g ascorbic acid	250 mL plastic	14 days					
		PFAS**	EPA1633	Cool to 4°C	Two 250 mL HDPE	14 days to extract; 28 days after extraction to analyze		1 per sampling day			
		1,4-Dioxane as SVOC***	EPA 8270D with SIM	Cool to 4°C	Two 250-mL Amber Glass	7 days to extract; 40 days after extraction to analyze		1 per sampling day			
Soil	Total VOCs via PID	Part 375 and TCL VOCs	EPA 8260C	Cool to 4°C	Two 40-mL VOC Vials with 5mL H_2O, one with MeOH	48 hours after sampling if not frozen to -70 or extruded into methanol. If frozen. analyze within 14 days of collection	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	1 per Shipment of VOC samples	NA	1 per 20 samples
		Part 375 and TCL SVOCs	EPA 8270D and 8270D with SIM	Cool to 4°C	4 oz. glass jar*	14 days to extract; 40 days after extraction to analyze			NA		
		Part 375 and TCL Pesticides	EPA 8081B	Cool to 4°C	4 oz. glass jar*	14 days to extract; 40 days after extraction to analyze					
		PCBs	EPA 8082A	Cool to 4°C							
		Part 375 and TAL Metals	EPA 6010C, 7471B	Cool to 4°C	2 oz. glass jar*	6 months, except Mercury 28 days					
		PFAS**	EPA 1633	Cool to 4°C	8 oz. HDPE	14 days to extract; 28 days after extraction to analyze		1 per sampling day			
		1,4-Dioxane as SVOC***	EPA 8270D	Cool to 4°C	8 oz. glass jar	14 days		1 per sampling day			
		Percent Solids	SM 2540G	Cool to 4°C	2 oz. plastic container	NA		NA			NA
Soil Vapor	Total VOCs, Oxygen, LEL, CO, and H_2S with MultiGas Meter	TO-15 Listed VOCs	EPA TO-15	Ambient Temperature	6-Liter Summa Canister	Analyze within 30 days of collection	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	NA	1 per 10 samples	NA
Indoor and Ambient Air	Total VOCs via PID	TO-15 Listed VOCs	EPA TO-15	Ambient Temperature	6-Liter Summa Canister	Analyze within 30 days of collection	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	NA	1 per 10 samples	NA

Notes:
ORP - Oxidation-reduction potential
TCL - Target compound list
VOCs - Volatile organic compounds
SVOCs - Semivolatile organic compounds
PCBs - Polychlorinated biphenyls
TAL - Target analyte list
PFAS - Per- and polyfluoroalkyl substances
EPA - Environmental Protection Agency
PID - Photoionization detector
SIM - Selected ion monitoring
LEL - Lower explosive limit
HCl - Hydrochloric acid
H_2S - Hydrogen sulfide
CO - Carbon monoxide
HDPE - High-density polyethylene
HNO_3 - Nitric acid
MeOH - Methanol
NaOH - Sodium hydroxide
*Can be combined in one or more 8 oz. jars
**The Reporting Limit for PFAS compounds in soil is 1 µg/kg and in water is 2 ng/L
***The Reporting Limits for 1,4-Dioxane in soil is 25.05 µg/kg and in water is 0.15 µg/L.

ATTACHMENT D

SAMPLE NOMENCLATURE AND STANDARD OPERATION

SOP #01 – Sample Nomenclature

INTRODUCTION

The Langan Environmental Group conducts an assortment of site investigations where samples (Vapor, Solids, and Aqueous) are collected and submitted to analytical laboratories for analysis. The results of which are then evaluated and entered into a data base allowing quick submittal to the state regulatory authority (New York State Division of Environmental Conservation [NYSDEC]). In addition, Langan is linking their data management system to graphic and analytical software to enable efficient evaluation of the data as well as creating client-ready presentational material.

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the general framework for labeling vapor, solid (soil) and aqueous (groundwater) samples that will be submitted for laboratory analysis. The nomenclature being introduced is designed to meet the NYSDEC EQuIS standard and has been incorporated into Langan software scripts to assist project personnel in processing the data. While this SOP is applicable to all site investigation; unanticipated conditions may arise which may require considerable flexibility in complying with this SOP. Therefore, guidance provided in this SOP is presented in terms of general steps and strategies that should be applied; but deviation from this SOP must be reported to the Project Manager (PM) immediately.

GENERAL SAMPLE IDENTIFICATION CONSIDERATIONS

Sample Labels

All sample ware must have a label. Recall that when you are using the Encore™ samples (see below); they are delivered in plastic lined foil bags. You are to label the bags[1]:

All other samples containers including Terra Cores™ must be labeled with laboratory provided self-adhesive labels.

Quick Breakdown of Sample Format

The general format for sample nomenclature is:

---

[1]Both Alpha and York laboratories permit the combining of the three Encore™ into a single bag. This may not be appropriate for all laboratories so please confirm with the labs themselves

LLNN_ID

Where

LL is a grouping of two (2) to four (4) letters signifying the sample media source. In older nomenclature SOPs this portion of the sample identification is commonly referred to as the *Sample Investigation Code*

NN represents a two digit number identifying the specific sample location or sample sequence number

_ ***(underscore)*** is required between the sample lettering and numeric identification and additional modifying data that determines the date of sampling or the depth of the sample interval

ID is a modifier specific to the sample type media (depth of soil sample or date of groundwater sample)

LL – Sample Investigation Code

Langan has devised a list of two to four letters to insure a quick ability to identify the sample investigation.

Code	Investigation
AA	Ambient Air
DS	Drum
EPB	Endpoint Location - Bottom (Excavation)
EPSW	Endpoint Location - Sidewall (Excavation)
FP	Free Product
IA	Indoor Air
IDW	Investigation Derived Waste (Soil Pile)
MW	Monitoring Well (Permanent)
SB	Soil Boring
SG	Staff Gauge (Stream Gauging)
SL	Sludge
SV	Soil Vapor Point
SVE	Soil Vapor Extraction Well
SW	Surface Water
TMW	Temporary Monitoring Well
TP	Test Pit (Excavated Material from Test Pit Not Associated With Sidewall or Bottom Samples)
WC	Waste Characterization Boring
COMP	Composite Sample
TB	Trip Blank (QA/QC Sampling – All Investigations)
FB	Field Blank (QA/QC Sampling – All Investigations)
DUP	Duplicate (QA/QC Sampling – All Investigations)

NN – Numeric Identifier

The two digit number that follows the sample investigation code (LL) identifies the specific sample based on the soil boring, monitoring well, endpoint or other location identification. For a subset of samples where there is no specific location identifier, the two digit number is the sequence number for the sample submitted. For example, an aqueous sample from a monitoring well identified as MW-1 would have the sample investigation code of MW and the numeric identifier as 01. Note there is no hyphen. The same can be done for soil borings, a soil sample collected from soil boring 9 (SB-9) would be have the LLNN identification of SB09 (again, no hyphen).

Note however that there is a subset of samples related to laboratory analytical quality assurance, among these includes TB, FB, and DUP. On many investigations, the Scope will require multiple collections of these types of samples, therefore the numerical number represents the sequence sample count where the first sample is 01, the second sample is 02, and the third sample is 03 and so on.

_ Underscore
The underscore is required. It separates the investigation code and numeric identifier from the modifier specific to the sample itself. Note that every effort should be made to insure that the underscore is clear on the sample label and chain of custody (COC).

ID – Modifier Specific to Type Media
Each sample investigation code and numeric identifier is further modified by an ID specific to the sample type media. In general, soil samples (soil borings or endpoint samples) use an ID that indicates the depth at which the sample was taken. Aqueous samples (groundwater or surface water samples) are identified by the date the sample was collected. Other types of samples including quality control (TB, FB, and DUP), Vapor samples (AA, IA, SV or SVE), other soil type samples (IDW, sludge, free product, drum, and others) are also identified by a date. The following rules apply to the ID when using sample depth or sample date.

Sample Depth
The sample depth must be whole numbers (no fractions) separated by a hyphen. Thus for a soil sample collected from the soil boring SB-1 from a depth of 6 feet to 8 feet, the sample would be identified as:

SB01_6-8

Unfortunately, the NYSDEC EQuIS system does not accept fractions. Therefore, if your sample interval is a fraction of a foot (6.5-7.5), round up to the larger interval (6-8).

Sample Date
The sample date is always in the format of MMDDYY. Note that the year is two digits. Thus for a groundwater sample collected on July 1, 2015 from the monitoring well MW-1, the sample would be identified as:

MW01_070115

Special Cases
There are a couple of specific sample types that require further explanation.

Endpoint Sampling
End point sidewall samples are sometimes modified by magnetic direction (N, S, E, and W). For example, the first sidewall endpoint sample from the north wall of an excavation at a depth of 5 feet would be written as:

EPSW01_N_5

Again, note that the N in the identification refers to north and is separated from the prefix investigation code/numeric identifier and ID modifier suffix by underscores.

Vapor Extraction Well Sample
As with the sidewall endpoint samples, the sample name is altered by inserting a middle modifier between the prefix and suffix of the sample name. The middle modifier is used to identify the source of the sample (inlet sample port, midpoint sample port or outlet sample port). For example the midpoint port of the vapor extraction well number 1 sampled on July 1, 2015 would be written as;

SVE01_MID_070115

Matrix Spike and Matrix Spike Duplicate
On occasion, a Langan investigation will collect a sample to be used to provide the lab with a site specific medium to spike to determine the quality of the analytical method. This special case of sampling requires additional information to be used in the sample name, specifically, a suffix specifying whether the sample is the matrix spike (MS) or the matrix spike duplicate (MSD). In the following example, the sample is collected from soil boring number 1 at a depth of 2-4 feet. For the matrix spike sample:

SB01_2-4_MS

and for the matrix spike duplicate sample:

SB01_2-4_MSD

Multiple Interval Groundwater Sampling
Although not currently a common practice, low flow sampling facilitates stratigraphic sampling of a monitoring well. If the scope requires stratigraphic sampling then groundwater samples will be labeled with a lower case letter following the well number. For example, placing the pump or sampling tube at 10 feet below surface in MW01 on July 1, 2015 would require the sample to be labeled as:

MW01a_070115

While a second sample where the pump or tubing intake is placed at 20 feet would be labeled as:

MW01b_070115

Note that it is important that you record what depth the intake for each sample represents in your field notes; as this information is going to be critical to interpreting the results.

ATTACHMENT E

PFAS SAMPLING AND ANALYSIS PROTOCOL

NEW YORK
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Department of Environmental Conservation

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

Under NYSDEC's Part 375 Remedial Programs

November 2022

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ERRATA SHEET for

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

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

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

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

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil…	In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil…	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021
Water Sample Results Page 9	“In addition, further assessment of water may be warranted if either of the following screening levels are met: a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L”	Deleted	6/15/2021

Citation and Page Number	Current Text	Corrected Text	Date
Routine Analysis, Page XX	Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids).	Deleted	5/31/2022
Analysis and Reporting, Page XX	As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.	Deleted	5/31/2022
Routine Analysis, Page XX	LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.	EPA Method 1633 is the procedure to use for environmental samples.	
Soil Sample Results, Page XX	Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6	
Appendix A	"Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1"	"Include in the text ….EPA Method 1633"	
Appendix A	"Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101"	Deleted	
Appendix B	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	

Citation and Page Number	Current Text	Corrected Text	Date
Appendix C	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix D	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	
Appendix G		Updated to include all forty PFAS analytes in EPA Method 533	
Appendix H		Deleted	
Appendix I	Appendix I	Appendix H	
Appendix H	"These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report."	"These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER)."	
Appendix H	"The holding time is 14 days…"	"The holding time is 28 days…"	
Appendix H, Initial Calibration	"The initial calibration should contain a minimum of five standards for linear fit…"	"The initial calibration should contain a minimum of six standards for linear fit…"	
Appendix H, Initial Calibration	Linear fit calibration curves should have an R^2 value greater than 0.990.	Deleted	
Appendix H, Initial Calibration Verification	Initial Calibration Verification Section	Deleted	
Appendix H	secondary Ion Monitoring Section	Deleted	
Appendix H	Branched and Linear Isomers Section	Deleted	

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

Objective

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

Applicability

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

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

Field Sampling Procedures

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

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

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

Analysis and Reporting

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

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

Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

Additional Analysis

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

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

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

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

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

Data Assessment and Application to Site Cleanup

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

Water Sample Results

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

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

Soil Sample Results

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

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

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

As the understanding of PFAS transport improves, DEC welcomes proposals for site-specific remedial objectives for protection of groundwater. DEC will expect that those may be dependent on additional factors including soil pH, aqueous pH, % organic carbon, % Sand/Silt/Clay, soil cations: K, Ca, Mg, Na, Fe, Al, cation exchange

[2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

capacity, and anion exchange capacity. Site-specific remedial objectives should also consider the dilution attenuation factor (DAF). The NJDEP publication on DAF can be used as a reference: https://www.nj.gov/dep/srp/guidance/rs/daf.pdf.

Testing for Imported Soil

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

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

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

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

General Guidelines in Accordance with DER-10

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

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
-
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

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

General

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

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

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

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix D - Sampling Protocols for PFAS in Surface Water

General

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

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

Equipment

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

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

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

- stainless steel cup

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

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

General

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

Laboratory Analysis and Container

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

Equipment

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

Appendix F - Sampling Protocols for PFAS in Fish

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

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

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

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

Version: 8

Previous Version Date: 21 March 2018

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

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

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

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

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

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

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

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

B. The following data are required on <u>each</u> **Fish Collection Record** form:

   1. Project and Site Name.

   2. DEC Region.

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

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

   5. Preservation Method.

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

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

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

   3. Date collected.

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

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

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

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

D. General data collection recommendations:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

page ______ of ______

Project and Site Name ____ DEC Region ______________

Collections made by (include all crew) ____

Sampling Method: ☐Electrofishing ☐Gill netting ☐Trap netting ☐Trawling ☐Seining ☐Angling ☐Other ______________________

Preservation Method: ☐Freezing ☐Other ____________________ Notes (SWFDB survey number): ______________________

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

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

I, ______________________________, of ____ collected the
(Print Name) (Print Business Address)

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

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

Town of ____, in __________________________________ County.

Item(s) ____

____

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

____ ____________________________
Signature Date

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

______________________________________ ___________________
Signature Date

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

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

NOTICE OF WARRANTY

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

HANDLING INSTRUCTIONS

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

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2

Group	Chemical Name	Abbreviation	CAS Number
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

Attachment C Community Air Monitoring Plan

Appendix C
New York State Department of Health Generic Community Air Monitoring Plan

Overview
A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area and when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with the New York State Department of Health (NYSDOH) to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan
Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate New York State Department of Environmental Conservation (NYSDEC)/NYSDOH staff.

> **Continuous monitoring** will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

VOCs must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** bases or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. 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 available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- 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 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 State (DEC and DOH) personnel to review.

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 must 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 should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should 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 should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should 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 shall be as 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.