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REMEDIAL INVESTIGATION WORK PLAN
120 EAST 140TH STREET
BRONX, NEW YORK
BCP SITE NO. TBD

by
H & A of New York Engineering and Geology, LLP
New York, New York

for
BH Walton LLC
Brooklyn, New York

and
New York State Department of Environmental Conservation
Albany, New York

File No. 0214715
January 2026

H & A OF NEW YORK ENGINEERING
AND GEOLOGY LLP
213 West 35th Street
7th Floor
New York, NY 10001
646.277.5686

January 14, 2026
File No. 0214715

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, New York 12233-7016

Subject: Remedial Investigation Work Plan
120 East 140th Street Redevelopment Site
120 East 140th Street
Bronx, New York

Ladies and Gentlemen:

On behalf of BH Walton LLC, H & A of New York Engineering and Geology, LLP is submitting for the review and approval of the New York State Department of Environmental Conservation (NYSDEC) this Remedial Investigation Work Plan (RIWP) for the property located at 120 East 140th Street (formerly 301 Walton Avenue) in the Bronx, New York (Site). This document was submitted as part of the Brownfield Cleanup Program Application for the Site. This RIWP has been developed based on NYSDEC's *Technical Guidance for Site Investigation and Remediation* (Division of Environmental Remediation [DER]-10, dated May 2010).

Please do not hesitate to contact us if there are any questions regarding this submittal or any other aspects of the project.

Sincerely yours,
H & A OF NEW YORK ENGINEERING AND GEOLOGY, LLP

Mari Cate Conlon

Mari C. Conlon, P.G.
Senior Associate

James M. Bellew

James M. Bellew
Principal

c:
Shimon Greenfeld (BH Walton LLC) Email: shimon@sgnyrealty.com
Shachne Rabi (BH Walton LLC) Email: sr@blueskybuilder.net
George Duke (Fox Rothschild) Email: gduke@foxrothschild.com

Certification

I, Mari C. Conlon, certify that I am currently a Qualified Environmental Professional as defined in Title 6 of the New York Codes, Rules and Regulations Part 375, and that this Remedial Investigation Work Plan[1] *was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10).*

Mari Cate Conlon — January 14, 2026

Mari C. Conlon, P.G. — *Date*

[1] Certification applies to remedial investigation activities conducted after the execution of a Brownfield Cleanup Agreement (BCA).

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List of Acronyms and Abbreviations

Acronym	Definition
$\mu g/kg$	micrograms per kilogram
$\mu g/L$	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
A	
Alpha	Alpha Analytical Laboratories, Inc.
AOC	Area of Concern
Applicant	BH Walton LLC
ASP	Analytical Services Protocol
AST	aboveground storage tank
ATV	acoustic televiewer
B	
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
C	
CAMP	Community Air Monitoring Plan
CEQR	City Environmental Quality Review
CVOC	chlorinated volatile organic compounds
D	
DER-10	Division of Environmental Remediation-10 *(specifically "May 2010 NYSDEC Technical Guidance for Site Investigation and Remediation")*
DUSR	Data Usability Summary Report
E	
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
ESI	Environmental Site Investigation
F	
FSP	Field Sampling Plan
ft	feet/foot
FWRIA	Fish and Wildlife Resource Impact Analysis
G	
gal/min	gallons per minute
GPR	ground penetrating radar
GPRS	Ground Penetrating Radar Systems, LLC

List of Acronyms and Abbreviations

Acronym	Definition
H	
Haley & Aldrich of New York	H & A of New York Engineering and Geology, LLP
HASP	Health and Safety Plan
HPFM	heat pulse flowmeter
HVAC	heating, ventilation, and air conditioning
I	
IDW	investigation-derived waste
M	
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
N	
ng/L	nanograms per liter
NOVA	NOVA Geophysical Engineering Subsurface Mapping Solutions
NYCDEP	New York City Department of Environmental Protection
NYCOER	New York City Office of Environmental Remediation
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
O	
OSHA	Occupational Safety and Health Administration
OTV	optical televiewer
P	
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PFAS	per- and polyfluoroalkyl substances
PID	photoionization detector
PM-10	particulate matter less than 10 micrometers in size
ppm	parts per million
Q	
QA/QC	quality assurance/quality control
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QHHEA	Qualitative Human Health Exposure Assessment

List of Acronyms and Abbreviations

Acronym	Definition
R	
RAWP	Remedial Action Work Plan
REC	Recognized Environmental Condition
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
RRSCOs	Restricted-Residential Soil Cleanup Objectives
S	
Site	the property located at 120 East 140th Street, Bronx, New York
SVOC	semi-volatile organic compound
T	
TAL	Target Analyte List
TCE	trichloroethene
TCL	Target Compound List
U	
$\mu g/m^3$	micrograms per cubic meter
UST	underground storage tank
UUSCOs	Unrestricted Use Soil Cleanup Objectives
V	
VOC	volatile organic compound

1. Introduction

On behalf of the Applicant, BH Walton LLC, H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York) has prepared this Remedial Investigation Work Plan (RIWP) for the property located at 120 East 140th Street (formerly 301 Walton Avenue) (see Figure 1) in the Mott Haven neighborhood of the Bronx, New York (Site). This RIWP was prepared in accordance with the regulations and guidance applicable to the Brownfield Cleanup Program (BCP).

The Site is identified as Block 2344, Lot 75 on the New York City tax map[2]. The Site is approximately 5,227 square feet (0.12 acres) and is currently an undeveloped parking lot. The Site is bounded to the north by East 140th Street, followed by a multi-story educational building occupied by Health Opportunities High School; to the east by a four-story manufacturing building, followed by Walton Avenue; to the south by a three-story commercial and office building occupied in part by Stanley Ruth (a heating, ventilation, and air conditioning [HVAC] contractor); and to the west by Gerard Avenue, followed by Highway 87. A Site Plan is shown in Figure 2.

The Site is located within a light manufacturing and residential zoning area (M1-4/R6A) and within a Special Mixed Use District (MX-13). The Site is located in an urban area surrounded by commercial and industrial properties served by municipal water. Surrounding land uses are depicted on Figure 3.

The subject property has been assigned an environmental E-Designation (E-227) for hazardous materials and air quality. As determined during the Lower Concourse Rezoning and Related Actions completed by the New York City Department of City Planning in June 2009 (City Environmental Quality Review [CEQR] No. 08DCP071X), the air quality restrictions associated with new development at this Site include the requirement that the HVAC use natural gas, or if the building is using fuel oil, the exhaust stack must be 18 feet (ft) from Block 2344 Lot 83 with a height of 70 ft. BH Walton LLC does not have approved redevelopment plans at this time; however, they are currently planning to develop a residential building.

1.1 PURPOSE

The objective of the Remedial Investigation (RI) is to characterize the nature and extent of environmental impacts at the Site and to provide sufficient information to evaluate remedial alternatives, as required. Based on the former use of the Site and previous investigations conducted, petroleum-related volatile organic compounds (VOCs), chlorinated volatile organic compounds (CVOCs), polychlorinated biphenyls (PCBs), pesticides, heavy metals, and 1,4-dioxane are the anticipated contaminants of concern.

Previous investigations did not comprehensively characterize the nature and the extent of soil, groundwater, and soil vapor contamination on the Site. Specifically, there are vertical and lateral data gaps that require additional sample collection. An RI will be performed upon approval of this RIWP. Results of the additional sample analyses will be used to confirm the results of the previous Site characterization activities, delineate any on-Site source(s), and determine a course for remedial action.

[2]Former Lot 75 was reapportioned into two lots (Lots 74 and 75) with a deed recorded on September 16, 2025, and changed as of December 3, 2025.

2. Background

2.1 CURRENT LAND USE

The Site is currently an undeveloped parking lot.

2.2 SITE HISTORY

Based on a Phase I Environmental Site Assessment (ESA) completed by NOVA Geophysical Engineering Subsurface Mapping Solutions (NOVA) for the Site in May 2022, the Site was first developed as early as 1908 with a four-story manufacturing/industrial building. Throughout the 20th century, Sanborn Fire Insurance Company Maps and City Directories showed the property and surrounding area in commercial, industrial, and manufacturing use, including nearby lumber yards, warehouses, garages, and, later, an automobile servicing facility on the adjacent eastern property. These long-term industrial/manufacturing uses of the Site and nearby parcels were identified as recognized environmental conditions (RECs) due to the potential for historical releases of hazardous substances or petroleum products.

Regulatory review shows the property is an E-Designated site (E-227), which requires hazardous materials Phase I and Phase II testing protocols, restrictions on HVAC fuel type (No. 2 or No. 4 fuel oil or natural gas), and exhaust stack location limitations, to be implemented under New York City Department of Environmental Protection (NYCDEP) and New York City Office of Environmental Remediation (NYCOER) oversight before any building permit is issued. The east adjacent lot is also listed with an in-service 3,500-gallon No. 2 fuel oil aboveground storage tank (AST). Numerous off-Site listings for spills, leaking tanks, Brownfields, and other regulated facilities were identified within the search radius, but these were generally concluded not to represent RECs for the property based on distance, elevation, regulatory status, and presumed groundwater flow direction.

2.3 SURROUNDING LAND USE

The Site is located within a mixed industrial/commercial and residential area of the Mott Haven neighborhood of the Bronx, New York, characterized by low-rise commercial buildings, warehouses, and educational institutions. There are two sensitive receptors within a 500-ft radius of the Site as listed below:

- Community School for Social Justice – 350 Gerard Avenue between E 140th and E 144th Street, Bronx, New York 10451, listed as an educational high school
- Family Life Academy Charter School III -- 370 Gerard Avenue between E 140th and E 144th Street, Bronx, New York 10451, listed as an educational charter school

Properties immediately surrounding the Site are zoned for mixed industrial, manufacturing, and residential use. A surrounding land use map is included as Figure 3.

2.4 SURROUNDING LAND USE HISTORY

The area surrounding the Site has been used primarily for industrial, manufacturing, and residential uses from the early 1900s to the present day. From 1977 to 2007, the east adjacent property operated as a two-story automobile service station.

2.5 PREVIOUS INVESTIGATIONS

The following previous investigations and reports were prepared for the Site and are included in the BCP Application:

- *Phase I Environmental Site Assessment,* prepared by NOVA Geophysical Engineering Subsurface Mapping Solutions, prepared for Mr. Joseph Mauskopf, May 23, 2022.
- *Limited Phase II Environmental Site Investigation Report,* prepared by Brussee Environmental Corp., prepared for Shimon Greenfeld SG NY Capital, December 2025.

A summary of the environmental findings of these investigations is provided below.

***Phase I Environmental Site Assessment,* prepared by NOVA Geophysical Engineering Subsurface Mapping Solutions, prepared for Mr. Joseph Mauskopf, May 23, 2022.**

A Phase I ESA was conducted for the Site by NOVA in May 2022. At the time of the Phase I ESA Site reconnaissance in March 2022, the building was owned by Ben Gomo Realty Inc., Benny Gomolinski. NOVA indicated the following REC associated with the Site:

> *REC #1: Historical Use of the site and surrounding area for manufacturing/industrial use*
>
> *The subject property was listed as a manufacturing/industrial building as early as 1908. The east adjacent property operated as automobile servicing between 1977 and 2007. The adjacent properties include manufacturing and industrial uses which are considered a REC.*

***Limited Phase II Environmental Site Investigation Report,* prepared by Brussee Environmental Corp., prepared for Shimon Greenfeld SG NY Capital, December 2025.**

Brussee Environmental Corp. performed a Limited Phase II Environmental Site Investigation (ESI) at the subject property in September and November 2025. The investigation included (i) a Site inspection to identify Areas of Concern (AOCs) and physical obstructions; (ii) the installation of five soil borings (SB1 through SB5) across the Site and the collection of 10 soil samples and one duplicate for chemical analysis; (iii) the installation of three groundwater monitoring wells (MW1 through MW3) across the Site and the collection of three groundwater samples and one duplicate for chemical analysis; and (iv) the installation of five soil vapor implants (SV1 through SV5) across the Site and the collection of five soil vapor samples for chemical analysis.

Field observations and laboratory analytical results are summarized below. Analytical results are also presented on Figures 5, 6, and 7.

- The elevation of the Site is approximately 28 ft above mean sea level. Bedrock was encountered at 9 to 12 ft below ground surface (bgs), and groundwater was encountered within bedrock at depths ranging from 11 to 32 ft bgs. Groundwater flow direction was reported from east to west. The stratigraphy of the Site, from the surface down, consists of historic fill (black/brown silty sand with gravel, brick, and concrete) up to 12 ft below grade underlain by bedrock.
- Soil analytical results were compared to New York State Department of Environmental Conservation (NYSDEC) Title 6 of the New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs) and Restricted-Residential Soil Cleanup Objectives (RRSCOs). Results are summarized as follows:
  - The VOCs acetone (at 340 micrograms per kilogram [µg/kg] in SB2 (7-9)), cis-1,2-Dichloroethene (maximum [max.] of 770 µg/kg), tetrachloroethene (PCE; max. of 54,000 µg/kg), trans-1,2-Dichloroethene (at 750 µg/kg in SB2 (7-9)), and trichloroethene (TCE; max. of 1,100 µg/kg), were detected above UUSCOs. Of these VOCs, PCE was also detected above RRSCOs. No other VOCs were detected above their UUSCOs within any of the other soil samples.
  - Seven semi-volatile organic compounds (SVOCs), including benz(a)anthracene (max. of 37,000 µg/kg), benzo(a)pyrene (max. of 33,000 µg/kg), benzo(b)fluoranthene (max. of 53,000 µg/kg), benzo(k)fluoranthene (max. of 14,000 µg/kg), chrysene (max. of 30,000 µg/kg), dibenz(a,h)anthracene (max. of 5,200 µg/kg), and indeno(1,2,3-cd)pyrene (max. of 23,000 µg/kg) were detected above their RRSCOs.
  - The PCBs PCB-1254 (max. of 130 µg/kg) and PCB-1260 (max. of 190 µg/kg) were detected above UUSCOs in several soil samples. No other PCBs were detected within any of the other soil samples collected.
  - Three pesticides, including 4,4'-DDD (max. of 19 µg/kg), 4,4'-DDE (max. of 17 µg/kg), and 4,4'-DDT (max. of 42 µg/kg) were detected above UUSCOs in three or more soil samples collected across the Site;
  - Nine Target Analyte List (TAL) metals, including arsenic (max. of 21.7 milligrams per kilogram [mg/kg]), barium (max. of 1,740 mg/kg), cadmium (max. of 71.3 mg/kg), copper (max. of 20,300 mg/kg), lead (max. of 2,710 mg/kg), mercury (max. of 0.976 mg/kg), nickel (max. of 1,110 mg/kg), silver (max. of 128 mg/kg), and zinc (max. of 15,200 mg/kg), were detected at concentrations exceeding their UUSCOs within one or more soil samples collected across the Site. Of these metals, arsenic, barium, cadmium, copper, lead, mercury, nickel, and zinc were also detected above RRSCOs in several samples;
  - No per- and polyfluoroalkyl substances (PFAS) compounds were detected within the soil sample retained for analysis.
- Soil vapor results collected during the RI were compared to the compounds listed in Table 3.1 Air Guidance Values derived by the New York State Department of Health (NYSDOH), located in the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion, dated October 2006, and the revised NYSDOH Decision Matrices dated May 2017 and February 2024.
  - The soil vapor results indicated low to high levels of benzene, toluene, ethylbenzene, and xylenes (BTEX) and CVOCs.

  - The total concentration of BTEX ranged from 97.42 micrograms per cubic meter (µg/m³) to 152.2 µg/m³.
  - The total concentration of CVOCs ranged from 89.75 µg/m³ to 17,042.75 µg/m³ in SV3.
  - CVOC detections included PCE (ranging from 85.4 µg/m³ to 16,700 µg/m³), TCE (ranging from 1.02 µg/m³ to 319 µg/m³), cis-1,2-Dichloroethene (ranging from 14.6 µg/m³ to 22.4 µg/m³), 1,1-Dichloroethene (at 2.04 µg/m³ in SV5), and carbon tetrachloride (ranging from 1.35 µg/m³ to 4.72 µg/m³). The CVOCs 1,1,1-Trichloroethane, methylene chloride, and vinyl chloride were not detected within any of the soil vapor samples.
  - PCE and TCE were detected above the monitoring level range established within the NYSDOH soil vapor guidance matrix.
- Groundwater results were compared to 6 NYCRR Part 703.5 Class GA Ambient Water Quality Standards (AWQS). Results are summarized below:
  - The VOCs cis-1,2-Dichloroethene (max. of 7.2 micrograms per liter [µg/L]), PCE (max. of 38 µg/L), and TCE (max. of 12 µg/L) were detected above AWQS within one or more groundwater samples.
  - The SVOCs benzo(a)anthracene (max. of 0.08 µg/L), benzo(a)pyrene (at of 0.07 µg/L in MW1), benzo(b)fluoranthene (at 0.06 µg/L in MW1), benzo(k)fluoranthene (at 0.06 µg/L in MW1), chrysene (max. of 0.07 µg/L), and indeno(1,2,3-cd)pyrene (at 0.05 µg/L in MW1) were detected above AWQS within one or more groundwater samples.
  - No pesticides or PCBs were detected above AWQS within the groundwater or duplicate sample.
  - The dissolved metals magnesium (max. of 80.9 milligrams per liter [mg/L]), manganese (at 1.15 mg/L in MW3), and sodium (max. of 231 mg/L) were detected at concentrations above AWQS in one or more monitoring wells.
  - No PFAS compounds were detected above their respective U.S. Environmental Protection Agency (EPA) Guidance Values within the soil sample retained for analysis.
  - 1,4-dioxane was detected at 2.2 nanograms per liter (ng/L) in MW2 and 3.5 ng/L in MW3.

3. Remedial Investigation

This section describes the field activities to be conducted during the RI and provides the sampling scope, objectives, methods, anticipated number of samples, and sample locations. A summary of the sampling and analysis plan is provided in Table 1, and proposed sample locations are shown on Figure 4. The following activities will be conducted to fill data gaps and determine the nature and extent of contamination at the Site.

3.1 UTILITY MARKOUT

A previous ground-penetrating radar (GPR) survey was completed to facilitate access to previous investigation locations; however, another Site-wide GPR survey will be performed prior to the commencement of any ground-intrusive activities. The GPR scan will potentially identify any underground structures, including, but not limited to, utilities and underground storage tanks (USTs), in preparation for the proposed sampling work. It is noted that borings may be adjusted based on the results of the GPR scan, and any adjustments to the locations presented below will be communicated to NYSDEC. Field personnel will mobilize to the Site to mark out (with flagging or paint) the proposed soil sample locations. Prior to mobilization, 811-Dig Safe New York will be contacted to mark public underground utilities. If necessary, the adjacent property owners and/or private vendors will be contacted for assistance with marking out of utilities. Once the utilities are marked, field equipment and personnel will be mobilized to the Site.

3.2 SOIL SAMPLING

To further characterize soil conditions, additional on-Site soil samples will be collected to meet NYSDEC Division of Environmental Remediation (DER)-10 requirements for RIs.

As part of this RI, a total of nine soil borings will be installed to the bedrock or groundwater interface, whichever is encountered shallower[3]. Borings will be by a track-mounted direct-push drill rig (Geoprobe®), or other drilling technology as needed, operated by a licensed operator. Soil samples will be collected from dedicated liners using stainless-steel macrocores, casings, or sampling spoons. Samples will be collected using laboratory-provided clean bottle ware. VOC grab samples will be collected using terra cores or encores.

Soils will be logged continuously by a geologist or engineer using the Modified Burmister Soil Classification System. The presence of staining, odors, and photoionization detector (PID) readings will be noted. Sampling methods are described in the Field Sampling Plan (FSP) provided in Appendix A. A Quality Assurance Project Plan (QAPP) is provided in Appendix B. Laboratory data will be reported in Analytical Services Protocols (ASP) Category B deliverable format.

Soil samples representative of Site conditions will be collected at nine locations widely distributed across the Site, as shown on Figure 4. Up to three grab samples will be collected from each soil boring. One surface sample will be collected from the top 0 to 2 ft immediately beneath the impervious Site cover

[3] Groundwater was previously encountered in bedrock from 11 to 32 ft bgs.

(i.e., surface soils). A second sample will be collected at an intermediate depth (within the last 2 ft of the fill layer, estimated at 7 to 9 ft bgs, but subject to field observation). A third sample will be collected from the 2-ft interval above the groundwater interface; however, if groundwater is encountered below bedrock, the third sample will be collected from the 2-ft interval above bedrock or weathered bedrock. If evidence of contamination is observed (staining, odors, or elevated PID readings), additional soil samples will be collected from the contaminated interval. If the contaminated interval is the deepest sample at the soil boring, then a soil sample will be collected at the next interval where there is no evidence of contamination in order to delineate the vertical extent of contamination. The number of samples collected during the RI may vary based on field conditions.

Soil samples will be analyzed for:

- Target Compound List (TCL) VOCs using EPA Method 8260B;
- TCL SVOCs using EPA Method 8270C;
- TAL metals using EPA Method 6010;
- PCBs using EPA Method 8082;
- TCL pesticides using EPA Method 8081B;
- PFAS using EPA Method 1633A; and
- 1,4-dioxane using EPA Method 8270.

Samples to be analyzed for PFAS will be collected and analyzed in accordance with the NYSDEC-issued April 2023 "Sampling, Analysis, and Assessment of PFAS Under NYSDEC's Part 375 Remedial Programs." As needed, additional samples may be collected to satisfy waste characterization analytical needs for facilities located in neighboring states.

3.3 GROUNDWATER SAMPLING

The purpose of the groundwater sampling is to obtain current groundwater data and analyze for additional parameters (i.e., PFAS and 1,4-dioxane) to meet NYSDEC DER-10 requirements for RIs. Groundwater is presumed to flow east to west.

Six 2-inch permanent monitoring wells will be installed at least 5 ft below the groundwater interface. Monitoring wells will be installed with a solid 2-inch polyvinyl chloride (PVC) riser and PVC with a 20-slot screen for the screened interval. Wells will be screened to straddle the groundwater table. The screen pack will consist of No. 0 certified clean sand filled to a depth of 2 ft above the screen. A bentonite seal will be placed above the sand pack for each monitoring well, and the remainder of the borehole will be filled with bentonite grout. Each monitoring well will be completed using a flush-mount well cover. Monitoring wells will have the appropriate 2-inch annular space and will be installed according to NYSDEC guidelines.

Previous investigations have identified groundwater within bedrock at depths ranging from 11 to 32 ft bgs. If groundwater is not observed in the overburden, bedrock groundwater monitoring wells will be installed. Bedrock groundwater monitoring wells will be installed in accordance with industry standards and will include steel casing keyed into competent bedrock. The bedrock groundwater monitoring wells will be sealed to prevent cross-contamination between the overburden and bedrock groundwater. Below the steel casing, the bedrock groundwater monitoring wells will be open-borehole wells. At each potential bedrock groundwater monitoring well location, a boring will be advanced while collecting bedrock cores and immediately logged for geophysical analysis. Observations will be communicated with NYSDEC daily in field reports, further detailed in Section 9.1.

Monitoring wells will be developed by surging a pump in the well several times to pull fine-grained material from the well. Development will be completed until the water turbidity is 50 nephelometric turbidity units or less, or 10 well volumes are removed, if possible. Generated development water will be containerized and handled as investigation-derived waste (IDW). Groundwater sampling will occur at a minimum of one week after monitoring well development. The well casings will be surveyed by a New York State-licensed surveyor and gauged during a round of synoptic groundwater depth readings to facilitate the preparation of a groundwater contour map and to determine the direction of groundwater flow. Due to the Site’s location and elevation (approximately 28 ft above mean sea level), Site groundwater is not anticipated to be influenced by tides.

The sampling and analysis plan is summarized in Table 1. Proposed monitoring well locations are provided on Figure 4. Proposed locations will be dependent on field observation and will be communicated with NYSDEC in daily reporting.

Monitoring wells will be sampled and analyzed for:

- TCL VOCs using EPA Method 8260B;
- TCL SVOCs using EPA Method 8270C;
- Total metals using EPA Methods 6010/7471;
- Dissolved metals using EPA Methods 6010/7471;
- PCBs using EPA Method 8082;
- TCL pesticides using EPA Method 8081B;
- PFAS using EPA Method 1633A; and
- 1,4-dioxane using EPA Method 8270 Selective Ion Monitoring.

Samples to be analyzed for PFAS will be collected and analyzed in accordance with the NYSDEC-issued April 2023 “Sampling, Analysis and Assessment of PFAS Under NYSDEC’s Part 375 Remedial Programs.”

Groundwater wells will be sampled using low-flow sampling methods as described in the FSP. Following the low-flow purge, samples will be collected from monitoring wells for analysis of the analytes mentioned above. Groundwater sampling will be conducted at least one week after monitoring well development.

The FSP presented in Appendix A details field procedures and protocols that will be followed during field activities. The QAPP presented in Appendix B details the analytical methods and procedures that will be used to analyze samples collected during field activities. Monitoring wells sampled for PFAS will be done following the purge and sampling method detailed in the NYSDEC guidance documents (see Appendix C).

3.4 GEOPHYSICAL BEDROCK SURVEY

As a contingency, if groundwater is not observed in the overburden and bedrock groundwater wells need to be installed, borehole geophysical methods will be used to further understand bedrock characteristics and to determine installation depths for the monitoring wells. The objective of the contingent geophysical bedrock survey is to map and characterize the subsurface bedrock and structural features and evaluate the potential for vertical migration of contaminants. The depth, orientation, distribution, transmissivity, and classifications of fractures will be evaluated along with the depths and flow rates of water ingress and egress. The survey will also determine if there are any correlations and communications between fractures and will provide a summary of ambient and pumping flow conditions. This information will help determine the feasibility of future groundwater treatment.

If needed, Haley & Aldrich of New York will contract Hager-Richter to conduct the geophysical survey. Hager-Richter is one of the largest geophysical specialty firms in the Eastern United States and has been in business for over 40 years. Their staff have significant borehole geophysical logging experience to characterize fracturing in boreholes and are local, with extensive regional experience.

Borehole geophysical logging will include the following parameters:

- Fluid temperature;
- Fluid conductivity/resistivity;
- Optical televiewer (OTV);
- Acoustic televiewer (ATV) and caliper;
- Heat pulse flowmeter (HPFM) under ambient conditions;
- HPFM under pumping conditions;
- Natural gamma; and
- Spontaneous potential.

HPFM data will be acquired at discrete depth intervals, based on an in-field review of the preceding geophysical data. The HPFM data will provide information regarding the vertical flow rate and direction of groundwater flow in order to determine the depths where groundwater flows into and out of the borehole. Data will be processed by the geophysical contractor, and the report deliverable will include geophysical logs for each borehole, tables with the depths and orientation of bedrock structures, and statistical plots of the orientations of bedrock structures. Statistical plots are expected to include stereograms (lower hemisphere) of bedrock fractures and bedding features, dip azimuth rose diagrams of bedrock fractures and bedding planes, and dip angle histograms of bedrock fractures and bedding planes.

We anticipate that a Mount Sopris (or equivalent) HPFM will be used for the investigation. The HPFM probe is calibrated for a measuring range of 0.03 to 1.0 gallons per minute (gal/min) but can detect flow as low as 0.01 gal/min. Vertical groundwater flow up and down the borehole will be reported. During HPFM logging, periodic groundwater level measurements will be collected from surrounding boreholes and accessible wells.

Newly installed boreholes will be immediately logged for geophysical analysis following installation and digitized and evaluated in WellCAD. Bedrock monitoring wells will generally be installed as described above in Section 3.3. However, based on core observations and downhole testing, the installation depths may be adjusted to better investigate open flow zones.

Borehole geophysical data will be provided to the NYSDEC within 24 hours and included in the Daily Field Report.

3.5 INVESTIGATION-DERIVED WASTE

Following sample collection, boreholes that are not converted to monitoring wells will be backfilled with soil cuttings and an upper bentonite plug. Boreholes will be restored to grade with the surrounding area. If soil is identified as grossly contaminated, it will be separated and placed into a sealed and labeled New York State Department of Transportation (NYSDOT)-approved 55-gallon drum pending characterization and off-Site disposal. Groundwater purged from the monitoring wells during development and sample collection will be placed into a NYSDOT-approved 55-gallon drum pending off-Site disposal.

3.6 SOIL VAPOR SAMPLING

Samples will be collected in accordance with the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, October 2006). Six soil vapor points will be installed to 2 ft above the groundwater interface, or, if groundwater is encountered below bedrock, the soil vapor points will be installed 2 ft above bedrock or weathered bedrock. The vapor implants will be installed with a direct-push drilling rig (e.g., Geoprobe®) to advance a stainless-steel probe to the desired sample depth. Sampling will occur for the duration of two hours.

Soil vapor samples will be collected in appropriately sized SUMMA® canisters that have been certified clean by the laboratory, and samples will be analyzed for VOCs using EPA Method TO-15. Flow rates for both purging and sampling will not exceed 0.2 liters per minute. Sampling methods are described in the FSP provided in Appendix A.

3.7 PROPOSED SAMPLING RATIONALE

Haley & Aldrich of New York has proposed the sampling plan described herein, and as shown on Figure 3, in consideration of observations reported during the May 2022 Phase I ESA by NOVA and the December 2025 Limited Phase II ESI report by Brussee Environmental Corp, as discussed in Section 2.5.

During the previous investigations conducted at the Site, soil, soil vapor, and groundwater samples were collected. The sample map from the previous investigations shows data gaps in both the vertical and lateral profiles. In addition, not all soil samples were analyzed for the full suite analysis and lacked results for 1,4-dioxane and PFAS. Soil vapor points were installed at 5 ft bgs, a proposed development depth, instead of at the groundwater or bedrock interface.

Proposed sampling locations will include groundwater, soil, and soil vapor sampling to address data gaps, ascertain and delineate on-Site source(s), and refine the findings of the previous investigations conducted at the Site. The proposed RI will characterize the nature and extent of contamination while evaluating if there is an on-Site source of contamination or a potential off-Site source migrating onto the Site.

The Proposed Sample Location Map (included on Figure 4) is designed to generate sufficient data to identify the source of contamination, classify subsurface conditions throughout the Site as a whole, with a particular focus on sample locations in areas of the Site that have historically revealed evidence of contamination, and to be the basis for a future remedy design.

4. Green and Sustainable Remediation and Climate Resiliency

The work completed as part of this RIWP will comply with all NYSDEC guidance documents, including DER-31: Green Remediation (NYSDEC, 2011). To ensure compliance with DER-31, the work will be completed using the best practices and techniques described below. Specific reporting methods relative to DER-31 are further described below.

4.1 BEST PRACTICES AND TECHNIQUES

DER-31 provides examples of best practices and techniques that could be applied during all phases of remediation (Attachment 1 of the DER-31 policy). In addition, the techniques identified below will be implemented at sites unless a Site-specific evaluation demonstrates impracticability or favors an alternative green approach:

Practice/Technique	Potential Benefits[1]	Applicable to this Work Plan
Use renewable energy where possible or purchase Renewable Energy Credits	Reduce/supplement purchased energy use	
Use of remediation technologies with an intermittent energy supply (i.e., energy use during peak energy generation only)	Reduce energy use	X
Incorporate green building design	Reduce future use impacts	
Reuse existing buildings and infrastructure to reduce waste	Reduce waste and material use	
Reuse and recycle construction and demolition debris and other materials (i.e., grind waste wood and other organics for on-site use)	Reduce waste and material use	
Design cover systems to be usable (i.e., habitat or recreation)	Reduce construction impacts of future development	
Reduce vehicle idling	Reduce air emissions and fuel use	X
Use of Low-Sulfur Diesel Fuel or alternate fuels (i.e., biodiesel or E85) when possible	Reduce air emissions	
Sequence work to minimize double-handling of materials	Reduce construction impacts	X
Use energy-efficient systems and office equipment in the job trailer	Reduce energy use	X
[1]*Potential benefits listed are not comprehensive and will vary depending upon the site and implementation of the practice or technique.*		

In order to comply with the requirements of DER-31, the following actions will be taken:

1. All vehicles and fuel-consuming equipment on the Site will be shut off if not in use for more than three minutes;
2. Work will be sequenced, to the extent practicable, to allow the direct loading of waste containers for off-Site disposal;
3. Work will be sequenced, to the extent practicable, to limit unnecessary mobilizations to and throughout the Site; and,
4. To the extent practicable, energy-efficient systems and office equipment will be utilized.

4.2 REPORTING

All green and sustainable practices and techniques employed will be discussed in the forthcoming Remedial Investigation Report (RIR).

4.3 CLIMATE RESILIENCY EVALUATION

The Site is not located within a 100-year flood zone. The development plan is still under design but will incorporate consideration for resiliency to climate change, including the design of a cover system that will mimic, rather than alter, the current setting in the vicinity of the Site and will provide pathways for surface runoff and resiliency against future flooding events. A Climate Screening Checklist is provided in Appendix D.

4.4 ENVIRONMENTAL FOOTPRINT ANALYSIS

While the remedy plan is still under development and is dependent on findings from implementing this investigation, a preliminary analysis has been performed using SiteWise™ for the investigation and baseline conceptual remedy. The conceptual remedy components included in this analysis include excavation, along with the installation of a composite cover as an engineering control. Further refinements to the remedy, including additional engineering controls, will be incorporated into the alternatives analysis as part of a forthcoming Remedial Action Work Plan (RAWP). Results of the preliminary analysis, available in Appendix E, indicate that the majority of greenhouse gas emissions, potentially exceeding 2,000 metric tons, would be the product of consumables and transportation associated with the conceptual remedy.

5. Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) procedures will be used to provide performance information with regard to the accuracy, precision, sensitivity, representation, completeness, and comparability associated with the sampling and analysis for this investigation. Field QA/QC procedures will be used (1) to document that samples are representative of actual conditions at the Site and (2) to identify possible cross-contamination from field activities or sample transit. Laboratory QA/QC procedures and analyses will be used to demonstrate whether analytical results have been biased either by interfering compounds in the sample matrix or by laboratory techniques that may have introduced systematic or random errors to the analytical process.

QA/QC procedures are defined in the QAPP included in Appendix B.

6. Data Use

6.1 DATA SUBMITTAL

Analytical data will be supplied in ASP Category B Data Packages. If more stringent than those suggested by the EPA, the laboratory's in-house QA/QC limits will be utilized. Validated data will be submitted to the NYSDEC EQuIS database in an electronic data deliverable package.

6.2 DATA VALIDATION

Data packages will be sent to a qualified data validation specialist to evaluate the accuracy and precision of the analytical results. A Data Usability Summary Report (DUSR) will be created to confirm the compliance of methods with the protocols described in the NYSDEC ASP. DUSRs will summarize and confirm the usability of the data for project-related decisions. Data validation will be completed in accordance with the DUSR guidelines from the NYSDEC DER. DUSRs will be included with the submittal of an RIR, further discussed in Section 9.2. Additional details on the DUSRs are provided in the QAPP in Appendix B.

7. Project Organization

A project team for the Site has been created, based on qualifications and experience, with personnel suited for the successful completion of the project.

The NYSDEC-designated Case Manager, **PENDING**, will be responsible for overseeing the successful completion of the project work and adherence to the work plan on behalf of NYSDEC.

The NYSDOH-designated Case Manager, **PENDING**, will be responsible for overseeing the successful completion of the project work and adherence to the work plan on behalf of NYSDOH.

Mari C. Conlon will be the Qualified Environmental Professional and Principal-in-Charge for this work. In this role, Ms. Conlon will be responsible for the overall completion of each task as per the requirements outlined in this RIWP and in accordance with the DER-10 guidance.

Emily Butler will be the Project Manager for this work. In this role, Ms. Butler will manage the day-to-day tasks, including coordination and supervision of field engineers and scientists, adherence to the RIWP, and oversight of the project schedule. As the Project Manager, Ms. Butler will also be responsible for communications with the NYSDEC Case Manager regarding project status, schedule, issues, and updates for project work.

Michael Boland will be the Assistant Project Manager and field team leader for this work and will also act as the Quality Assurance Officer (QAO). The QAO will ensure the application and effectiveness of the QAPP by the analytical laboratory and the project staff, provide input to the field team as to corrective actions that may be required as a result of the above-mentioned evaluations, and prepare and/or review data validation and audit reports.

Zavier Richards will be the field person responsible for implementing the field effort for this work. Mr. Richards' responsibilities will include implementing the RIWP activities and directing the subcontractors to ensure the successful completion of all field activities.

The drilling subcontractor will be Coastal Environmental Solutions, Inc. or Lakewood Environmental. In this role, Coastal Environmental Solutions, Inc. or Lakewood Environmental will provide environmental drilling to implement the scope of work outlined in this RIWP.

The geophysical survey contractor will be Ground Penetrating Radar Systems, LLC (GPRS). In this role, GPRS will conduct a geophysical survey throughout all accessible regions of the Site prior to the performance of ground-intrusive work.

The analytical laboratory will be Alpha Analytical Laboratories, Inc. (Alpha) of Westborough, Massachusetts, a New York Environmental Laboratory Approval Program-certified laboratory (No. 11148). Alpha will be responsible for analyzing samples as per the analyses and methods identified in Section 2.

8. Health and Safety

8.1 HEALTH AND SAFETY PLAN

A Site-specific Health and Safety Plan (HASP) has been prepared in accordance with NYSDEC and NYSDOH guidelines and is provided in Appendix F. The HASP includes a description of health and safety protocols to be followed by Haley & Aldrich of New York field staff during implementation of the RIWP, including monitoring within the work area, along with response actions should impacts be observed. The HASP has been developed in accordance with the Occupational Safety and Health Administration (OSHA) Title 40 Code of Federal Regulations Part 1910.120 regulatory requirements for use by Haley & Aldrich of New York field staff who will work at the Site during planned activities. Contractors or other personnel who perform work at the Site are required to develop their own HASP and procedures of comparable or higher content for their respective personnel in accordance with relevant OSHA regulatory requirements for work at hazardous waste sites, as well as the general industry requirements as applicable based on the nature of work being performed.

8.2 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) will require real-time monitoring for particulates (i.e., dust) and VOCs at one location upwind of the work area/exclusion zone and one location downwind of the work area/exclusion zone. The proposed investigation work may be completed both indoors and outdoors. The CAMP will be implemented during all intrusive activities and the handling of contaminated or potentially contaminated media to protect downwind receptors. Background readings will be collected at each station prior to intrusive activities each day. Ground-intrusive activities include, but are not limited to, drilling, excavation, stockpiling, equipment idling, transport, etc.

A Haley & Aldrich of New York representative will continually monitor the breathing air in the vicinity of the immediate work area using a PID to measure total VOCs in the air at concentrations as low as 1 part per million (ppm). CAMP will be performed using appropriate equipment to monitor VOCs and particulate matter less than 10 micrometers in size (PM-10). The equipment will be furnished with an audible alarm activated on all field personnel’s mobile devices that notifies them when there is an exceedance of the action level. Particulate monitoring will be performed using real-time equipment capable of measuring PM-10 and integrating over a period of 15 minutes (or less) for comparison to the action level. In addition, fugitive dust migration will be visually assessed during all work activities. The equipment will be calibrated at least daily and will be capable of calculating 15-minute running average concentrations. Upwind background conditions will be evaluated prior to intrusive work and periodically throughout the day. The air in the work zone will also be monitored for visible dust generation.

If downwind VOC measurements above 5 ppm are sustained for 15 minutes or visible dust generation is observed, the intrusive work will be temporarily halted, and a more rigorous monitoring of VOCs and dust using recordable meters will be implemented in accordance with the NYSDOH Generic CAMP; CAMP data will be provided to NYSDEC in the daily reports, further detailed in Section 9.1. Exceedances of the action levels for VOCs or particulates will be reported to NYSDEC and NYSDOH within 24 hours of the occurrence, along with the reason for the exceedance and any mitigation completed to address as per this CAMP. The NYSDOH CAMP guidance document is included as Appendix G.

8.3 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

A comprehensive Qualitative Human Health Exposure Assessment (QHHEA) (on-Site and off-Site) will be performed following the collection of all RI data. The exposure assessment will be performed in accordance with Section 3.3(c)4 of DER-10 and the NYSDOH guidance for performing a Qualitative Exposure Assessment (DER-10; Appendix 3B). The results of the QHHEA will be provided in the RIR.

The Site, which was developed in 1908 and most recently operated as a parking lot, is located in the Mott Haven neighborhood of the Bronx, New York. The Site provides little or no wildlife habitat or food value and/or access to the detected subsurface contamination. The Harlem River is located approximately 590 ft (0.11 miles) west of the Site; the Major Deegan Expressway separates the Harlem River from the western boundary of the Site. The proposed future use of the Site is anticipated to consist of a new building, anticipated to encompass the entire Site footprint, with a full cellar level. As the Site is located within a half-mile of the Harlem River, based on the requirements stipulated in Section 3.10 and Appendix 3C of DER-10, a Fish and Wildlife Resource Impact Analysis (FWRIA) will be prepared and submitted with the Remedial Investigation Report (RIR) for the Site[4].

[4] Based on the understanding to date, the RIR will incorporate a Part 1 FWRIA.

9. Reporting

9.1 DAILY REPORTING

Daily reports will be submitted to the NYSDEC and NYSDOH summarizing the Site activities completed during the RI. Daily reports will include a Site figure, a description of Site activities, a photograph log, and a summary of community air monitoring performed. Daily reports will be submitted on the following calendar day after Site work is completed.

9.2 REMEDIAL INVESTIGATION REPORT

Following completion of the work, a summary of the RI will be provided to the NYSDEC in an RIR to support the implementation of the proposed remedial action. The report will include:

- A description of existing Site conditions;
- Summary of the RI activities;
- Figure showing sampling locations;
- Tables summarizing laboratory analytical results;
- Laboratory analytical data reports;
- DUSRs:
- Field sampling data sheets;
- Community air monitoring data;
- Daily reports;
- Findings regarding the nature and extent of contamination at the Site;
- Qualitative Exposure Assessment of any contamination from an on-Site source that has migrated off the Site; and
- Conclusions and recommendations.

The RIR will include all data collected during the RI and adhere to the technical requirements of DER-10.

10. Schedule

The Site owner plans to implement this RIWP promptly upon execution of a Brownfield Cleanup Agreement (BCA) and after approval of the RIWP. The below anticipated schedule highlights the BCP milestones anticipated for the Site.

Anticipated RI/BCP Schedule	
BCP Application, RIWP, and 30-Day Public Comment Period (Concurrent with BCP Application)	January 2026 to March 2026
Executed BCA	April 2026
NYSDEC Approval of RIWP and Citizen Participation Plan	May 2026
RI Implementation	June to July 2026
RIR/RAWP Submittal, NYSDEC Review and 45-Day Public Comment Period	August to October 2026
NYSDEC Approval of RIR/RAWP and Issuance of Decision Document	December 2026

References

1. Brownfield Cleanup Program Application. 120 East 40th Street Development. 120 East 140th Street (Formerly 301 Walton Avenue), Bronx, New York. Prepared by Haley & Aldrich of new York for submission to the New York State Department of Environmental Conservation. Submitted in January 2026.

2. Limited Phase II Environmental Site Investigation Report. *Limited Phase II Environmental Site Investigation Report,* prepared by Brussee Environmental Corp., prepared for Shimon Greenfeld SG NY Capital, December 2025.

3. New York State Department of Environmental Conservation, Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), revised April 2023.

4. Phase I Environmental Site Assessment. 150 Walton Street Block 2344 Lot 75, Bronx, New York. Prepared by NOVA prepared by NOVA Geophysical Engineering Subsurface Mapping Solutions, prepared for Mr. Joseph Mauskopf , May 23, 2022.

5. United States Environmental Protection Agency, Low Flow Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, EQASOP-GW 001, September 19, 2017.

6. Program Policy DER-10, "Technical Guidance for Site Investigation and Remediation," New York State Department of Environmental Conservation. May 2010.

7. New York State Department of Environmental Conservation, Part 375 of Title 6 of the New York Compilation of Codes, Rules, and Regulations, Effective December 14, 2006.

8. New York State Department of Health, Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006.

9. New York State Division of Water Technical and Operational Guidance Series (TOGS) (1.1.1) dated June 1998.

TABLE

TABLE 1
SAMPLING AND ANALYSIS PLAN
120 EAST 140TH STREET
BRONX, NEW YORK

Boring Number	Sample Depth	Units	Sample Rationale	Target Compound List VOCs (8260D/5035)	Target Compound List SVOCs (8270E)/(8270)	Total Analyte List Metals (6020D)/(6010)	PCBs (8082A)	Pesticides (8081B)	PFAS (1633)	1,4-Dioxane (8270)/(8270E-SIM)	Dissolved Target Analyte List Metals (6020)	VOCs (TO-15)
SOIL												
HA-B01	0-0.5'	bgs	0-0.5 ft interval immediately below slab	X	X	X	X	X	X	X		
	7-9'	bgs	Terminal 2 ft of fill layer	X	X	X	X	X	X	X		
	10-12'	bgs	2 ft above groundwater interface/bedrock	X	X	X	X	X	X	X		
HA-B02	0-0.5'	bgs	0-0.5 ft interval immediately below slab	X	X	X	X	X	X	X		
	7-9'	bgs	Terminal 2 ft of fill layer	X	X	X	X	X	X	X		
	10-12'	bgs	2 ft above groundwater interface/bedrock	X	X	X	X	X	X	X		
HA-B03	0-0.5'	bgs	0-0.5 ft interval immediately below slab	X	X	X	X	X	X	X		
	7-9'	bgs	Terminal 2 ft of fill layer	X	X	X	X	X	X	X		
	10-12'	bgs	2 ft above groundwater interface/bedrock	X	X	X	X	X	X	X		
HA-B04	0-0.5'	bgs	0-0.5 ft interval immediately below slab	X	X	X	X	X	X	X		
	7-9'	bgs	Terminal 2 ft of fill layer	X	X	X	X	X	X	X		
	10-12'	bgs	2 ft above groundwater interface/bedrock	X	X	X	X	X	X	X		
HA-B05	0-0.5'	bgs	0-0.5 ft interval immediately below slab	X	X	X	X	X	X	X		
	7-9'	bgs	Terminal 2 ft of fill layer	X	X	X	X	X	X	X		
	10-12'	bgs	2 ft above groundwater interface/bedrock	X	X	X	X	X	X	X		
HA-B06	0-0.5'	bgs	0-0.5 ft interval immediately below slab	X	X	X	X	X	X	X		
	7-9'	bgs	Terminal 2 ft of fill layer	X	X	X	X	X	X	X		
	10-12'	bgs	2 ft above groundwater interface/bedrock	X	X	X	X	X	X	X		
HA-B07	0-0.5'	bgs	0-0.5 ft interval immediately below slab	X	X	X	X	X	X	X		
	7-9'	bgs	Terminal 2 ft of fill layer	X	X	X	X	X	X	X		
	10-12'	bgs	2 ft above groundwater interface/bedrock	X	X	X	X	X	X	X		
HA-B08	0-0.5'	bgs	0-0.5 ft interval immediately below slab	X	X	X	X	X	X	X		
	7-9'	bgs	Terminal 2 ft of fill layer	X	X	X	X	X	X	X		
	10-12'	bgs	2 ft above groundwater interface/bedrock	X	X	X	X	X	X	X		
HA-B09	0-0.5'	bgs	0-0.5 ft interval immediately below slab	X	X	X	X	X	X	X		
	7-9'	bgs	Terminal 2 ft of fill layer	X	X	X	X	X	X	X		
	10-12'	bgs	2 ft above groundwater interface/bedrock	X	X	X	X	X	X	X		
GROUNDWATER												
HA-MW01	Straddle water table			X	X	X	X	X	X	X	X	
HA-MW02	Straddle water table			X	X	X	X	X	X	X	X	
HA-MW03	Straddle water table			X	X	X	X	X	X	X	X	
HA-MW04	Straddle water table			X	X	X	X	X	X	X	X	
HA-MW05	Straddle water table			X	X	X	X	X	X	X	X	
HA-MW06	Straddle water table			X	X	X	X	X	X	X	X	
SOIL VAPOR												
HA-SV01	38-40'	bgs	2 ft above groundwater interface									X
HA-SV02	38-40'	bgs	2 ft above groundwater interface									X
HA-SV03	38-40'	bgs	2 ft above groundwater interface									X
HA-SV04	38-40'	bgs	2 ft above groundwater interface									X
HA-SV05	38-40'	bgs	2 ft above groundwater interface									X
HA-SV06	38-40'	bgs	2 ft above groundwater interface									X

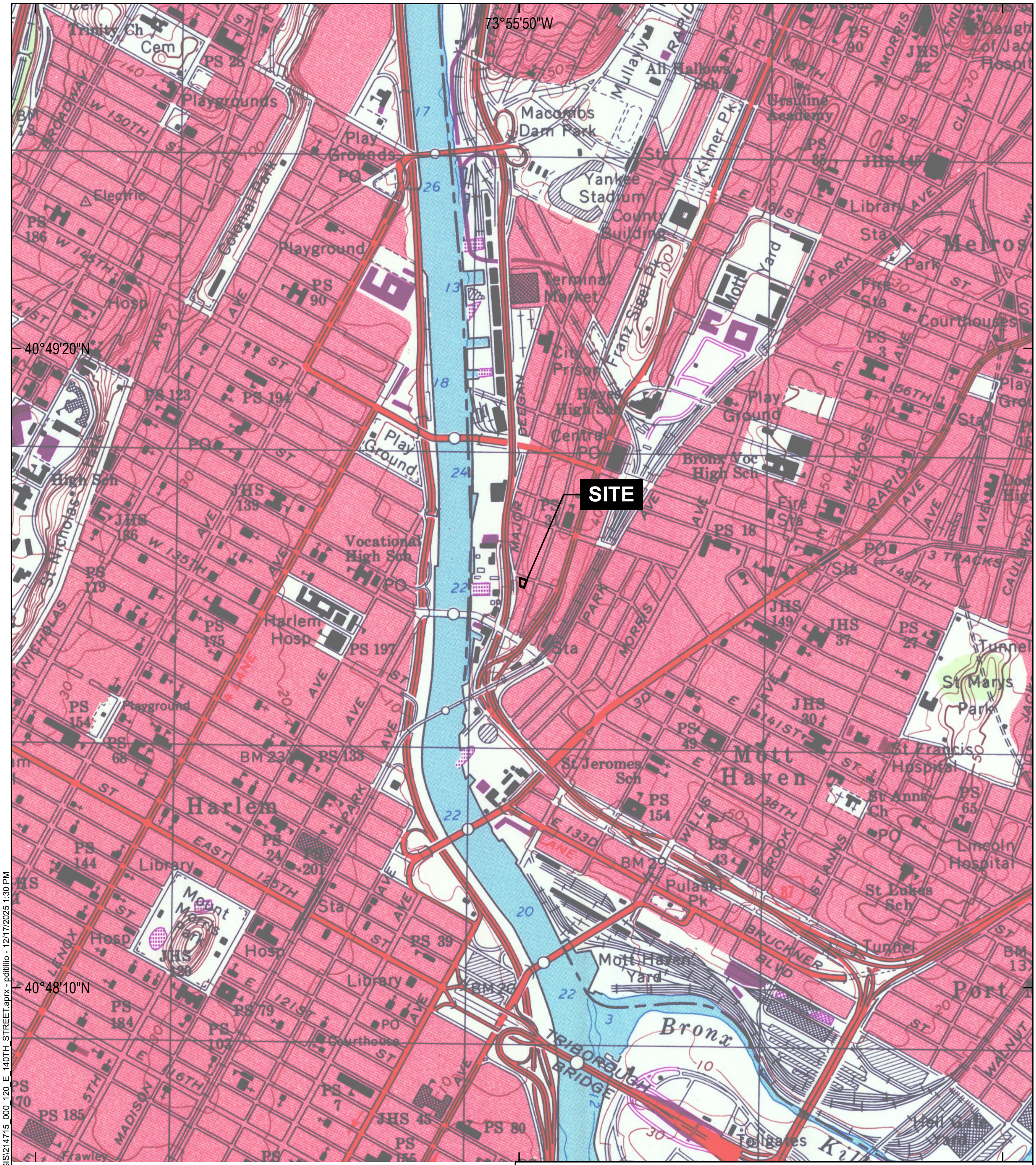
Notes:
VOCs - Volatile Organic Compounds
PCBs - Polychlorinated biphenyls
PFAS - Per- and Polyfluoroalkyl Substances
bgs - below grade surface
Samples to be collected at terminal 2 ft of fill layer are anticipated at 3 to 5 ft bgs however may be adjusted as determined by visual logging
Samples to be collected at 2 ft above the groundwater interface are anticipated at 38 to 40 ft bgs but may be adjusted as determined by groundwater depth encountered in the field

MS/MSD - 1 for every 20 samples
Field Blanks - 1 for every 20 samples
Duplicates - 1 for every 20 samples

Soil QA/QC Samples:
(2) MS/MSD
(2) Field Blanks
(1) Trip Blank per day

Groundwater QA/QC Samples:
(1) MS/MSD
(1) Field Blank
(1) Trip Blank per day

FIGURES



N

MAP SOURCE: USGS
SITE COORDINATES: 40°48'90"N, 73°55'81"W

HALEY ALDRICH

120 E 140TH STREET
BRONX, NEW YORK

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
DECEMBER 2025

FIGURE 1

GIS: \\haleyaldrich.com\share\CF\Projects\0214715\GIS\214715_000_120_E_140TH_STREET.aprx - pdtillio - 12/17/2025 1:30 PM

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LEGEND

SITE BOUNDARY

PARCEL BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ASSESSOR PARCEL DATA SOURCE: NEW YORK CITY DEPARTMENT OF FINANCE (DOF)
3. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 1, 2025

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0 20 40

SCALE IN FEET

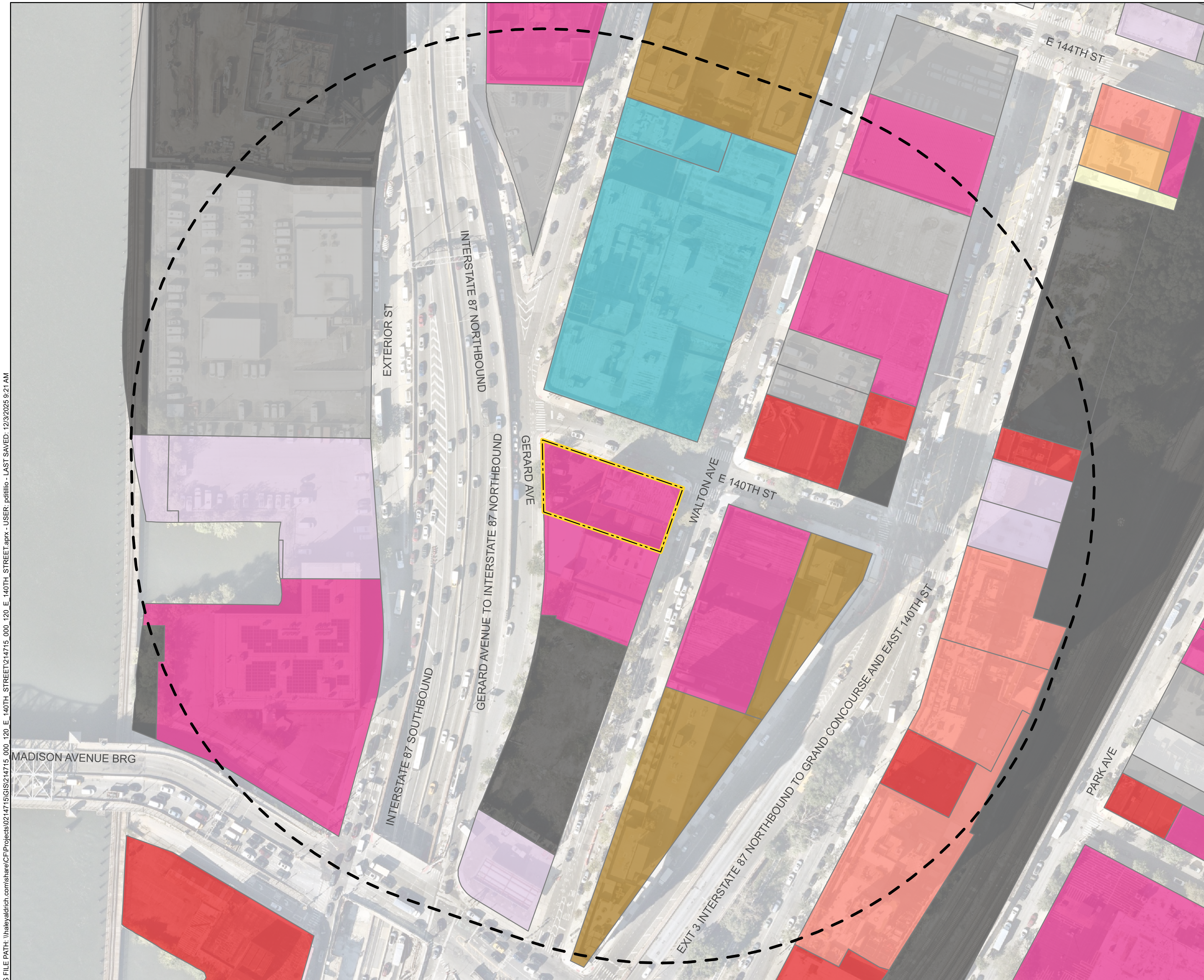
HALEY ALDRICH

120 E 140TH STREET
BRONX, NEW YORK

SITE PLAN

DECEMBER 2025

FIGURE 2



LEGEND

500-FT BUFFER OF SITE BOUNDARY

SITE BOUNDARY

PARCEL BOUNDARY

LAND USE CATEGORY

ONE AND TWO FAMILY BUILDINGS

MULTI-FAMILY WALK-UP BUILDINGS

MULTI-FAMILY ELEVATOR BUILDINGS

MIXED RESIDENTIAL AND COMMERCIAL BUILDINGS

COMMERCIAL AND OFFICE BUILDINGS

INDUSTRIAL AND MANUFACTURING BUILDINGS

TRANSPORTATION AND UTILITY

PUBLIC FACILITIES AND INSTITUTIONS

PARKING FACILITIES

VACANT LAND

OTHER

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ASSESSOR PARCEL DATA SOURCE: NYC DEPARTMENT OF CITY PLANNING, INFORMATION TECHNOLOGY DIVISION
3. LAND USE DATA SOURCE: NYC DEPARTMENT OF CITY PLANNING
4. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 1, 2025

HALEY ALDRICH

120 E 140TH STREET
BRONX, NEW YORK

SURROUNDING LAND USE

DECEMBER 2025

FIGURE 3

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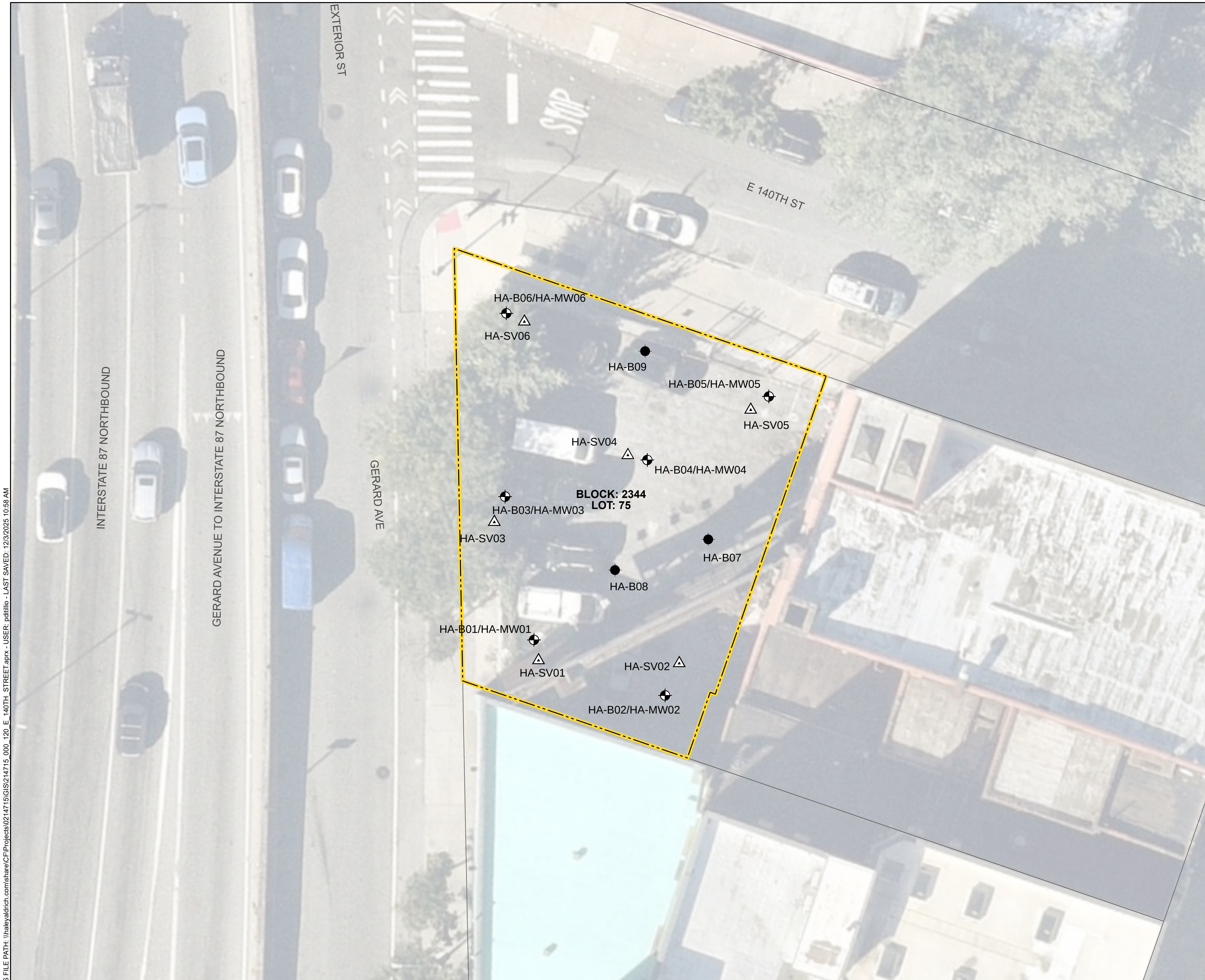

LEGEND

SITE BOUNDARY

PARCEL BOUNDARY

PROPOSED SOIL BORING

PROPOSED SOIL BORING AND MONITORING WELL

PROPOSED SOIL VAPOR SAMPLE

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ASSESSOR PARCEL DATA SOURCE: NEW YORK CITY DEPARTMENT OF FINANCE (DOF)
3. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 1, 2025

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0 20 40

SCALE IN FEET

HALEY ALDRICH

120 E 140TH STREET
BRONX, NEW YORK

PROPOSED SAMPLE LOCATION PLAN

JANUARY 2026

FIGURE 4

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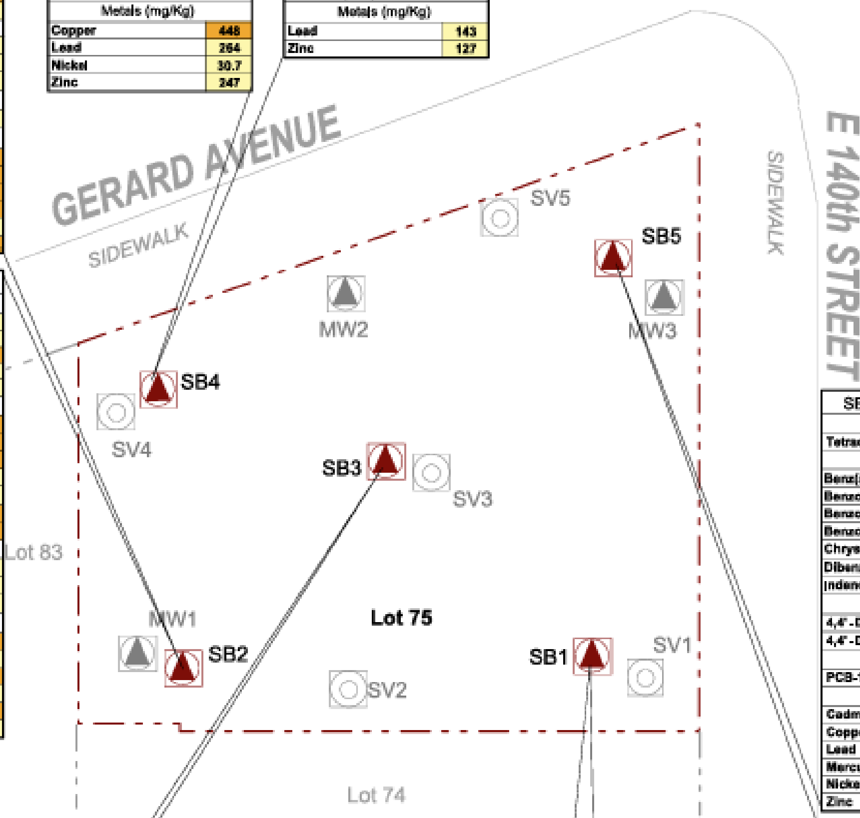
SB2 (0-2') 9/12/2025	
SVOCs (ug/Kg)	
Benz(a)anthracene	1,700
Benzo(a)pyrene	1,400
Benzo(b)fluoranthene	1,900
Chrysene	1,600
Pesticides (ug/Kg)	
4,4' -DDD	11
4,4' -DDE	17
4,4' -DDT	25
PCBs (ug/Kg)	
PCB-1254	130
Metals (mg/Kg)	
Cadmium	71.3
Copper	20,300
Lead	994
Nickel	1,100
Silver	128
Zinc	11,100

SB4 (4-6') 9/12/2025	
Metals (mg/Kg)	
Copper	448
Lead	264
Nickel	30.7
Zinc	247

SB4 (7-9) 9/12/2025	
Metals (mg/Kg)	
Lead	143
Zinc	127

SB2 (7-9') 9/12/2025	
VOCs (ug/Kg)	
Acetone	340
cis-1,2-Dichloroethene	690
Tetrachloroethene	3,900
trans-1,2-Dichloroethene	750
Trichloroethene	690
SVOCs (ug/Kg)	
Benz(a)anthracene	3,100
Benzo(a)pyrene	2,700
Benzo(b)fluoranthene	3,500
Benzo(k)fluoranthene	1,200
Chrysene	2,900
Dibenz(a,h)anthracene	390
Indeno(1,2,3-cd)pyrene	1,900
Pesticides (ug/Kg)	
4,4' -DDD	19
4,4' -DDE	17
4,4' -DDT	34
Metals (mg/Kg)	
Cadmium	14
Copper	215
Lead	635
Mercury	0.584
Nickel	363
Zinc	3,170



SB5 (4-6') 9/12/2025	
VOCs (ug/Kg)	
Tetrachloroethene	7,800
SVOCs (ug/Kg)	
Benz(a)anthracene	3,300
Benzo(a)pyrene	2,900
Benzo(b)fluoranthene	3,400
Benzo(k)fluoranthene	1,200
Chrysene	3,400
Dibenz(a,h)anthracene	520
Indeno(1,2,3-cd)pyrene	2,000
Pesticides (ug/Kg)	
4,4' -DDE	6.4
4,4' -DDT	9.5
PCBs (ug/Kg)	
PCB-1260	140
Metals (mg/Kg)	
Cadmium	5.23
Copper	122
Lead	737
Mercury	0.695
Nickel	40.7
Zinc	1,510

SB3 (0-2') 9/12/2025	
VOCs (ug/Kg)	
Tetrachloroethene	54,000
Trichloroethene	690
Pesticides (ug/Kg)	
4,4' -DDE	14
4,4' -DDT	42
Metals (mg/Kg)	
Arsenic	15.1
Barium	603
Cadmium	3.44
Copper	114
Lead	468
Mercury	1.53
Silver	2.41
Zinc	553

KEY:

PROPERTY BOUNDARY

MONITORING WELL LOCATION

SOIL BORING LOCATION

SOIL VAPOR SAMPLING LOCATION

NYSDEC UUSCOs

NYSDEC RRSCOs

SB1 (0-2') 9/12/2025	
VOCs (ug/Kg)	
Tetrachloroethene	33,000
SVOCs (ug/Kg)	
Benz(a)anthracene	1,500
Benzo(a)pyrene	1,400
Benzo(b)fluoranthene	2,000
Chrysene	1,500
Indeno(1,2,3-cd)pyrene	1,100
Pesticides (ug/Kg)	
4,4' -DDD	8
4,4' -DDT	12
PCBs (ug/Kg)	
PCB-1260	120
Metals (mg/Kg)	
Arsenic	13.2
Barium	408
Cadmium	14.4
Copper	1,460
Lead	1,370
Mercury	0.817
Nickel	90
Silver	9.8
Zinc	1,170

SB1 (7-9') 9/12/2025	
Metals (mg/Kg)	
Cadmium	10.5
Copper	140
Lead	194
Mercury	0.256
Zinc	2,960

SB5 (10-12') 9/12/2025	
SVOCs (ug/Kg)	
Benz(a)anthracene	2,100
Benzo(a)pyrene	2,100
Benzo(b)fluoranthene	2,800
Benzo(k)fluoranthene	880
Chrysene	2,100
Dibenz(a,h)anthracene	380
Indeno(1,2,3-cd)pyrene	1,600
PCBs (ug/Kg)	
PCB-1260	190
Metals (mg/Kg)	
Arsenic	21.7
Barium	1,740
Cadmium	22.9
Copper	737
Lead	2,710
Mercury	0.967
Nickel	129
Zinc	15,200

SB3 (7-9') 9/12/2025	
VOCs (ug/Kg)	
cis-1,2-Dichloroethene	770
Tetrachloroethene	23,000
Trichloroethene	1,100
SVOCs (ug/Kg)	
Benz(a)anthracene	37,000
Benzo(a)pyrene	33,000
Benzo(b)fluoranthene	53,000
Benzo(k)fluoranthene	14,000
Chrysene	30,000
Dibenz(a,h)anthracene	5,200
Indeno(1,2,3-cd)pyrene	23,000
Metals (mg/Kg)	
Barium	1,650
Cadmium	2.78
Copper	85.9
Lead	378
Mercury	0.271
Zinc	1,260

SCALE:

0 10 20

Scale 1 Inch = 20 feet

NOTE: Figure and analytical data from Remedial Investigation Report, prepared by Brussee Environmental Corp., prepared for SG NY Capital and New York City Office of Environmental Remediation, December 2025.

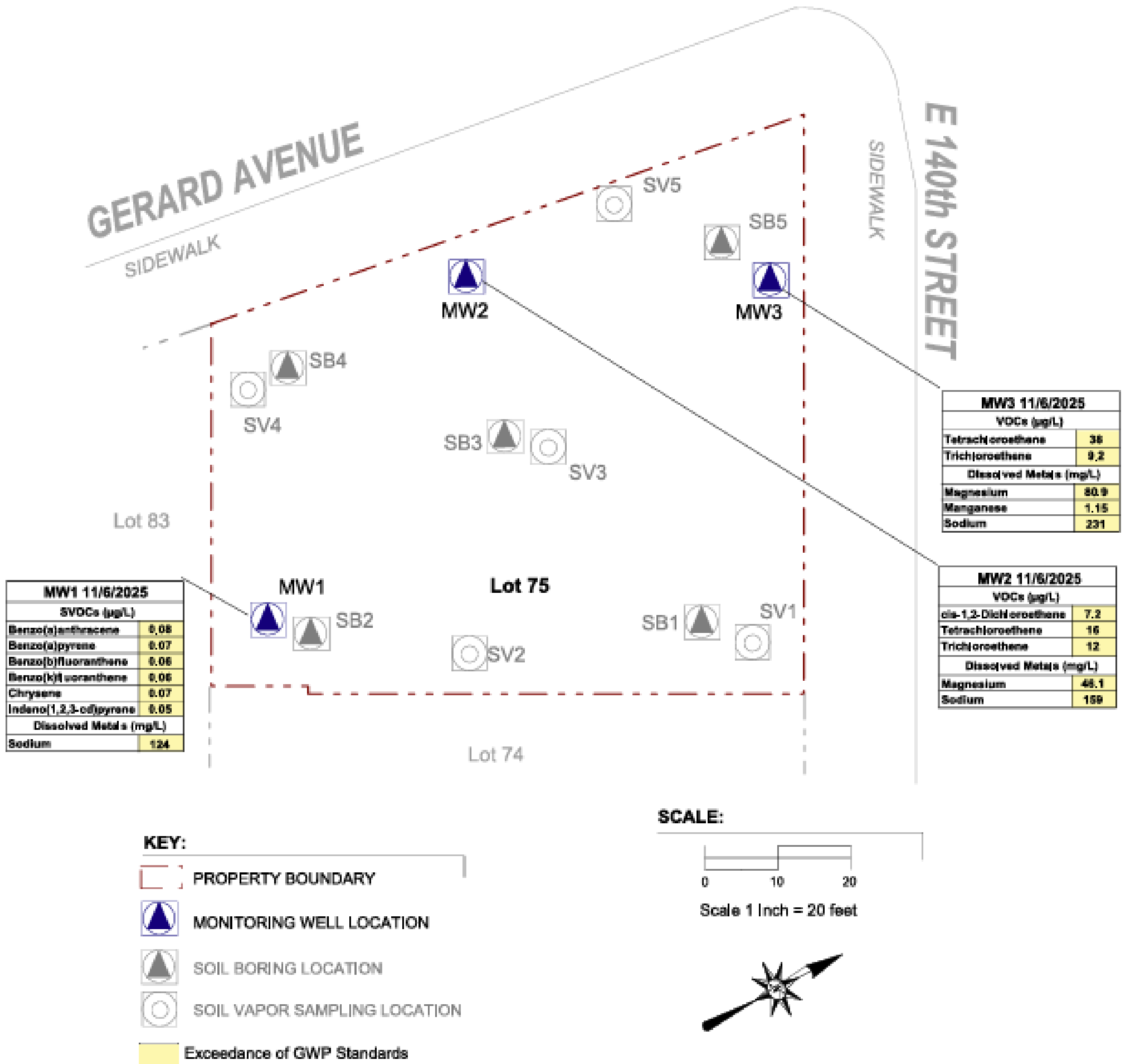
HALEY ALDRICH

120 E 140TH STREET
BRONX, NEW YORK

SUMMARY OF HISTORICAL SOIL ANALYTICAL DATA

JANUARY 2026

FIGURE 5



MW1 11/6/2025	
SVOCs (µg/L)	
Benzo(a)anthracene	0.08
Benzo(a)pyrene	0.07
Benzo(b)fluoranthene	0.06
Benzo(k)fluoranthene	0.06
Chrysene	0.07
Indeno(1,2,3-cd)pyrene	0.05
Dissolved Metals (mg/L)	
Sodium	124

MW3 11/6/2025	
VOCs (µg/L)	
Tetrachloroethene	38
Trichloroethene	9.2
Dissolved Metals (mg/L)	
Magnesium	80.9
Manganese	1.15
Sodium	231

MW2 11/6/2025	
VOCs (µg/L)	
cis-1,2-Dichloroethene	7.2
Tetrachloroethene	16
Trichloroethene	12
Dissolved Metals (mg/L)	
Magnesium	46.1
Sodium	159

NOTE: Figure and analytical data from Remedial Investigation Report, prepared by Brussee Environmental Corp., prepared for SG NY Capital and New York City Office of Environmental Remediation, December 2025.

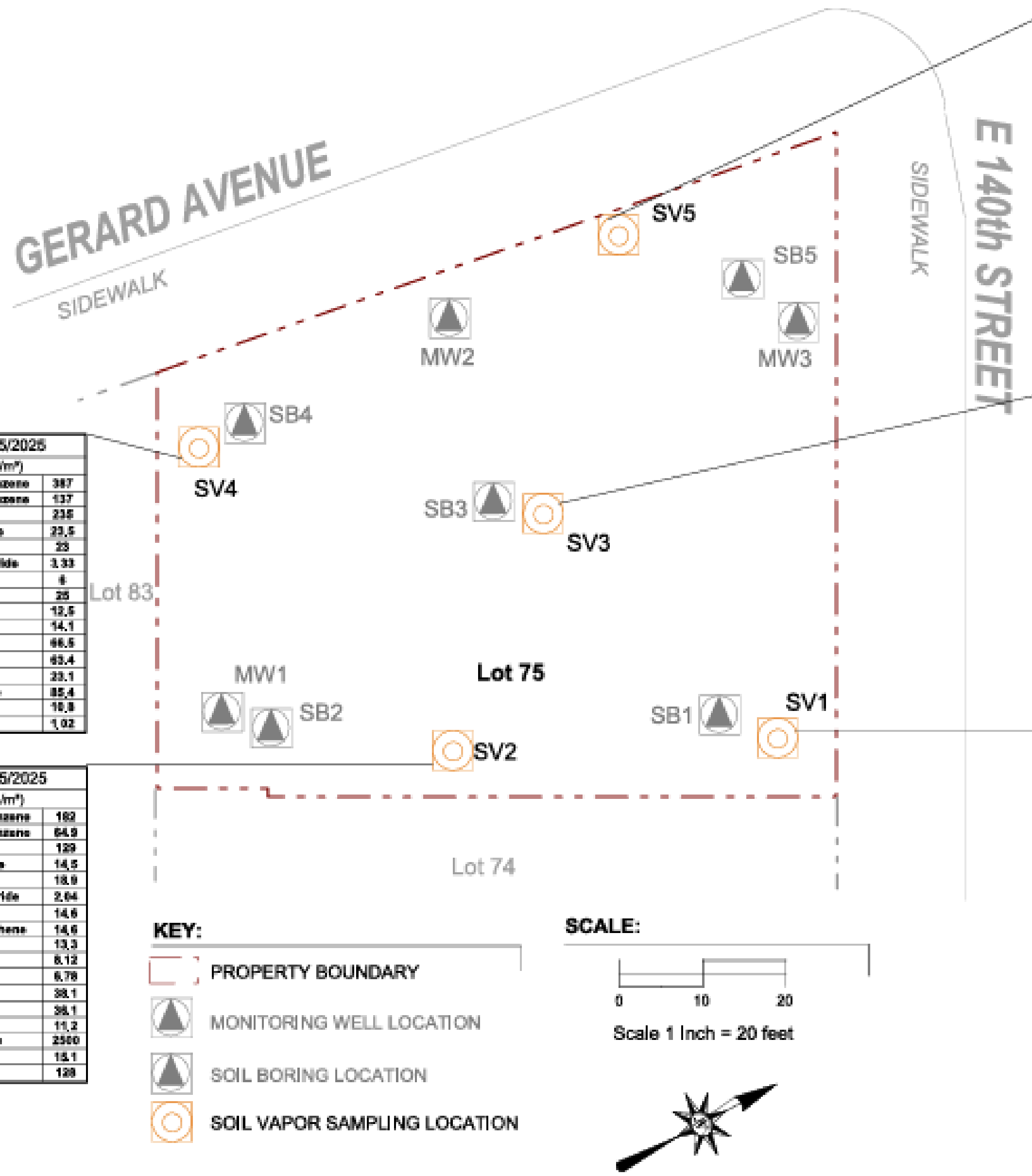
HALEY ALDRICH

120 E 140TH STREET
BRONX, NEW YORK

SUMMARY OF HISTORICAL GROUNDWATER ANALYTICAL DATA

JANUARY 2026

FIGURE 6



SV5 - 9/15/2025	
VOCs (µg/m³)	
1,1-Dichloroethene	2.04
1,2,4-Trimethylbenzene	246
1,3,5-Trimethylbenzene	90.4
4-Ethyltoluene	129
4-Isopropyltoluene	17.1
Acetone	11.8
Carbon Tetrachloride	1.85
Chloroform	8.39
Ethanol	13.1
Ethylbenzene	8.85
Isopropylbenzene	6.93
Xylene (m&p)	52.5
Isopropylbenzene	13.8
Naphthalene	6.38
Xylene (o)	40.8
sec-Butylbenzene	15.2
Tetrachloroethene	396
Toluene	8.47
Trichloroethene	7.89

SV3 - 9/15/2025	
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	338
1,3,5-Trimethylbenzene	112
4-Ethyltoluene	189
4-Isopropyltoluene	20.9
Acetone	27.5
Carbon Tetrachloride	1.35
Chloroform	27.1
cis-1,2-Dichloroethene	22.4
Ethanol	16.1
Ethylbenzene	10
Isopropylbenzene	9.56
Xylene (m&p)	52.5
Xylene (o)	46
sec-Butylbenzene	18.7
Tetrachloroethene	16700
trans-1,2-Dichloroethene	8.08
Trichloroethene	319

SV4 - 9/15/2025	
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	387
1,3,5-Trimethylbenzene	137
4-Ethyltoluene	235
4-Isopropyltoluene	23.5
Acetone	23
Carbon Tetrachloride	3.33
Chloroform	6
Ethanol	25
Ethylbenzene	12.5
Isopropylbenzene	14.1
Xylene (m&p)	66.5
Xylene (o)	63.4
sec-Butylbenzene	23.1
Tetrachloroethene	85.4
Toluene	10.8
Trichloroethene	1.02

SV2 - 9/15/2025	
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	182
1,3,5-Trimethylbenzene	64.9
4-Ethyltoluene	129
4-Isopropyltoluene	14.5
Acetone	18.9
Carbon Tetrachloride	2.04
Chloroform	14.6
cis-1,2-Dichloroethene	14.6
Ethanol	13.3
Ethylbenzene	8.12
Isopropylbenzene	6.78
Xylene (m&p)	38.1
Xylene (o)	38.1
sec-Butylbenzene	11.2
Tetrachloroethene	2500
Toluene	15.1
Trichloroethene	128

SV1 - 9/15/2025	
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	313
1,3,5-Trimethylbenzene	116
4-Ethyltoluene	195
4-Isopropyltoluene	20.1
Acetone	28.3
Carbon Tetrachloride	4.72
Chloroform	5.32
cis-1,2-Dichloroethene	15.8
Ethanol	23
Ethylbenzene	11.9
Heptane	5.77
Hexane	7.19
Isopropylbenzene	13.8
Xylene (m&p)	56.4
Naphthalene	6.44
Xylene (o)	57.3
sec-Butylbenzene	19.4
Tetrachloroethene	396
Toluene	14.2
Trichloroethene	68.7

NOTE: Figure and analytical data from Remedial Investigation Report, prepared by Brussee Environmental Corp., prepared for SG NY Capital and New York City Office of Environmental Remediation, December 2025.

HALEY ALDRICH

120 E 140TH STREET
BRONX, NEW YORK

SUMMARY OF HISTORICAL SOIL VAPOR ANALYTICAL DATA

JANUARY 2026

FIGURE 7

GIS: \\haleyaldrich.com\share\CF\Projects\0214715\GIS\214715_000_120_E_140TH_STREET.aprx - pditillio - 12/17/2025 1:30 PM

APPENDIX A
Field Sampling Plan

www.haleyaldrich.com

FIELD SAMPLING PLAN
120 EAST 140TH STREET
BRONX, NEW YORK

by
H & A of New York Engineering and Geology LLP
New York, New York

for
BH Walton LLC
Brooklyn, New York

File No. 0214715
January 2026

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Table of Contents

List of Appendices

1. Introduction

This Field Sampling Plan (FSP) has been prepared as a component of the Remedial Investigation Work Plan (RIWP) for the project located at 120 East 140th Street in the Mott Haven neighborhood of the Bronx, New York (Site). This document was prepared to establish field procedures for field data collection to be performed in support of the RIWP for the Site.

The RIWP includes this FSP, a Quality Assurance Project Plan (QAPP), Health and Safety Plan (HASP), and Community Air Monitoring Plan (CAMP), which are included as part of this RIWP by reference.

The standard operating procedures (SOPs) included as components of this RIWP will provide the procedures necessary to meet the project objectives. The SOPs will be used as reference for the methods to be employed for field sample collection, handling, and the management of field data collected in the execution of the approved RIWP. The SOPs include numerous methods to execute the tasks of the RIWP. The Project Manager will select the appropriate method as required by field conditions and/or the objective of the respective project task at the time of sample collection. Field procedures will be conducted in general accordance with the New York State Department of Conservation (NYSDEC) Technical Guidance for Site Investigation and Remediation and the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC Part 375 Remedial Program when applicable.

2. Field Program

This FSP provides the general purpose of sampling as well as procedural information. The RIWP contains the details on sampling and analysis (locations, depths, frequency, analyte lists, etc.).

The field program has been designed to acquire the necessary data to comply with the RIWP and includes the following tasks:

- soil sampling;
- groundwater sampling;
- soil vapor sampling; and,
- sampling of investigation-derived waste (IDW) as needed for disposal.

A Limited Phase II Environmental Site Investigation was performed at the Site in December 2025 to investigate the anticipated contaminants of concern identified based on the Site's former uses. While the sampling events provided preliminary Site characterization data, they did not fully determine the nature and extent of soil, groundwater, and soil vapor contamination at the Site. The Site characterization did not identify a source of contamination on the Site; therefore, additional targeted soil, groundwater, and soil vapor sampling are proposed.

The SOPs presented herein may be changed as required, dependent on Site conditions or equipment limitations, at the time of sample collection. If the procedures employed differ from the SOP, the deviations will be documented in the associated sampling report.

3. Utility Clearance

Invasive remedial activities, such as excavation or remedial construction activities, require the location of underground utilities prior to initiating work. Such clearance is sound practice in that it minimizes the potential for damage to underground facilities and, more importantly, is protective of the health and safety of personnel. Under no circumstances will invasive activities be allowed to proceed without obtaining proper utility clearance by the appropriate public agencies and/or private entities. This clearance requirement applies to all work on both public and private properties, whether located in a dense urban area or a seemingly out-of-the-way rural location.

The drilling contractor performing the work will be responsible for obtaining utility clearance.

Utility clearance is required by law, and obtaining clearance includes contacting a public or private central clearance agency via a “one-call” telephone service and providing the proposed exploration location information. It is important to note that public utility agencies may not, and usually do not, have information regarding utility locations on private property.

Before beginning subsurface work at any proposed exploration locations, it is critical that all readily available information on underground utilities and structures be obtained. This includes publicly available information as well as information in the possession of private landowners. Any drawings obtained must be reviewed in detail for information pertaining to underground utilities.

Using the information obtained, the Site should be viewed in detail for physical evidence of buried lines or structures, including pavement cuts and patches, variation in or lack of vegetation, variations in grading, etc. Care must also be taken to avoid overhead utilities. The presence of surface elements of buried utilities should be documented, such as manholes, gas or water service valves, catch basins, monuments, or other evidence.

Overhead utility lines must be considered when choosing exploration and excavation locations. Most states require a minimum of 10 feet of clearance between equipment and energized wires. Such separation requirements may also be voltage-based and may vary depending on state or municipality regulations. In evaluating clearance from overhead lines, the same restrictions may apply to “drops,” or wires on a utility pole connecting overhead and underground lines.

Using the information obtained and observations made, proposed exploration or construction locations should be marked in the field. Marking locations can be accomplished using spray paint on the ground, stakes, or other means. All markings of proposed locations should be made in white, in accordance with the generally accepted universal color code for facilities identification (American Public Works Association [APWA] 4/99):

- White: Proposed Excavation or Drilling Location
- Pink: Temporary Survey Markings
- Red: Electrical Power Lines, Cables, Conduit, and Lighting Cables
- Yellow: Gas, Oil, Steam, Petroleum, or Gaseous Materials
- Orange: Communication, Alarm or Signal Lines, Cables, or Conduits

- Blue: Potable Water
- Purple: Reclaimed Water, Irrigation and Slurry Lines
- Green: Sewers and Drain Lines

In order to effectively evaluate the proposed locations with these entities, detailed, accurate measurements between the proposed locations and existing surface features should be obtained. Such features can be buildings, street intersections, utility poles, guardrails, etc.

- Obtaining the utility clearance generally involves the designated “one-call” underground facilities protection organization for the area and the landowner, and one or both following methods:
  - A third-party utility locator company will be utilized to locate underground utilities outside of the public right-of-way; and/or
  - “Soft dig” excavation techniques to confirm or deny the presence of underground utilities in the area.

The proposed locations should be evaluated in consideration of the information available for existing underground facilities. The detailed measurement information described above will be required by the “one-call” agency. The owners of the applicable, participating underground utilities are obligated to mark their respective facilities at the Site in the colors described above. Utility stakeout activities will typically not commence for approximately 72 hours after the initial request is made.

The public and private utility entities generally only mark the locations of their respective underground facilities within public rights-of-way. Determination of the locations of these facilities on private property will be the responsibility of the property owner or the Contractor. If available information does not contain sufficient detail to locate underground facilities with a reasonable amount of confidence, alternate measures may be appropriate, as described below. In some cases, the memory of a long-time employee of a facility on private property may be the best or only source of information. It is incumbent on the Consultant or Contractor to exercise caution and use good judgement when faced with uncertainty.

Note: It is important to note that not all utilities are participants in the “one-call” agency or process. As such, inquiries must be made with the “one-call” agency to determine which entities do not participate, so they can be contacted independently.

Most utility stakeouts have a limited time period for which they remain valid, typically two to three weeks. It is critical that this time period be considered to prevent expiration of clearance prior to completion of the invasive activities and the need to repeat the stakeout process.

Care must be exercised to document receipt of notice from the involved agencies of the presence or absence of utilities in the vicinity of the proposed locations.

Most agencies will generally provide a telephone or fax communication indicating the lack of facilities in the project area. If contact is not made by all of the agencies identified by the “one-call” process, do not assume that such utilities are not present. Re-contact the “one-call” agency to determine the status.

For complicated sites with multiple proposed locations and multiple utilities, it is advisable to arrange an on-site meeting with utility representatives. This will minimize the potential for miscommunication amongst the involved parties.

Completion of the utility stakeout process is not a guarantee that underground facilities will not be encountered in excavations or boreholes; in fact, most "one-call" agencies and individual utilities do not offer guarantees, nor do they accept liability for damage that might occur. In areas outside the public right-of-way, a utility locating service may be utilized to locate underground utilities. It is advisable that any invasive activities proceed with extreme caution in the upper 4 to 5 feet in the event that the clearance has failed to identify an existing facility. This may necessitate hand-excavation or probing to confirm the potential presence of shallow utilities. If uncertainty exists for any given utility, extra activities can be initiated to address utility clearance concerns. These options include:

- Screening the proposed work areas with utility locating devices, and/or hiring a utility locating service to perform this task.
- Hand digging, augering, or probing to expose or reveal shallow utilities and confirm the presence and location. In northern climates, this may require advancing to below the frost line, typically at least 4 feet.
- Using "soft dig" techniques that utilize specialized tools and compressed air to excavate soils and locate utilities. This technique is effective in locating utilities to a depth of 4 to 5 feet.

Equipment/Materials:

- White spray paint
- Wooden stakes, painted white or containing white flagging
- Color-code key
- Available drawings

4. Field Data Recording

This procedure describes the protocol for documenting the investigation activities in the field. Field data serves as the cornerstone for an environmental project, not only for Site characterization but for additional phases of investigation or remedial design. Producing defensible data includes proper and appropriate recording of field data as it is obtained in a manner to preserve the information for future use. This procedure provides guidelines for accurate, thorough collection and preservation of written and electronic field data.

Field data to be recorded during the project generally includes, but is not limited to, the following:

- General field observations;
- Numeric field measurements and instrument readings;
- Quantity estimates;
- Sample locations and corresponding sample numbers;
- Relevant comments and details pertaining to the samples collected;
- Documentation of activities, procedures, and progress achieved;
- Contractor pay item quantities;
- Weather conditions;
- A listing of personnel involved in Site-related activities;
- A log of conversations, Site meetings, and other communications; and,
- Field decisions and pertinent information associated with the decisions.

4.1 Written Field Data

Written field data will be collected using a standardized, pre-printed field log form. In general, the use of a field log form is preferable as it prompts field personnel to make appropriate observations and record data in a standardized format. This promotes completeness and consistency from one person to the next. Otherwise, electronic data collection using a handheld device produces equal completeness and consistency using a preformatted log form.

In the absence of an appropriate pre-printed form, the data should be recorded in an organized and structured manner in a dedicated project field logbook. Logbooks must be hardcover, bound so that pages cannot be added or removed, and should be made from high-grade 50 percent rag paper with a water-resistant surface.

The following are guidelines for the use of field log forms and logbooks:

1. Information must be factual and complete.
2. All entries will be made in black indelible ink with a ballpoint pen and will be written legibly. Do not use “rollerball” or felt-tip-style pens, since the water-soluble ink can run or smear in the presence of moisture.

3. Field log forms should be consecutively numbered.
4. Each day's work must start on a new form/page.
5. At the end of each day, the current logbook page or forms must be signed and dated by the field personnel making the entries.
6. Make data entries immediately upon obtaining the data. Do not make temporary notes in other locations for later transfer; this only increases the potential for error or loss of data.
7. Entry errors are to be crossed out with a single line and initialed by the person making the correction.
8. Do not leave blanks on log forms; if no entry is applicable for a given data field, indicate so with "NA" or a dash ("--").
9. At the earliest practical time, photocopies or typed versions of log forms and logbook pages should be made and placed in the project file as a backup in the event the book or forms are lost or damaged.
10. Logbooks should be dedicated to one project only (i.e., do not record data from multiple projects in one logbook).

4.2 Electronic Data

Electronic data recording involves electronic measurement of field information through the use of monitoring instruments, sensors, gauges, and equipment controls. The following is a list of guidelines for the proper recording and management of electronic field data:

1. Field data management should follow the requirements of a project-specific data management plan, if applicable.
2. Use only instruments that have been calibrated in accordance with the manufacturer's recommendations.
3. Usage of instruments, controls, and computers for the purpose of obtaining field data should only be performed by personnel properly trained and experienced in the use of the equipment and software.
4. Use only fully licensed software on personal computers and laptops.
5. Loss of electronic files may mean loss of irreplaceable data. Every effort should be made to back up electronic files obtained in the field as soon as practical. A backup file placed on the file server will minimize the potential for loss.
6. Electronic files, once transferred from field instruments or laptops to office computers, should be protected, if possible, to prevent unwanted or inadvertent manipulation or modification of data. Several levels of protection are usually available for spreadsheets, including making a file "read-only" or assigning a password to access the file.
7. Protect CDs from exposure to moisture, excessive heat or cold, magnetic fields, or other potentially damaging conditions.
8. Remote monitoring is often used to obtain stored electronic data from Site environmental systems. A thorough discussion of this type of electronic field data recording is beyond the scope of this Section. Such on-site systems are generally capable of storing a limited amount of

data as a comma-delimited or spreadsheet file. Users must remotely access the monitoring equipment files via modem or other access and download the data. In order to minimize the potential for loss of data, access and downloading of data should be performed frequently enough to ensure the data storage capacity of the remote equipment is not exceeded.

Equipment/Materials:

- Appropriate field log forms, or iPad® or equivalent, with preformatted log forms
- Indelible ball-point pen (do not use “rollerball” or felt-tip-style pens)
- Straight edge
- Pocket calculator
- Laptop computer (if required)

5. Aquifer Characterization

This procedure describes the measurement of water levels in groundwater monitoring.

A synoptic gauging round will be completed to obtain water levels in monitoring wells. Water levels will be acquired in a manner that provides accurate data that can be used to calculate vertical and horizontal hydraulic gradients and other hydrogeologic parameters. Accuracy in obtaining the measurements is critical to ensure the usability of the data.

5.1 Procedure

In order to provide reliable data, water level monitoring events should be collected over as short a period of time as practical. Barometric pressure can affect groundwater levels, and therefore, observation of significant weather changes during the period of water level measurements must be noted. Rainfall events and groundwater pumping can also affect groundwater level measurements. Personnel collecting water level data must note if any of these controls are in effect during the groundwater level collection period. Due to possible changes during the groundwater level collection period, it is imperative that the time of data collection at each station be accurately recorded. Water levels will also be collected prior to any sample collection that day.

The depth to groundwater will be measured with an electronic depth-indicating probe. Prior to obtaining a measurement, a fixed reference point on the well casing will be established for each well to be measured. Unless otherwise established, the reference point is typically established and marked on the north side of the well casing. Do not use protective casings or flush-mounted road boxes as a reference, due to the potential for damage or settlement. The elevation of the reference point shall be obtained by accepted surveying methods, to the nearest 0.01 feet.

The water level probe will be lowered into the well until the meter indicates (via indicator light or tone) that the water has been reached. The probe will be raised above the water level and slowly lowered again until water is indicated. The cable will be held against the side of the inner protective casing at the point designated for water level measurements, and a depth reading will be taken. This procedure will be followed three times or until a consistent value is obtained. The value will be recorded to the nearest 0.01 feet on the Groundwater Level Monitoring Report form.

Upon completion, the probe will be raised to the surface and, together with the amount of cable that entered the well casing, will be decontaminated in accordance with the methods described in the Equipment Decontamination Procedure.

Equipment/Materials:

- Battery-operated, non-stretch electronic water level probe with permanent markings at 0.01-foot increments, such as the Solinst Model 101 or equivalent.
- The calibrated cable on the depth indicator will be checked against a surveyor's steel tape once per quarter year. A new cable will be installed if the cable has changed by more than 0.01 percent (0.01 feet for a 100-foot cable). See also the Field Instruments – Use and Calibration Procedure.
- Groundwater Level Monitoring Report form.

6. Sample Collection for Laboratory Analysis

6.1 SOIL SAMPLE COLLECTION FOR LABORATORY ANALYSIS

The following procedure is an introduction to soil sampling techniques and an outline of field staff responsibilities. All samples will be collected with dedicated sampling equipment.

6.1.1 Preparatory Requirements

Prior to the beginning of any remedial investigation or remedial measures activities, staff must attend a project briefing for the purpose of reviewing the project work plan, Site and utility plans, drawings, applicable regulations, sampling location, depth, and criteria, Site contacts, and other related documents. Health and safety concerns will be documented in a Site-specific HASP.

A file folder for the field activities should be created and maintained such that all relevant documents and log forms likely to be useful for the completion of field activities by others are readily available in the event of personnel changes.

6.1.2 Soil Classification

The stratigraphic log is a factual description of the soil at the borehole location and is relied upon to interpret the soil characteristics, their influence, and significance in the subsurface environment. The accuracy of the stratigraphic log is to be verified by the person responsible for interpreting subsurface conditions. An accurate description of the soil stratigraphy is essential for a reasonable understanding of the subsurface conditions. Confirmation of the field description by examination of representative soil samples by the project geologist, hydrogeologist, or geotechnical engineer (whenever practicable) is recommended.

The ability to describe and classify soil correctly is a skill that is learned from a person with experience and by systematic training and comparison of laboratory results to field descriptions.

6.1.2.1 Data Recording

Several methods for classifying and describing soils or unconsolidated sediments are in relatively widespread use. The Unified Soil Classification System (USCS) is the most common. With the USCS, a soil is first classified according to whether it is predominantly coarse-grained or fine-grained.

The description of fill soil is similar to that of natural undisturbed soil except that it is identified as fill and not classified by USCS group, relative density, or consistency. Those logging soils must attempt to distinguish between soils that have been placed (i.e., fill) and not naturally present, or soils that have been naturally present but disturbed (i.e., disturbed native).

It is necessary to identify and group soil samples consistently to determine the subsurface pattern or changes and non-conformities in soil stratigraphy in the field at the time of drilling. The stratigraphy in each borehole during drilling is to be compared to the stratigraphy found at the previously completed boreholes to ensure that patterns or changes in soil stratigraphy are noted and that consistent terminology is used.

Visual examination, physical observations, and manual tests (adapted from ASTM D2488, visual-manual procedures) are used to classify and group soil samples in the field and are summarized in this subsection. ASTM D2488 should be reviewed for detailed explanations of the procedures. Visual-manual procedures used for soil identification and classification include:

- Visual determination of grain size, soil gradation, and percentage fines;
- Dry strength, dilatancy, toughness, and plasticity (thread or ribbon test) tests for identification of inorganic fine-grained soil (e.g., CL, CH, ML, or MH); and
- Soil compressive strength and consistency estimates based on thumb indent and pocket penetrometer (preferred) methods.

Soil characteristics like plasticity, strength, and dilatancy should be determined using the H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York) Soil Identification Field Form.

6.1.2.2 Field Sample Screening

Upon the collection of soil samples, the soil is screened with a photoionization detector (PID) for the presence of organic vapor. This is accomplished by running the PID across the soil sample. The highest reading and sustained readings are recorded.

Note: The PID measurement must be done upwind of the excavating equipment or any running engines so that exhaust fumes will not affect the measurements.

Another method of field screening is headspace measurements. This consists of placing a portion of the soil sample in a sealable glass jar, placing aluminum foil over the jar top, and tightening the lid. Alternatively, plastic sealable bags may be utilized for a field screen in lieu of glass containers. The jar should only be partially filled. Shake the jar and set aside for at least 30 minutes. After the sample has equilibrated, the lid of the jar can be opened; the foil is punctured with the PID probe, and the air (headspace) above the soil sample is monitored. This headspace reading on the field form or in the field book is recorded. All headspace measurements must be completed under similar conditions to allow comparability of results. Soil classification and PID readings will be recorded in the daily field report.

Equipment/Materials:

- Pocket knife or small spatula
- Small handheld lens
- Stratigraphic Log (Overburden) (Form 2001)
- Tape measure
- When sampling for PFAS, acceptable materials for sampling include stainless-steel, high-density polyethylene (HDPE), polyvinyl chloride (PVC), silicone, acetate, and polypropylene.

6.1.3 Soil Sampling

Soil samples will be collected from acetate liners installed by a track-mounted direct-push drill rig (Geoprobe®) or sonic drill rig (as necessary) operated by a licensed operator. Soil samples will be collected using a stainless-steel trowel or sampling spoon into laboratory-provided sample containers.

If it is necessary to relocate any proposed sampling location due to terrain, utilities, access, etc., the Project Manager must be notified, and an alternate location will be selected.

Prior to use and between each sampling location at an environmental site, the sampling equipment must be decontaminated. All decontamination must be conducted in accordance with the project-specific plans or the methods presented in SOP 7.0.

6.1.4 Sampling Techniques

The following procedure describes typical soil sample collection methods for submission of samples to a laboratory for chemical analysis. The primary goal of soil sampling is to collect representative samples for examination and chemical analysis (if required).

Environmental soil samples obtained for chemical analyses are collected with special attention given to the rationale behind determining the precise zone to sample, the specifics of the method of soil extraction, and the requisite decontamination procedures. Preservation, handling, and glassware for environmental soil samples vary considerably depending upon several factors, including the analytical method to be conducted and the analytical laboratory being used.

Soil sampling for PFAS will be performed in accordance with NYSDEC, Division of Environmental Remediation (DER), Sampling, Analysis, and Assessment of PFAS under NYSDEC Part 375 Remedial Program (April 2023).

6.1.4.1 Grab Versus Composite Samples

A grab sample is collected to identify and quantify conditions at a specific location or interval. The sample is comprised of the minimum amount of soil necessary to make up the volume of a sample dictated by the required sample analyses. Composite samples may be obtained from several locations or along a linear trend (in a test pit or excavation). Sampling may occur within or across stratification.

6.2 GROUNDWATER SAMPLE COLLECTION FOR LABORATORY ANALYSIS

The following section describes two techniques for groundwater sampling: “Low-Stress/Low-Flow Methods” and “Typical Sampling Methods.”

“Low-Stress/Low-Flow” methods will be employed when collecting groundwater samples for the evaluation of volatile constituents (i.e., dissolved oxygen [DO]) or in fine-grained formations where sediment/colloid transport is possible. Analyses typically sensitive to colloidal transport issues include polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons, and metals.

The “Typical Sampling Methods” will be employed where parameters less sensitive to turbidity/sediment issues are being collected (general chemistry, pesticides, and other semi-volatile organic compounds [SVOCs]).

NOTE: If non-aqueous phase liquids (NAPL) (light or dense) are detected in a monitoring well, groundwater sample collection will not be conducted, and the Project Manager must be contacted to determine a course of action.

6.2.1 Preparatory Requirements

- Verify well identification and location using borehole log details and location layout figures. Note the condition of the well and record any necessary repair work required.
- Prior to opening the well cap, measure the breathing space above the well casing with a handheld organic vapor analyzer to establish baseline breathing space volatile organic compound (VOC) levels. Repeat this measurement once the well cap is opened. If either of these measurements exceeds the air quality criteria in the HASP, field personnel should adjust their personal protective equipment (PPE) accordingly.
- Prior to commencing the groundwater purging/sampling, a water level must be obtained to determine the well volume for hydraulic purposes. In some settings, it may be necessary to allow the water level time to equilibrate. This condition exists if a watertight seal exists at the well cap and the water level has fluctuated above the top of screen, creating a vacuum or pressurized area in this air space. Three water level checks will verify that static water level conditions have been achieved.
- Calculate the volume of water in the well. Typically, overburden well volumes consider only the quantity of water standing in the well screen and riser; bedrock well volumes are calculated on the quantity of water within the open core hole and within the overburden casing.

6.2.2 Well Development

Well development is completed to remove fine-grained materials from the well, but in such a manner as to not introduce fines from the formation into the sand pack. Well development continues until the well responds to water level changes in the formation (i.e., a good hydraulic connection is established between the well and formation) and the well produces clear, sediment-free water to the extent practical.

- Attach the appropriate pump and lower tubing into the well.
- Gauge well and calculate one well volume. Turn on the pump. If the well runs dry, shut off the pump and allow it to recover.
- Surging will be performed by raising and lowering the pump several times to pull fine-grained material from the well. Periodically measure the turbidity level using a La Motte turbidity reader.
- The second and third steps will be repeated until turbidity is less than 50 nephelometric turbidity units (NTU) or when 10 well volumes have been removed.
- All water generated during cleaning and development procedures will be collected and contained on Site in 55-gallon drums for future analysis and appropriate disposal.

Equipment:

- Appropriate health and safety equipment
- Knife
- Power source (generator)
- Field book

- Well Development Form (Form 3006)
- Well keys
- Graduated pails
- Pump and tubing
- Cleaning supplies (including non-phosphate soap, buckets, brushes, laboratory-supplied distilled/deionized water, tap water, cleaning solvent, aluminum foil, plastic sheeting, etc.)
- Water level meter

6.2.3 Well Purging and Stabilization Monitoring (Low-Stress/Low-Flow Method)

The preferred method for groundwater sampling will be the low-stress/low-flow method described below.

- Slowly lower the pump, safety cable, tubing, and electrical lines into the well to the depth specified by the project requirements. The pump intake must be at the midpoint of the well screen to prevent disturbance and resuspension of any sediment in the screen base.
- Before starting the pump, measure the water level again with the pump in the well, leaving the water level measuring device in the well when completed.
- Purge the well at 100 to a maximum of 500 milliliters per minute (mL/min). During purging, the water level should be monitored approximately every five minutes, or as appropriate. A steady flow rate should be maintained that results in a drawdown of 0.3 feet or less. The rate of pumping should not exceed the natural flow rate conditions of the well. Care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record adjustments made to the pumping rates and water levels immediately after each adjustment.
- During the purging of the well, monitor and record the field indicator parameters (pH, temperature, conductivity, oxidation-reduction (redox) reaction potential (ORP), DO, and turbidity) approximately every five minutes. Stabilization is considered to be achieved when the final groundwater flow rate is achieved, and three consecutive readings for each parameter are within the following limits:
  - pH: 0.1 pH units of the average value of the three readings;
  - Temperature: 3 percent of the average value of the three readings;
  - Conductivity: 0.005 milliSiemen per centimeter (mS/cm) of the average value of the three readings for conductivity less than 1 mS/cm and 0.01 mS/cm of the average value of the three readings for conductivity greater than 1 mS/cm;
  - ORP: 10 millivolts of the average value of the three readings;
  - DO: 10 percent of the average value of the three readings; and
  - Turbidity: 10 percent of the average value of the three readings, or a final value of less than 50 NTU.
- The pump must not be removed from the well between purging and sampling.

6.2.4 Sampling Techniques

- If an alternate pump is utilized, the first pump discharge volumes should be discarded to allow the equipment a period of acclimation to the groundwater.
- Samples are collected directly from the pump, with the groundwater being discharged directly into the appropriate sample container. Avoid handling the interior of the bottle or bottle cap, and don new gloves for each well sampled to avoid contamination of the sample.
- Order of sample collection:
  - PFAS
  - VOCs
  - 1,4-dioxane
  - SVOCs
  - Total Analyte List metals
  - PCBs, pesticides, and herbicides
- No sampling equipment components or sample containers should come in contact with aluminum foil, low-density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials, including plumber's tape and sample bottle cap liners with a PTFE layer.
- For low-stress/low-flow sampling, samples should be collected at a flow rate between 100 and 500 mL/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 feet.
- The pumping rate used to collect a sample for VOC should not exceed 100 mL/min. Samples should be transferred directly to the final container, 40-mL glass vials completely full and topped with a Teflon™ cap. Once capped, the vial must be inverted and tapped to check for headspace/air presence (bubbles). If air is present, the sample will be discarded and recollected until free of air.
- Groundwater sampling for PFAS will be performed in accordance with NYSDEC, DER, Sampling, Analysis and Assessment of PFAS under NYSDEC Part 375 Remedial Program (April 2023)
- All samples must be labeled with:
  - A unique sample number
  - Date and time
  - Parameters to be analyzed
  - Project reference ID
  - Sampler's initials
- Labels should be written in indelible ink and secured to the bottle with clear tape.

Equipment/Materials:

- pH meter, conductivity meter, DO meter, ORP meter, nephelometer, temperature gauge
- Field filtration units (if required)
- Purging/sampling equipment
- Peristaltic pump

- Water level probe
- Sampling materials (containers, logbook/forms, coolers, chain of custody)
- Work plan
- HASP
- When sampling for PFAS, acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene.

Note: Peristaltic pump use for VOC collection is not acceptable on NYSDEC/U.S. Environmental Protection Agency (EPA)/Resource Conservation and Recovery Act (RCRA) sites; this technique has gained acceptance in select areas where it is permissible to collect VOCs using a peristaltic pump at a low flow rate (e.g., Michigan).

Note: 1,4-dioxane and PFAS purge and sample techniques will be conducted following the NYSDEC guidance documents (see Appendix C of the RIWP). Acceptable groundwater pumps include a stainless-steel inertia pump with HDPE tubing, a peristaltic pump equipped with HDPE tubing and silicone tubing, and a stainless-steel bailer with a stainless-steel ball or bladder pump (identified as PFAS-free) with HDPE tubing.

Field Notes:

- Field notes must document all the events, equipment used, and measurements collected during the sampling activities. Section 2 describes the data/recording procedure for field activities.
- The logbook should document the following for each well sampled:
  - Identification of well
  - Well depth
  - Static water level depth and measurement technique
  - Sounded well depth
  - Presence of immiscible layers and detection/collection method
  - Well yield – high or low
  - Purge volume and pumping rate
  - Time well purged
  - Measured field parameters
  - Purge/sampling device used
  - Well sampling sequence
  - Sampling appearance
  - Sample odors
  - Sample volume
  - Types of sample containers and sample identification
  - Preservative(s) used
  - Parameters requested for analysis
  - Field analysis data and method(s)
  - Sample distribution and transporter

- Laboratory shipped to
- Chain of custody number for shipment to laboratory
- Field observations on sampling event
- Name of collector(s)
- Climatic conditions, including air temperature
- Problems encountered and any deviations made from the established sampling protocol.

Standard log forms for documentation and reporting groundwater purging and sampling events are presented on the Groundwater Sampling Record, Low Flow Groundwater Sampling Form, and Low Flow Monitored Natural Attenuation Field Sampling Form. Refer to Appendix A for example field forms.

Groundwater/Decon Fluid Disposal:

- Groundwater disposal methods will vary on a case-by-case basis but may include:
  - Off-site treatment at private treatment/disposal facilities or public-owned treatment facilities;
  - On-site treatment at facility-operated facilities; and/or
  - Direct discharge to the surrounding ground surface, allowing groundwater infiltration to the underlying subsurface regime.
- Decontamination fluids should be segregated and collected separately from wash waters/groundwater containers.

6.3 SOIL VAPOR SAMPLING

The following procedure is an introduction to soil vapor sampling techniques and an outline of field staff responsibilities.

6.3.1 Preparatory Requirements

Prior to collecting the field sample, ensure the stainless-steel or polyethylene soil vapor probe has been installed to the desired depth and sealed completely to the surface using a material such as bentonite. As part of the vapor intrusion evaluation, a tracer gas should be used in accordance with New York State Department of Health protocols to serve as a quality assurance/quality control (QA/QC) to verify the integrity of the soil vapor probe seal. A container (box, plastic pail, etc.) will serve to keep the tracer gas in contact with the probe during testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer gas prior to sampling. If the tracer sample results show a significant presence of the tracer, the probe seals will be adjusted to prevent infiltration. At the conclusion of the sampling round, tracer monitoring should be performed a second time to confirm the integrity of the probe seals.

6.3.2 Sampling Techniques

Samples will be collected in appropriately sized SUMMA® canisters that have been certified clean by the laboratory, and samples will be analyzed by using EPA Method TO-15. Flow rate for both purging and sampling will not exceed 0.2 liters per minute (L/min). One to three implant volumes shall be purged prior to the collection of any soil-gas samples. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, soil vapor purge volumes, volume of the soil vapor extracted, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

6.4 SAMPLE HANDLING AND SHIPPING

Sample management is the continuous care given to each sample from the point of collection to receipt at the analytical laboratory. Good sample management ensures that samples are properly recorded, properly labeled, and not lost, broken, or exposed to conditions that may affect the sample's integrity.

All sample submissions must be accompanied by a chain of custody document to record sample collection and submission. Personnel performing sampling tasks must check the sample preparation and preservation requirements to ensure compliance with the QAPP.

The following sections provide the minimum standards for sample management.

6.4.1 Sample Handling

Prior to entering the field area where sampling is to be conducted, especially at sites with defined exclusion zones, the sampler should ensure that all materials necessary to complete the sampling are on hand. If samples must be maintained at a specified temperature after collection, dedicated coolers and ice must be available for use. Conversely, when sampling in cold weather, proper protection of water samples, trip blanks, and field blanks must be considered. Sample preservation will involve pH adjustment, cooling to 4 degrees Celsius, and sample filtration and preservation.

6.4.2 Sample Labeling

Samples must be properly labeled immediately upon collection.

Note that the data shown on the sample label is the minimum data required. The sample label data requirements are listed below for clarity.

- Project name
- Sample name/number/unique identifier
- Sampler's initials
- Date of sample collection
- Time of sample collection
- Analysis required
- Preservatives

To ensure that samples are not confused, a clear notation should be made on the container with a permanent marker. If the containers are too soiled for marking, the containers can be put into a “Zip Lock” bag, which can then be labeled.

All sample names will be as follows:

- Sample unique identifier: Enter the sample name or number. There should be NO slashes, spaces, or periods in the date.
- Date: Enter the six-digit date when the sample was collected. Note that for one-digit days, months, and/or years, add zeros so that the format is MMDDYY (050210). There should be NO slashes, dashes, or periods in the date.

The QA/QC samples will be numbered consecutively as collected with a sample name, date, and number of samples collected throughout the day (i.e., when multiple QA/QC samples are collected in one day).

Examples of this naming convention are as follows:

Sample Name:	Comments
TB-050202-0001	TRIP BLANK
TB-050202-0002	TRIP BLANK
FD-050202-0001	FIELD DUPLICATE
FD-050202-0002	FIELD DUPLICATE

NOTE: The QA/QC Sample # resets to 0001 EACH DAY. This will avoid having to look back to the previous day for the correct sequential number.

6.4.3 Field Code

The field code will be written in the "Comments" field on the chain of custody for EVERY sample, but will not be a part of the actual sample name. Enter the one/two-character code for the type of sample (must be in CAPITALS):

N	Normal Field Sample
FD	Field Duplicate (note sample number [i.e., 0001] substituted for time)
TB	Trip Blank (note sample number [i.e., 0001] substituted for time)
EB	Equipment Blank (note sample number [i.e., 0001] substituted for time)
FB	Field Blank (note sample number [i.e., 0001] substituted for time)
KD	Known Duplicate
FS	Field Spike Sample
MS	Matrix Spike Sample (note on "Comments" field of chain of custody – laboratory to spike matrix.
MD	Matrix Spike Duplicate Sample (note on "Comments" field of chain of custody – laboratory to spike matrix.
RM	Reference Material

The sample labeling – both chain and sample bottles must be EXACTLY as detailed above. In addition, the Field Sample Key for each sample collected must be filled out.

6.4.4 Packaging

Sample container preparation and packing for shipment should be completed in a well-organized and clean area, free of any potential cross-contamination. The following is a list of standard guidelines that must be followed when packing samples for shipment.

- Double-bag ice in “Zip Lock” bags.
- Double-check to ensure trip and temperature blanks have been included for all shipments containing VOCs, or where otherwise specified in the QAPP.
- Enclose the chain of custody form in a “Zip Lock” bag.
- Ensure custody seals (two, minimum) are placed on each cooler. Coolers with hinged lids should have both seals placed on the opening edge of the lid. Coolers with “free” lids should have seals placed on opposite diagonal corners of the lid. Place clear tape over custody seals.
- Containers should be wiped clean of all debris/water using paper towels (paper towels must be disposed of with other contaminated materials).
- Clear, wide packing tape should be placed over the sample label for protection.
- Do not bulk pack. Each sample must be individually padded.
- Large glass containers (1 liter and up) require much more space between containers.
- Ice is not a packing material due to the reduction in volume when it melts.

Note: Never store sterile sample containers in enclosures containing equipment that uses any form of fuel or volatile petroleum-based product. When conducting sampling in freezing conditions at sites without a heated storage area (free of potential cross-contaminants), unused trip blanks should be isolated from coolers immediately after receipt. Trip blanks should be double-bagged and kept from freezing.

6.4.5 Chain of Custody Records

Chain of custody forms will be completed for all samples collected. The form documents the transfer of sample containers. The chain of custody record, completed at the time of sampling, will contain, but not be limited to, the sample number, date and time of sampling, and the name of the sampler. The chain of custody document will be signed and dated by the sampler when transferring the samples.

Each sample cooler being shipped to the laboratory will contain a chain of custody form. The cooler will be sealed properly for shipment. The laboratory will maintain a copy for its records. One copy will be returned with the data deliverables package.

The following list provides guidance for the completion and handling of all chains of custody:

- Chains of custody used should be a Haley & Aldrich of New York standard form or supplied by the analytical laboratory.
- Chains of custody must be completed in black ball-point ink only.
- Chains of custody must be completed neatly using printed text.

- If a simple mistake is made, cross out the error with a single line and initial and date the correction.
- Each separate sample entry must be sequentially numbered.
- If numerous repetitive entries must be made in the same column, place a continuous vertical arrow between the first entry and the next different entry.
- When more than one chain of custody form is used for a single shipment, each form must be consecutively numbered using the “Page ___ of ___” format.
- If necessary, place additional instructions directly onto the chain of custody in the Comment section. Do not enclose separate instructions.
- Include a contact name and phone number on the chain of custody in case there is a problem with the shipment.
- Before using an acronym on a chain of custody, define clearly the full interpretation of your designation (i.e., PCBs).

6.4.6 Shipment

Prior to the start of the field sampling, the carrier should be contacted to determine if pickup will be at the field site location. If pick-up is not available at the Site, the nearest pick-up or drop-off location should be determined. Sample shipments must not be left at unsecured drop locations.

Copies of all shipment manifests must be maintained in the field file.

7. Field Instruments – Use and Calibration

A significant number of field activities involve the use of electronic instruments to monitor environmental conditions and for health and safety purposes. It is imperative that the instruments are used and maintained properly to optimize their performance and minimize the potential for inaccuracies in the data obtained. This section provides guidance on the usage, maintenance, and calibration of electronic field equipment.

- All monitoring equipment will be in proper working order and operated in accordance with the manufacturer's recommendations.
- Field personnel will be responsible for ensuring that the equipment is maintained and calibrated in the field in accordance with the manufacturer's recommendations.
- Instruments will be operated only by personnel trained in the proper usage and calibration.
- Personnel must be aware of the range of conditions, such as temperature and humidity, for instrument operation. Usage of instruments in conditions outside these ranges will only proceed with approval of the Project Manager and/or Health and Safety Officer as appropriate.
- Instruments that contain radioactive source material, such as x-ray fluorescence analyzers or moisture-density gauges, require specific transportation, handling, and usage procedures that are generally associated with a license from the Nuclear Regulatory Commission (NRC) or an NRC-Agreement State. Under no circumstances will operation of such instruments be allowed on the Site unless by properly authorized and trained personnel, using the proper personal dosimetry badges or monitoring instruments.

7.1 GENERAL PROCEDURE DISCUSSION

Care must be taken to minimize the potential for transfer of contaminated materials to the ground or onto other materials. Regardless of the size or nature of the equipment being decontaminated, the process will utilize a series of steps that involve removal of gross material (dirt, grease, oil, etc.), washing with a detergent, and multiple rinsing steps. In lieu of a series of wash and rinse steps, steam cleaning with low-volume, high-pressure equipment (i.e., steam cleaner) is acceptable.

Exploration equipment and all monitoring equipment in contact with the sampling media must be decontaminated prior to initiating Site activities, in between exploration locations to minimize cross-contamination, and prior to mobilizing off-site after completion of Site work.

The following specific decontamination procedure is recommended for sampling equipment and tools:

- Brush loose soil off equipment;
- Wash equipment with laboratory-grade detergent (i.e., Alconox or equivalent);
- Rinse with tap water;
- Rinse equipment with distilled water;
- Allow water to evaporate before reusing equipment; and
- Wrap equipment in aluminum foil when not being used.

7.2 DECONTAMINATION OF MONITORING EQUIPMENT

Because monitoring equipment is difficult to decontaminate, care should be exercised to prevent contamination. Sensitive monitoring instruments should be protected when they are at risk of exposure to contaminants. This may include enclosing them in plastic bags, allowing an opening for the sample intake. Ventilation ports should not be covered.

If contamination does occur, decontamination of the equipment will be required; however, immersion in decontamination fluids is not possible. As such, care must be taken to wipe the instruments down with detergent-wetted wipes or sponges, and then with de-ionized water-wetted wipes or sponges.

7.3 DISPOSAL OF WASH SOLUTIONS AND CONTAMINATED EQUIPMENT

All contaminated wash water, rinses, solids, and materials used in the decontamination process that cannot be effectively decontaminated (such as polyethylene sheeting) will be containerized and disposed of in accordance with applicable regulations. All containers will be labeled with an indelible marker as to contents and date of placement in the container, and any appropriate stickers required (such as PCBs). Storage of decontamination wastes on site will not exceed 90 days under any circumstances.

Equipment/Materials:

Decontamination equipment and solutions are generally selected based on ease of decontamination and disposability.

- Polyethylene sheeting;
- Metal racks to hold equipment;
- Soft-bristle scrub brushes or long-handle brushes for removing gross contamination and scrubbing with wash solutions;
- Large, galvanized wash tubs, stock tanks, or wading pools for wash and rinse solutions;
- Plastic buckets or garden sprayers for rinse solutions;
- Large plastic garbage cans or other similar containers lined with plastic bags can be used to store contaminated clothing; and
- Contaminated liquids and solids should be segregated and containerized in New York State Department of Transportation (NYSDOT)-approved plastic or metal drums, appropriate for off-site shipping/disposal if necessary.

8. Investigation Derived Waste Disposal

8.1 RATIONALE/ASSUMPTIONS

This procedure applies to the disposition of IDW, including soils and/or groundwater. IDW is dealt with the following "Best Management Practices" and is not considered a listed waste due to the lack of generator knowledge concerning chemical source, chemical origin, and timing of chemical introduction to the subsurface.

Consequently, waste sampling and characterization are performed to determine if the wastes exhibit characteristics of hazardous waste. The disposal of soil cuttings, test pit soils, and/or purged groundwater will be reviewed on a case-by-case basis prior to initiation of field activities. Two scenarios typically exist:

- When no information is available in the area of activity or investigation, and impacted media/soils are identified. Activities such as new construction and /or maintenance below grade may encounter environmental conditions that were unknown.
- Disposal Required/Containerization Required – When sufficient Site information regarding the investigative Site conditions warrants that all materials handled will be contained and disposed.

If a known listed hazardous and/or characteristically hazardous waste/contaminated environmental media is being handled, then handling must be performed in accordance with RCRA Subtitle C (reference 2, Part V, Section 1(a),(b),(c)).

The following outlines the waste characterization procedures to be employed when IDW disposal is required.

The following procedure describes the techniques for the characterization of IDW for disposal purposes. IDW may consist of soil cuttings (augering, boring, well installation soils, test pit soils), rock core or rock flour (from coring, reaming operations), groundwater (from well development, purging, and sampling activities), decontamination fluids, PPE, and disposal equipment (DE).

8.2 PROCEDURE

The procedures for handling and characterization of field activity-generated wastes are:

A.) Soil Cuttings - Soils removed from boring activities will be contained within an approved container, suitable for transportation and disposal.
   - Once placed into the approved container, any free liquids (i.e., groundwater) will be removed for disposal as waste fluids or solidified within the approved container using a solidification agent such as Speedy Dri (or equivalent).
   - Contained soils will be screened for the presence of VOCs using a PID; this data will be logged for future reference.
   - Once screened, full, and closed, the container will be labeled and placed into the container storage area. At a minimum, the following information will be shown on each container label: date of filling/generation, Site name, source of soils (i.e., borehole or well), and contact.

- Prior to container closure, representative samples from the containers will be collected for waste characterization purposes and submitted to the project laboratory.
- Typically, at a location where an undetermined site-specific parameter group exists, sampling and analysis may consist of the full RCRA Waste Characterization (ignitability, corrosivity, reactivity, toxicity), or a subset of the above based upon data collected, historical information, and generator knowledge.

B.) Groundwater - purging and sampling groundwater, which requires disposal, will be contained.

- Containment may be performed in 55-gallon drums, tanks suitable for temporary storage (i.e., Nalgene tanks 500 to 1,000 gallons), or, if large volumes of groundwater are anticipated, tanker trailers (5,000 to 10,000 gallons ±), or drilling "Frac" tanks may be utilized (20,000 gallons ±). In all cases, the container/tank used for groundwater storage must be clean before use, such that cross-contamination does not occur.

C.) Decon Waters/Decon Fluids - Decon waters and/or fluids will be segregated, contained, and disposed of accordingly.

- Decon waters may be disposed of with the containerized groundwater once analytical results have been acquired.

D.) PPE/DE - A number of disposal options exist for spent PPE/DE generated from investigation tasks. The options typically employed are:

- Immediately disposed of within on-site dumpster/municipal trash; or
- If known to be contaminated with RCRA hazardous waste, dispose off Site at an RCRA Subtitle C facility.
- Spent Solvent/Acid Rinses - The need for sampling must be determined in consultation with the waste management organization handling the materials. If known that only the solvent and/or acids are present, then direct disposal/treatment using media-specific options may be possible without sampling (i.e., incineration).
- PPE/DE - Typically not sampled and included with the disposal of the solid wastes.

Equipment/Materials:

- Sample spoons, trier, and auger
- Sample mixing bowl
- Sampling bailer or pump
- Sample glassware

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26. USEPA RCRA - Management of Contaminated Media (October 1998).

27. USEPA CERCLA Guidance (Options Relevant to RCRA Facilities): Guide to Management of Investigation-Derived Wastes (January 1992).

28. USEPA: Low-flow (Minimal Drawdown) Groundwater Sampling Procedures (EPA/540/S-95/504).

29. USEPA: RCRA Groundwater Monitoring: Draft Technical guidance (EPA/530 R 93 001).

30. The Occupational Safety and Health Administration’s (OSHA) Excavation and Trenching Standard Title 29 of the Code of Federal Regulations (CFR) Part 1926.650.

APPENDIX A
Field Forms

HALEY ALDRICH

EQUIPMENT CALIBRATION LOG

Project: ____________________

Location: ____________________

Model Name: ____________________

Model Number: ____________________ **Serial Number:** ____________________

Cal. Standards: ____________________

____

____

Instruments will be calibrated in accordance with manufacturer's recommendations at least once per day.

Date	Time	Calibration Satandard Solution	Calibration Result	Calibrated by

Other Comments: ____________________

Groundwater Field Sampling Form

Location:

Job Number: ____________________
Well ID: ____________________
Field Sampling Crew: ___________

Date: ____________________
Start Time: ____________________
Finished Time: ____________________

Initial Depth to Water: ____________________
Well Depth: ____________________
Depth to top of screen: ____________________
Depth to bottom of screen: ____________________
Depth of Pump Intake: ____________________

Purging Device: ________________
Tubing present in well? __________
Tubing type: __________________

Time Elapsed (24 hour)	Depth to Water (from casing)	Pump Setting (ml/min or gal/min)	Purge Rate (ml/min or gal/min)	Cumulative Purge Volume (liters or gallons)	Temperature (degrees Celsius)	pH	Conductivity us/cm	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP/eH (mv)	Comments

Comments:

HALEY ALDRICH

SAMPLE IDENTIFICATION KEY

PROJECT ____________________ **H&A FILE NO.** ____________________

LOCATION ____________________ **PROJECT MGR.** ____________________

CLIENT ____________________

CONTRACTOR ____________________

Sample ID	Parent Sample ID	Location ID	Sample Date	Sample Time (military)	Sample Type Code	Filtered (Water Only T/D/N)	Composite Y/N	Soil Type	Depth To Top Of Sample	Depth To Bottom Of Sample	C.O.C. Number	Notes	Collected By

Notes:

Common Sample Type Codes:

N Normal Environmental Samp	WG Groundwater	WS Surface Water	SO Soil	GS Soil Gas	SE Sediment
WQ Water for Quality Control	FD Field Duplicate	EB Equipment Blank	TB Trip Blank	MS Matris Spike	MSD Matrix Spike Duplicate

see Memorandum dated 08/08/05 from Melanie Satanek "Sample Labeling for Submission to Analytical Laboratory" for less common codes

DAILY FIELD REPORT

Page of

Project		Report No.	
Location		Date	
Client		Page	of
Contractor		File No.	
Weather		Temperature	

Field Representative(s)	Time on site	Report/Travel/Other	Total hours

Distribution:

Haley & Aldrich, Inc.

Form 4004

GEOPROBE BORING REPORT

BORING NO.

Page 1 of

PROJECT			
LOCATION		PROJECT MGR.	
CLIENT		FIELD REP.	
CONTRACTOR		DATE STARTED	
DRILLER		DATE FINISHED	

Elevation ft.	Datum	Boring Location

Item	Casing	Sampler	Core Barrel	Rig Make & Model			Hammer Type	Drilling Mud	Casing Advance
Type				☐ Truck	☐ Tripod	☐ Cat-Head	☐ Safety	☐ Bentonite	Type Method Depth
Inside Diameter (in.)				☐ ATV	☐ Geoprobe	☐ Winch	☐ Doughnut	☐ Polymer	
Hammer Weight (lb.)				☐ Track	☐ Air Track	☐ Roller Bit	☐ Automatic	☐ None	
Hammer Fall (in.)				☐ Skid	☐ ______	☐ Cutting Head	Drilling Notes:		

Depth (ft.)	Casing Blows	Sampler Blows per 6 in.	Sample No. & Recovery (in.)	Sample Depth (ft)	Elev./ Depth (ft)	Visual-Manual Identification & Description (density/consistency, color, GROUP NAME & SYMBOL, maximum particle size*, structure, odor, moisture, optional descriptions, geologic interpretation)

Water Level Data						Sample ID	Summary
			Depth in feet to:				
Date	Time	Elapsed Time (hr.)	Bottom of Casing	Bottom of Hole	Water	O Open End Rod T Thin Wall Tube U Undisturbed Sample S Split Spoon Sample G Geoprobe	Overburden (Linear ft.) ______ Rock Cored (Linear ft.) ______ Number of Samples ______
Date							BORING NO.

*NOTE: Maximum Particle Size is determined by direct observation within the limitations of sampler size.

NOTE: Soil descriptions based on a modified Burmister method of visual-manual identification

Form #3000

APPENDIX B
Quality Assurance Project Plan

www.haleyaldrich.com

QUALITY ASSURANCE PROJECT PLAN
120 EAST 140TH STREET
BRONX, NEW YORK

by
H & A of New York Engineering and Geology, LLP
New York, New York

for
BH Walton LLC
Brooklyn, New York

File No. 0214715
January 2026

Executive Summary

This Quality Assurance Project Plan outlines the scope of the quality assurance and quality control activities associated with the Site sampling activities associated with the Remedial Investigation Work Plan for 120 East 140th Street (formerly 301 Walton Avenue), Bronx, New York.

Protocols for sample collection, sample handling and storage, chain of custody procedures, and laboratory and field analyses are described herein or specifically referenced to related project documents.

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1. Project Description

This Quality Assurance Project Plan (QAPP) has been prepared as a component of the Remedial Investigation Work Plan (RIWP) for 120 East 140th Street (formerly 301 Walton Avenue), Bronx, New York (Site).

1.1 PROJECT OBJECTIVES

The primary objective for data collection activities is to collect sufficient data necessary to characterize the subsurface conditions at the Site and determine the nature and extent of contamination.

1.2 SITE DESCRIPTION AND HISTORY

The general Site description and Site history are provided in the Site Description and History Summary that accompanies the RIWP appended to the Brownfield Cleanup Program (BCP) Application for the Site and incorporated herein by reference.

1.3 LABORATORY PARAMETERS

The laboratory parameters for soil include:

- Target Compound List (TCL) volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 8260B
- TCL semi-volatile organic compounds (SVOCs) using EPA Method 8270C
- Total Analyte List (TAL) metals using EPA Method 6010
- TCL pesticides using EPA Method 8081B
- Polychlorinated biphenyls (PCBs) using EPA Method 8082
- Per- and polyfluoroalkyl substances (PFAS) using EPA Method 1633
- 1,4-dioxane using EPA Method 8270

The laboratory parameters for groundwater include:

- TCL VOCs using EPA Method 8260B
- TCL SVOCs using EPA Method 8270C
- Total metals using EPA Methods 6010/7471
- Dissolved metals using EPA Methods 6010/7471
- PCBs using EPA Method 8082;
- Pesticides by EPA Method 8081B
- PFAS using EPA Method 1633
- 1,4-dioxane using EPA Method 8270 SIM

Note: PFAS will be collected in accordance with the New York State Department of Environmental Conservation (NYSDEC), Division of Environmental Remediation (DER), "Sampling, Analysis and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC Part 375 Remedial Program," April 2023.

During the collection of groundwater samples, pH, specific conductivity, temperature, dissolved oxygen (DO), and oxidation/reduction potential (ORP) will be measured until stabilized.

The analytical laboratory parameters for soil vapor samples include:

- VOCs using EPA Method TO-15

Laboratory parameters for disposal samples will be determined by the disposal facility after an approved facility has been determined.

1.4 SAMPLING LOCATIONS

The RIWP provides the locations of soil borings, soil vapor implants, and groundwater monitoring wells that will be sampled (as applicable).

2. Project Organization and Responsibilities

This section defines the roles and responsibilities of the individuals who will perform the RIWP monitoring activities. A New York State Department of Health (NYSDOH)-certified analytical laboratory will perform the analyses of environmental samples collected at the Site.

2.1 PROJECT TEAM

The following project personnel are anticipated for oversight of the RIWP implementation. Project team resumes are included in Attachment A.

NYSDEC Case Manager	Pending
NYSDOH Case Manager	Pending
Qualified Environmental Professional (QEP)	Mari C. Conlon
Project Manager	Emily Butler
Haley & Aldrich of New York* Health & Safety Director	Brian Fitzpatrick, CHMM
Health & Safety Officer (HSO)	Brian Ferguson
Quality Assurance (QA) Officer	Nicole Mooney
Third Party Validator	Katherine Miller

** H & A of New York Engineering and Geology, LLP = Haley & Aldrich of New York*

2.2 MANAGEMENT RESPONSIBILITIES

The Project Manager is responsible for managing the implementation of the RIWP and monitoring and coordinating the collection of data. The Project Manager is responsible for technical quality control (QC) and project oversight. The Project Manager's responsibilities include the following:

- Acquire and apply technical and corporate resources as needed to ensure performance within budget and schedule restraints;
- Review work performed to ensure quality, responsiveness, and timeliness;
- Communicate with the client point of contact concerning the progress of the monitoring activities;
- Assure corrective actions are taken for deficiencies cited during audits of RIWP monitoring activities; and
- Assure compliance with the Site Health and Safety Plan (HASP).

2.3 QUALITY ASSURANCE RESPONSIBILITIES

The QA team will consist of a QA Officer and the Data Validation Staff. QA responsibilities are described in the following sections.

2.3.1 Quality Assurance Officer

The QA Officer reports directly to the Project Manager and will be responsible for overseeing the review of field and laboratory data. Additional responsibilities include the following:

- Assure the application and effectiveness of the QAPP by the analytical laboratory and the project staff;
- Provide input to the Project Manager as to corrective actions that may be required as a result of the above-mentioned evaluations; and
- Prepare and/or review data validation and audit reports.

The QA Officer will be assisted by the Data Validation Staff in the evaluation and validation of field and laboratory-generated data.

2.3.2 Data Validation Staff

The Data Validation Staff will be independent of the laboratory and familiar with the analytical procedures performed. The validation will include a review of each validation criterion as prescribed by the guidelines presented in Section 9.2 of this document and will be presented in a Data Usability Summary Report (DUSR) for submittal to the QA Officer.

2.4 LABORATORY RESPONSIBILITIES

The Environmental Laboratory Approval Program (ELAP)-approved laboratory to be used will be Alpha Analytical Inc. (Alpha), located in Westborough, Massachusetts. Laboratory services in support of the RIWP monitoring include the following personnel:

2.4.1 Laboratory Project Manager

The Laboratory Project Manager will report directly to the QA Officer and Project Manager and will be responsible for ensuring all resources of the laboratory are available on an as-required basis. The Laboratory Project Manager will also be responsible for the approval of the final analytical reports.

2.4.2 Laboratory Operations Manager

The Laboratory Operations Manager will report to the Laboratory Project Manager and will be responsible for coordinating laboratory analysis, supervising in-house chain of custody reports, scheduling sample analyses, overseeing data review, and overseeing the preparation of analytical reports.

2.4.3 Laboratory QA Officer

The Laboratory QA Officer will have sole responsibility for the review and validation of the analytical laboratory data. The Laboratory QA Officer will provide Case Narrative descriptions of any data quality issues encountered during the analyses conducted by the laboratory. The Laboratory QA Officer will also define appropriate QA procedures, overseeing QA/QC documentation.

2.4.4 Laboratory Sample Custodian

The Laboratory Sample Custodian will report to the Laboratory Operations Manager and will be responsible for the following:

- Receive and inspect the incoming sample containers;
- Record the condition of the incoming sample containers;
- Sign appropriate documents;
- Verify chain of custody and its correctness;
- Notify the Project Manager and Operations Manager of sample receipt and inspection;
- Assign a unique identification number and enter each into the sample receiving log;
- Initiate transfer of samples to laboratory analytical sections; and
- Control and monitor access/storage of samples and extracts.

2.4.5 Laboratory Technical Personnel

The Laboratory Technical Personnel will have the primary responsibility for the performance of sample analysis and the execution of the QA procedures developed to determine the data quality. These activities will include the proper preparation and analysis of the project samples in accordance with the laboratory's Quality Assurance Manual (QAM) and associated Standard Operating Procedures (SOPs).

2.5 FIELD RESPONSIBILITIES

2.5.1 Field Coordinator

The Field Coordinator is responsible for the overall operation of the field team and reports directly to the Project Manager. The Field Coordinator works with the project HSO to conduct operations in compliance with the project HASP. The Field Coordinator will facilitate communication and coordinate efforts between the Project Manager and the field team members.

Other responsibilities include the following:

- Develop and implement field-related work plans, ensuring schedule compliance and adhering to management-developed project requirements;
- Coordinate and manage field staff;
- Perform field system audits;
- Oversee QC for technical data provided by the field staff;
- Prepare and approve text and graphics required for field team efforts;
- Coordinate and oversee technical efforts of subcontractors assisting the field team;
- Identify problems in the field, resolve difficulties in consultation with the Project QA Officer and Project Manager, and implement and document corrective action procedures; and
- Participate in preparation of the final reports.

2.5.2 Field Team Personnel

Field Team Personnel will be responsible for the following:

- Perform field activities as detailed in the RIWP and in compliance with the Field Sampling Plan (FSP; Appendix A of the RIWP) and QAPP.
- Immediately report any accidents and/or unsafe conditions to the Site HSO and take reasonable precautions to prevent injury.

3. Sampling Procedures

The FSP in Appendix A of the RIWP provides the SOPs for sampling required by the RIWP. Sampling will be conducted in general accordance with the NYSDEC Technical Guidance for Site Investigation and Remediation (DER-10) and the Sampling, Analysis, and Assessment of PFAS under NYSDEC Part 375 Remedial Program (April 2023) when applicable. Proposed sample locations are shown on Figure 4 of the RIWP.

3.1 SAMPLE CONTAINERS

Sample containers for each sampling task will be provided by the laboratory performing the analysis. The containers will be cleaned by the manufacturer to meet or exceed the analyte specifications established in the EPA's "Specifications and Guidance for Obtaining Contaminant-Free Sample Containers," April 1992, OSWER Directive #9240.0-0.5A. Certificates of analysis for each lot of sample containers used will be maintained by the laboratory.

The appropriate sample containers, preservation method, maximum holding times, and handling requirements for each sampling task are provided in Table I.

3.2 SAMPLE LABELING

Each sample will be labeled with a unique sample identifier that will facilitate tracking and cross-referencing of sample information. Field blanks and field duplicate samples will also be numbered with a unique sample identifier to prevent analytical bias of field QC samples.

Refer to the FSP (Appendix A of the RIWP) for the sample labeling procedures.

3.3 FIELD QC SAMPLE COLLECTION

3.3.1 Field Duplicate Sample Collection

3.3.1.1 Water Samples

Field duplicate samples will be collected by filling the first sample container to the proper level and sealing and then repeating for the second set of sample containers.

1. The samples are properly labeled as specified in Section 3.2.
2. Steps 1 through 4 are repeated for the bottles for each analysis. The samples are collected in order of decreasing analyte volatility.
3. Chain of custody documents are executed.
4. The samples will be handled as specified in Table I.

3.3.1.2 Soil Samples

Soil field duplicates will be collected as specified in the following procedure:

1. Soils will be sampled directly from acetate liners.
2. Soil for VOC analysis will be removed from the sampling device as specified in the FSP provided as Appendix A of the RIWP.
3. Soil for non-VOC analysis will be removed from the sampling device and collected into clean laboratory-provided containers.

3.4 GENERAL DECONTAMINATION PROCEDURES

Care must be taken to minimize the potential for transfer of contaminated materials to the ground or onto other materials. Regardless of the size or nature of the equipment being decontaminated, the process will utilize a series of steps that involve removal of gross material (dirt, grease, oil, etc.), washing with a detergent, and multiple rinsing steps. In lieu of a series of wash and rinse steps, steam cleaning with low-volume, high-pressure equipment (i.e., steam cleaner) is acceptable.

Exploration equipment, and all monitoring equipment in contact with the sampling media must be decontaminated prior to initiating Site activities, in between exploration locations to minimize cross-contamination, and prior to mobilizing off-Site after completion of Site work.

The following specific decontamination procedure is recommended for sampling equipment and tools:

- Brush loose soil off equipment;
- Wash equipment with laboratory-grade detergent (i.e., Alconox or equivalent);
- Rinse with tap water;
- Rinse equipment with distilled water;
- Allow water to evaporate before reusing equipment; and
- Wrap equipment in aluminum foil when not being used.

4. Custody Procedures

Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final project files. Custody of a sample begins when it is collected by or transferred to an individual and ends when that individual relinquishes or disposes of the sample.

A sample is under custody if:

1. The item is in actual possession of a person;
2. The item is in the view of the person after being in actual possession of the person;
3. The item was in actual possession and subsequently stored to prevent tampering; or
4. The item is in a designated and identified secure area.

4.1 FIELD CUSTODY PROCEDURES

Field personnel will keep written records of field activities on applicable preprinted field forms or in a bound field notebook to record data collecting activities. These records will be written legibly in ink and will contain pertinent field data and observations. Entry errors or changes will be crossed out with a single line, dated, and initialed by the person making the correction. Field forms and notebooks will be periodically reviewed by the Field Coordinator.

The beginning of each entry in the logbook or preprinted field form will contain the following information:

- Date;
- Start time;
- Weather;
- Names of field personnel (including subcontractors);
- Level of personal protection used at the Site; and
- Names of all visitors and the purpose of their visit.

For each measurement and sample collected, the following information will be recorded:

- A detailed description of the sample location;
- The equipment used to collect the sample or make the measurement, and the date the equipment was calibrated;
- The time the sample was collected;
- A description of the sample conditions;
- The depth at which the sample was collected (if applicable);
- The volume and number of containers filled with the sample; and
- The sampler's identification.

4.1.1 Field Procedures

The following procedure describes the process to maintain the integrity of the samples:

- Upon collection, samples are placed in the proper containers. In general, samples collected for organic analysis will be placed in pre-cleaned glass containers, and samples collected for inorganic analysis will be placed in pre-cleaned plastic (polyethylene) bottles. Refer to the FSP in Appendix A of the RIWP for sample packaging procedures.
- Samples will be assigned a unique sample number and will be affixed to a sample label. Refer to the FSP in Appendix A of the RIWP for sample labeling procedures.
- Samples will be properly and appropriately preserved by field personnel in order to minimize loss of the constituent(s) of interest due to physical, chemical, or biological mechanisms.
- Appropriate volumes will be collected to ensure that the appropriate reporting limits can be successfully achieved and that the required QC sample analyses can be performed.

4.1.2 Transfer of Custody and Shipment Procedures

- A chain of custody record will be completed at the time of sample collection and will accompany each shipment of project samples to the laboratory. The field personnel collecting the samples will be responsible for the custody of the samples until the samples are relinquished to the laboratory. Sample transfer will require the individuals relinquishing and receiving the samples to sign, date, and note the time of sample transfer on the chain of custody record.
- Samples will be shipped or delivered in a timely fashion to the laboratory so that holding times and/or analysis times as prescribed by the methodology can be met.
- Samples will be transported in containers (coolers) that will maintain the refrigeration temperature for those parameters for which refrigeration is required in the prescribed preservation protocols.
- Samples will be placed in an upright position and limited to one layer of samples per cooler. Additional bubble wrap or packaging material will be added to fill the cooler. Shipping containers will be secured with strapping tape and custody tape for shipment to the laboratory.
- When samples are split with the NYSDEC representatives, a separate chain of custody will be prepared and marked to indicate with whom the samples are shared. The person relinquishing the samples will require the representative's signature acknowledging sample receipt.
- If samples are sent by a commercial carrier, a bill of lading will be used. A copy of the bill of lading will be retained as part of the permanent record. Commercial carriers will not sign the custody record as long as the custody record is sealed inside the sample cooler and the custody tape remains intact.
- Samples will be picked up by a laboratory courier or transported to the laboratory the same day they are collected, unless collected on a weekend or holiday. In these cases, the samples will be stored in a secure location until delivery to the laboratory. Additional ice will be added to the cooler as needed to maintain proper preservation temperatures.

4.2 LABORATORY CHAIN OF CUSTODY PROCEDURES

A Sample Custodian will be designated by the laboratory and will have the responsibility to receive all incoming samples. Once received, the custodian will document if the sample is received in good condition (i.e., unbroken, cooled, etc.) and that the associated paperwork, such as chain of custody forms, has been completed. The custodian will sign the chain of custody forms.

The custodian will also document if sufficient sample volume has been received to complete the analytical program. The Sample Custodian will then place the samples into secure, limited-access storage (refrigerated storage, if required). The Sample Custodian will assign a unique number to each incoming sample for use in the laboratory. The unique number will then be entered into the sample-receiving log, with the verified time and date of receipt also noted.

Consistent with the analyses requested on the chain of custody form, analyses by the laboratory's analysts will begin in accordance with the appropriate methodologies. Samples will be removed from secure storage, with internal chain of custody sign-out procedures followed.

4.3 STORAGE OF SAMPLES

Empty sample bottles will be returned to secure and limited-access storage after the available volume has been consumed by the analysis. Upon completion of the entire analytical work effort, samples will be disposed of by the Sample Custodian. The length of time that samples are held will be at least 30 days after reports have been submitted. Disposal of remaining samples will be completed in compliance with all federal, state, and local requirements.

4.4 FINAL PROJECT FILES CUSTODY PROCEDURES

The final project files will be the central repository for all documents with information relevant to sampling and analysis activities as described in this QAPP. The Haley & Aldrich of New York Project Manager will be the custodian of the project file. The project files, including all relevant records, reports, logs, field notebooks, pictures, subcontractor reports, and data reviews, will be maintained in a secured, limited-access area and under the custody of the Project Director or his designee.

The final project file will include the following:

- Project plans and drawings;
- Field data records;
- Sample identification documents and soil boring/monitoring well logs;
- All chain of custody documentation;
- Correspondence;
- References, literature;
- Laboratory data deliverables;
- Data validation and assessment reports;
- Progress reports, QA reports; and

- A final report.

The laboratory will be responsible for maintaining analytical logbooks, laboratory data, and sample chain of custody documents. Raw laboratory data files and copies of hard copy reports will be inventoried and maintained by the laboratory for a period of six years, at which time the laboratory will contact the Haley & Aldrich of New York Project Manager regarding the disposition of the project-related files.

5. Calibration Procedures and Frequency

5.1 FIELD INSTRUMENT CALIBRATION PROCEDURES

Several field instruments will be used for both on-Site screening of samples and for health and safety monitoring, as described in the HASP. On-Site air monitoring for health and safety purposes may be accomplished using a vapor detection device, such as a photoionization detector (PID).

Field instruments will be calibrated at the beginning of each day and checked during field activities to verify performance. Instrument-specific calibration procedures will be performed in accordance with the instrument manufacturer's requirements.

5.2 LABORATORY INSTRUMENT CALIBRATION PROCEDURES

Reference materials of known purity and quality will be utilized for the analysis of environmental samples. The laboratory will carefully monitor the preparation and use of reference materials, including solutions, standards, and reagents, through well-documented procedures.

All solid chemicals and acids/bases used by the laboratory will be rated as "reagent grade" or better. All gases will be "high" purity or better. All Standard Reference Materials (SRMs) or Performance Evaluation (PE) materials will be obtained from approved vendors of the National Institute of Standards and Technology (NIST; formerly National Bureau of Standards), the EPA Environmental Monitoring Support Laboratories (EMSL), or reliable Cooperative Research and Development Agreement (CRADA)-certified commercial sources.

6. Analytical Procedures

Analytical procedures to be utilized for analysis of environmental samples will be based on referenced EPA analytical protocols and/or project-specific SOPs.

6.1 FIELD ANALYTICAL PROCEDURES

Field analytical procedures include the measurement of pH, temperature, ORP, DO, and specific conductivity during sampling of groundwater, and the qualitative measurement of VOC during the collection of soil samples.

6.2 LABORATORY ANALYTICAL PROCEDURES

Laboratory analyses will be based on the EPA methodology requirements promulgated in:

- “Test Methods for Evaluating Solid Waste,” SW-846, EPA, Office of Solid Waste, and promulgated updates, 1986.

6.2.1 List of Project Target Compounds and Laboratory Detection Limits

The method detection limits (MDLs) studies are performed by the laboratories in accordance with the procedures established in the Code of Federal Regulations, Title 40, Part 136.

Laboratory parameters for soil samples are listed in the RIWP. Laboratory parameters for disposal samples will be determined by the disposal facility after an approved facility has been determined.

6.2.2 List of Method-Specific Quality Control Criteria

The laboratory SOPs include a section that presents the minimum QC requirements for the project analyses. Section 7.0 references the frequency of the associated QC samples for each sampling effort and matrix.

7. Internal Quality Control Checks

This section presents the internal QC checks that will be employed for field and laboratory measurements.

7.1 FIELD QUALITY CONTROL

7.1.1 Field Blanks

Internal QC checks will include analysis of field blanks to validate equipment cleanliness. Whenever possible, dedicated equipment will be employed to reduce the possibility of cross-contamination of samples.

7.1.2 Trip Blanks

Trip blanks samples will be prepared by the project laboratory using ASTM Type II or equivalent water placed within pre-cleaned 40-milliliter (mL) VOC vials equipped with Teflon™ septa. Trip blanks will accompany each sample delivery group (SDG) of environmental samples collected for analysis of VOCs.

Trip blank samples will be placed in each cooler that stores and transports project samples that are to be analyzed for VOCs.

7.2 LABORATORY PROCEDURES

Procedures that contribute to the maintenance of overall laboratory QA/QC include appropriately cleaned sample containers, proper sample identification and logging, applicable sample preservation, storage, and analysis within prescribed holding times, and use of controlled materials.

7.2.1 Field Duplicate Samples

The precision or reproducibility of the data generated will be monitored through the use of field duplicate samples. Field duplicate analysis will be performed at a frequency of one in 20 project samples.

Precision will be measured in terms of the absolute value of the relative percent difference (RPD) as expressed by the following equation:

$$RPD = [|R1-R2|/[(R1+R2)/2]] \times 100\%$$

Acceptance criteria for duplicate analyses performed on solid matrices will be 100 percent, and aqueous matrices will be 35 percent (or the absolute difference rule was satisfied if detects were less than five times the RL). RPD values outside these limits will require an evaluation of the sampling and/or analysis procedures by the project QA Officer and/or Laboratory QA Director. Corrective actions may include re-analysis of additional sample aliquots and/or qualification of the data for use.

7.2.2 Matrix Spike Samples

Ten percent of each project sample matrix for each analytical method performed will be spiked with known concentrations of the specific target compounds/analytes.

The amount of the compound recovered from the sample compared to the amount added will be expressed as a percent recovery. The percent recovery of an analyte is an indication of the accuracy of an analysis within the Site-specific sample matrix. Percent recovery will be calculated for matrix spike and matrix spike duplicate (MS/MSD) samples using the following equation.

$$\% \; Recovery = \frac{Spiked \; Sample \text{ - } Background}{Known \; Value \; of \; Spike} \; x \, 100\%$$

If the QC value falls outside the control limits (upper control limit [UCL] or lower control limit [LCL]) due to sample matrix effects, the results will be reported with appropriate data qualifiers. To determine the effect a non-compliant MS recovery has on the reported results, the recovery data will be evaluated as part of the validation process.

7.2.3 Laboratory Control Sample Analyses

The laboratory will perform laboratory control sample (LCS) analyses prepared from SRMs. The SRMs will be supplied from an independent manufacturer and traceable to NIST materials with known concentrations of each target analyte to be determined by the analytical methods performed. In cases where an independently supplied SRM is not available, the LCS may be prepared by the laboratory from a reagent lot other than that used for instrument calibration.

The laboratory will evaluate LCS analyses in terms of percent recovery using the most recent laboratory-generated control limits.

LCS recoveries that do not meet acceptance criteria will be deemed invalid. Analysis of project samples will cease until an acceptable LCS analysis has been performed. If sample analysis is performed in association with an out-of-control LCS sample analysis, the data will be deemed invalid.

Corrective actions will be initiated by the Haley & Aldrich of New York QA Officer and/or Laboratory QA Officer to investigate the problem. After the problem has been identified and corrected, the solution will be noted in the instrument run logbook, and re-analysis of project samples will be performed, if possible.

The analytical anomaly will be noted in the SDG Case Narrative and reviewed by the Data Validator. The Data Validator will confirm that appropriate corrective actions were implemented and recommend the applicable use of the affected data.

7.2.4 Surrogate Compound/Internal Standard Recoveries

For VOCs, surrogates will be added to each sample prior to analysis to establish purge and trap efficiency. Quantitation will be accomplished via internal standardization techniques.

The recovery of surrogate compounds and internal standards will be monitored by laboratory personnel to assess possible Site-specific matrix effects on instrument performance.

For SVOC analyses, surrogates will be added to the raw sample to assess extraction efficiency. Internal standards will be added to all sample extracts and instrument calibration standards immediately before analysis for quantitation via internal standardization techniques.

Method-specific QC limits are determined by appropriate laboratory method SOPs. Surrogate compound/internal standard recoveries that do not fall within accepted QC limits for the analytical methodology performed will have the analytical results flagged with data qualifiers as appropriate by the laboratory and will not be noted in the laboratory report Case Narrative.

To ascertain the effect that non-compliant surrogate compound/internal standard recoveries may have on the reported results, the recovery data will be evaluated as part of the validation process. The Data Validator will provide recommendations for corrective actions, including but not limited to additional data qualification.

7.2.5 Calibration Verification Standards

Calibration verification (CV) standards will be utilized to confirm instrument calibrations and performance throughout the analytical process. CV standards will be prepared as prescribed by the respective analytical protocols. Continuing calibration will be verified by compliance with method-specific criteria prior to additional analysis of project samples.

Non-compliant analysis of CV standards will require immediate corrective action by the project Laboratory QA Officer and/or designated personnel. Corrective action may include re-analysis of each affected project sample, a detailed description of the problem, the corrective action undertaken, the person who performed the action, and the resolution of the problem.

7.2.6 Laboratory Method Blank Analyses

Method blank sample analysis will be performed as part of each analytical batch for each methodology performed. If target compounds are detected in the method blank samples, the reported results will be flagged by the laboratory in accordance with standard operating procedures. The Data Validator will provide recommendations for corrective actions, including but not limited to additional data qualification.

8. Data Quality Objectives

Sampling that will be performed as described in the RIWP is designed to produce data of the quality necessary to achieve the minimum standard requirements of the field and laboratory analytical objectives described below. These data are being obtained with the primary objective of assessing levels of contaminants of concern associated with the Site.

The overall project data quality objective (DQO) is to implement procedures for field data collection, sample collection, handling, laboratory analysis, and reporting that achieve the project objectives. The following section is a general discussion of the criteria that will be used to measure achievement of the project DQO.

8.1 PRECISION

8.1.1 Definition

Precision is defined as a quantitative measure of the degree to which two or more measurements are in agreement. Precision will be determined by collecting and analyzing field duplicate samples and by creating and analyzing laboratory duplicates from one or more of the field samples. The overall precision of measurement data is a mixture of sampling and analytical factors. The analytical results from the field duplicate samples will provide data on sampling precision. The results from duplicate samples created by the laboratory will provide data on analytical precision. The measurement of precision will be stated in terms of RPD; RPD is defined as the absolute difference of duplicate measurements divided by the mean of these analyses, normalized to a percentage.

8.1.2 Field Precision Sample Objectives

Field precision will be assessed through the collection and measurement of field duplicate samples at a rate of one duplicate per 20 investigative samples. The RPD criteria for the project field duplicate samples will be +/- 100 percent for soil and +/- 35 percent for groundwater for parameters of analysis detected at concentrations greater than five times the laboratory reporting (RL).

8.1.3 Laboratory Precision Sample Objectives

Laboratory precision will be assessed through the analysis of LCS and laboratory control duplicate samples (LCSD) and MS/MSD samples for groundwater and soil samples, and the analysis of laboratory duplicate samples for air and soil vapor samples. Air and soil vapor laboratory duplicate sample analyses will be performed by analyzing the same SUMMA® canister twice. The RPD criteria for the air/soil vapor laboratory duplicate samples will be +/- 35 percent for parameters of analysis detected at concentrations greater than five times the laboratory RL.

8.2 ACCURACY

8.2.1 Definition

Accuracy relates to the bias in a measurement system. Bias is the difference between the observed and the "true" value. Sources of error are the sampling process, field contamination, preservation techniques, sample handling, sample matrix, sample preparation, and analytical procedure limitations.

8.2.2 Field Accuracy Objectives

Sampling bias will be assessed by evaluating the results of the field equipment rinse and trip blanks. Equipment rinse and trip blanks will be collected as appropriate based on sampling and analytical methods for each sampling effort.

If non-dedicated sampling equipment is used, equipment rinse blanks will be collected by passing ASTM Type II water over and/or through the respective sampling equipment utilized during each sampling effort. One equipment rinse blank will be collected for each type of non-dedicated sampling equipment used for the sampling effort. Equipment rinse blanks will be analyzed for each target parameter for the respective sampling effort for which environmental media have been collected.

Note: If dedicated or disposable sampling equipment is used, equipment rinse samples will not be collected as part of that field effort.

Trip blank samples will be prepared by the laboratory and provided with each shipping container that includes containers for the collection of groundwater samples for the analysis of VOC. Trip blank samples will be analyzed for each VOC for which groundwater samples have been collected for analysis.

8.3 LABORATORY ACCURACY OBJECTIVES

Analytical bias will be assessed through the use of LCS and Site-specific MS sample analyses. LCS analyses will be performed with each analytical batch of project samples to determine the accuracy of the analytical system.

One set of MS/MSD analyses will be performed with each batch of 20 project samples collected for analysis to assess the accuracy of the identification and quantification of analytes within the Site-specific sample matrices. Additional sample volume will be collected at sample locations selected for the preparation of MS/MSD samples so that the standard laboratory RLs are achieved.

The accuracy of analyses that include a sample extraction procedure will be evaluated through the use of system monitoring or surrogate compounds. Surrogate compounds will be added to each sample, standard, blank, and QC sample prior to sample preparation and analysis. Surrogate compound percent recoveries will provide information on the effect of the sample matrix on the accuracy of the analyses.

8.4 REPRESENTATIVENESS

8.4.1 Definition

Representativeness expresses the degree to which sample data represent a characteristic of a population, a parameter variation at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon the design of the sampling program. The representativeness criterion is satisfied through the proper selection of sampling locations, the quantity of samples, and the use of appropriate procedures to collect and analyze the samples.

8.4.2 Measures to Ensure Representativeness of Field Data

Representativeness will be addressed by prescribing sampling techniques and the rationale used to select sampling locations. Sampling locations may be biased (based on existing data, instrument surveys, observations, etc.) or unbiased (completely random or stratified-random approaches).

8.5 COMPLETENESS

8.5.1 Definition

Completeness is a measure of the amount of valid (usable) data obtained from a measuring system compared to the total amount anticipated to be obtained. The completeness goal for all data uses is that a sufficient amount of valid data be generated so that determinations can be made related to the intended data use with a sufficient degree of confidence. Valid data is determined by independent confirmation of compliance with method-specific and project-specific data quality objectives. The calculation of data set completeness will be performed using the following equation.

$$\frac{\textit{Number of Valid Sample Results}}{\textit{Total Number of Samples Planned}} \; X\ 100 = \%\ \textit{Complete}$$

8.5.2 Field Completeness Objectives

Completeness is a measure of the amount of valid measurements obtained from measurements taken in this project versus the number planned. The field completeness objective for this project will be greater than 90 percent.

8.5.3 Laboratory Completeness Objectives

The laboratory data completeness objective is a measure of the amount of valid data obtained from laboratory measurements. The evaluation of the data completeness will be performed at the conclusion of each sampling and analysis effort.

The completeness of the data generated will be determined by comparing the amount of valid data, based on independent validation, with the total laboratory data set. The completeness goal will be greater than 90 percent.

8.6 COMPARABILITY

8.6.1 Definition

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another.

8.6.2 Measures to Ensure Comparability of Laboratory Data

Comparability of laboratory data will be measured from the analysis of SRM obtained from either EPA CRADA suppliers or the NIST. The reported analytical data will also be presented in standard units of mass of contaminant within a known volume of environmental media. The standard units for various sample matrices are as follows:

- Solid Matrices – micrograms per kilogram for PFAS analyses, milligrams per kilogram of media (Dry Weight).
- Aqueous Matrices – nanograms per liter for PFAS analyses, micrograms per liter of media for organic analyses, and milligrams per liter for inorganic analyses.

8.7 LEVEL OF QUALITY CONTROL EFFORT

If non-dedicated sampling equipment is used, equipment rinse blanks will be prepared by field personnel and submitted for analysis of target parameters. Equipment rinse blank samples will be analyzed to check for potential cross-contamination between sampling locations that may be introduced during the investigation. One equipment rinse blank will be collected per sampling event to the extent that non-dedicated sampling equipment is used.

If necessary, a separate equipment rinse blank sample will be collected for PFAS using the sample collection procedure described in Section 8.1.1 of the NYSDEC-approved FSP.

Note: If dedicated or disposable sampling equipment is used, equipment rinse samples will not be collected as part of that field effort.

Trip blanks will be used to assess the potential for contamination during sample storage and shipment. Trip blanks will be provided with the sample containers to be used for the collection of groundwater samples for the analysis of VOCs. Trip blanks will be preserved and handled in the same manner as the project samples. One trip blank will be included along with each shipping container containing project samples to be analyzed for VOCs.

Method blank samples will be prepared by the laboratory and analyzed concurrently with all project samples to assess potential contamination introduced during the analytical process.

Field duplicate samples will be collected and analyzed to determine sampling and analytical reproducibility. One field duplicate will be collected for every 20 or fewer investigative samples collected for off-Site laboratory analysis.

MS will provide information to assess the precision and accuracy of the analysis of the target parameters within the environmental media collected. One MS/MSD will be collected for every 20 or fewer investigative samples per sample matrix.

Note: Soil MS/MSD samples require triple sample volume for VOCs only. Aqueous MS/MSD samples require triple the normal sample volume for VOC analysis and double the volume for the remaining parameters.

9. Data Reduction, Validation, and Reporting

Data generated by the laboratory operation will be reduced and validated prior to reporting in accordance with the following procedures:

9.1 DATA REDUCTION

9.1.1 Field Data Reduction Procedures

Field data reduction procedures will be minimal in scope compared to those implemented in the laboratory setting. The pH, conductivity, temperature, turbidity, DO, ORP, and breathing zone VOC readings collected in the field will be generated from direct read instruments. The data will be written into field logbooks immediately after measurements are taken. If errors are made, data will be legibly crossed out, initialed and dated by the field member, and corrected in a space adjacent to the original entry.

9.1.2 Laboratory Data Reduction Procedures

Laboratory data reduction procedures are provided by the appropriate chapter of EPA's "Test Methods for Evaluating Solid Waste," SW-846, Third Edition. Errors will be noted; corrections will be made with the original notations crossed out legibly. Analytical results for soil samples will be calculated and reported on a dry weight basis.

9.1.3 Quality Control Data

QC data (e.g., laboratory duplicates, surrogates, MS, and MSD) will be compared to the method acceptance criteria. Data determined to be acceptable will be entered into the laboratory information management system.

Unacceptable data will be appropriately qualified in the project report. Case Narratives will be prepared, which will include information concerning data that fell outside acceptance limits and any other anomalous conditions encountered during sample analysis.

9.2 DATA VALIDATION

Data validation procedures of the analytical data will be performed by the Haley & Aldrich of New York QA Officer or designee using the following documents as guidance for the review process:

- "U.S. EPA National Functional Guidelines for Organic Data Review," "Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15," "Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances Under NYSDEC's Part 375 Remedial Programs," and the "U.S. EPA National Functional Guidelines for Inorganic Data Review."
- The specific data qualifiers used will be applied to the reported results as presented and defined in the EPA National Functional Guidelines. Validation will be performed by qualified personnel at the direction of the Haley & Aldrich of New York QA Officer. Tier 1 data validation (the equivalent of EPA's Stage 2A validation) will be performed to evaluate data quality.

- The completeness of each data package will be evaluated by the Data Validator. Completeness checks will be administered on all data to determine that the deliverables are consistent with the NYSDEC Analytical Services Protocol (ASP) Category A and Category B data package requirements. The validator will determine whether the required items are present and request copies of missing deliverables (if necessary) from the laboratory.

9.3 DATA REPORTING

Data reporting procedures will be carried out for field and laboratory operations as indicated below:

- Field Data Reporting: Field data reporting will be conducted principally through the transmission of report sheets containing tabulated results of measurements made in the field and documentation of field calibration activities.
- Laboratory Data Reporting: The laboratory data reporting package will enable data validation based on the protocols described above. The final laboratory data report format will include the QA/QC sample analysis deliverables to enable the development of a DUSR based on NYSDEC DER-10, Appendix 2B.

10. Performance and System Audits

A performance audit is an independent quantitative comparison with data routinely obtained in the field or the laboratory. Performance audits include two separate, independent parts: internal and external audits.

10.1 FIELD PERFORMANCE AND SYSTEM AUDITS

10.1.1 Internal Field Audit Responsibilities

Internal audits of field activities will be initiated at the discretion of the Project Manager and will include the review of sampling and field measurements. The audits will verify that all procedures are being followed. Internal field audits will be conducted periodically during the project. The audits will include examination of the following:

- Field sampling records, screening results, instrument operating records;
- Sample collection;
- Handling and packaging in compliance with procedures;
- Maintenance of QA procedures; and
- Chain of custody reports.

10.1.2 External Field Audit Responsibilities

External audits may be conducted by the Project Coordinator at any time during the field operations. These audits may or may not be announced and are at the discretion of the NYSDEC. The external field audits can include (but are not limited to) the following:

- Sampling equipment decontamination procedures;
- Sample bottle preparation procedures;
- Sampling procedures;
- Examination of HASPs;
- Procedures for verification of field duplicates; and
- Field screening practices.

10.2 LABORATORY PERFORMANCE AND SYSTEM AUDITS

10.2.1 Internal Laboratory Audit Responsibilities

The laboratory system audits are typically conducted by the Laboratory QA Officer or designee on an annual basis. The system audit will include an examination of laboratory documentation, including sample receiving logs, sample storage, chain of custody procedures, sample preparation and analysis, and instrument operating records.

At the conclusion of internal system audits, reports will be provided to the laboratory's operating divisions for appropriate comment and remedial/corrective action where necessary. Records of audits and corrective actions will be maintained by the Laboratory QA Officer.

10.2.2 External Laboratory Audit Responsibilities

External audits will be conducted, as required, by the NYSDOH or designee. External audits may include any of the following:

- Review of laboratory analytical procedures;
- Laboratory on-site visits; and
- Submission of performance evaluation samples for analysis.

Failure of any of the above audit procedures can lead to laboratory decertification. An audit may consist of, but not be limited to:

- Sample receipt procedures;
- Custody, sample security, and log-in procedures;
- Review of instrument calibration logs;
- Review of QA procedures;
- Review of logbooks;
- Review of analytical SOPs; and
- Personnel interviews.

A review of a data package from samples recently analyzed by the laboratory can include (but not be limited to) the following:

- Comparison of the resulting data to the SOP or method;
- Verification of initial and continuing calibrations within control limits;
- Verification of surrogate recoveries and instrument timing results;
- Review of extended quantitation reports for comparisons of library spectra to instrument spectra, where applicable; and
- Assurance that samples are run within holding times.

11. Preventive Maintenance

11.1 FIELD INSTRUMENT PREVENTIVE MAINTENANCE

The field equipment preventive maintenance program is designed to ensure the effective completion of the sampling effort and to minimize equipment downtime. Program implementation is concentrated in three areas:

- Maintenance responsibilities;
- Maintenance schedules; and
- Inventory of critical spare parts and equipment.

The maintenance responsibilities for field equipment will be assigned to the task leaders in charge of specific field operations. Field personnel will be responsible for daily field checks and calibrations and for reporting any problems with the equipment. The maintenance schedule will follow the manufacturer's recommendations. In addition, the field personnel will be responsible for determining that an inventory of spare parts will be maintained with the field equipment. The inventory will primarily contain parts that are subject to frequent failure, have limited useful lifetimes, and/or cannot be obtained in a timely manner.

11.2 LABORATORY INSTRUMENT PREVENTIVE MAINTENANCE

Analytical instruments at the laboratory will undergo routine and/or preventive maintenance. The extent of the preventive maintenance will be a function of the complexity of the equipment.

Generally, annual preventive maintenance service will involve cleaning, adjusting, inspecting, and testing procedures designed to detect instrument failure and/or extend useful instrument life. Between visits, routine operator maintenance and cleaning will be performed according to the manufacturer's specifications by laboratory personnel.

12. Specific Routine Procedures Used to Assess Data Precision, Accuracy, and Completeness

12.1 FIELD MEASUREMENTS

Field-generated information will be reviewed by the Field Coordinator and typically includes evaluation of bound logbooks/forms, data entry, and calculation checks. Field data will be assessed by the Project Coordinator, who will review the field results for compliance with the established QC criteria that are specified in Sections 7 and 8 of this QAPP. The accuracy of pH and specific conductance will be assessed using daily instrument calibration, calibration checks, and blank data. Accuracy will be measured by determining the percent recovery (% R) of calibration check standards. Precision of the pH and specific conductance measurements will be assessed on the basis of the reproducibility of duplicate readings of a field sample and will be measured by determining the RPD. Accuracy and precision of the soil VOC screening will be determined using duplicate readings of calibration checks. Field data completeness will be calculated using the following equation:

$$Completeness = \frac{Valid\ (usable)\ Data\ Obtained}{Total\ Data\ Planned}\ X\ 100$$

12.2 LABORATORY DATA

Laboratory data will be assessed by the Haley & Aldrich of New York QA Officer or designee, who will review the laboratory results for compliance with the established QC criteria that are specified in Sections 7 and 8 of this QAPP.

13. Quality Assurance Reports

Critically important to the successful implementation of the QAPP is a reporting system that provides the means by which the program can be reviewed, problems identified, and programmatic changes made to improve the plan.

QA reports to management can include:

- Audit reports, internal and external audits with responses;
- Performance evaluation sample results, internal and external sources; and
- Daily QA/QC exception reports/corrective actions.

QA/QC corrective action reports will be prepared by the Haley & Aldrich of New York QA Officer when appropriate and presented to the project and/or laboratory management personnel so that performance criteria can be monitored for all analyses from each analytical department. The updated trend/QA charts prepared by the laboratory QA personnel will be distributed and reviewed by various levels of the laboratory management.

References

1. New York State Department of Environmental Conservation, 1991. NYSDEC Analytical Services Protocol (ASP), Bureau of Environmental Investigation, 1991 with updates.

2. New York State Department of Environmental Conservation, 2010. Division of Environmental Remediation, Technical Guidance for Site Investigation and Remediation, DER-10. May.

3. New York State Department of Environmental Conservation, 2023. Division of Environmental Remediation, Sampling, Analysis and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC Part 375 Remedial Program. April.

4. United States Environmental Protection Agency, 1986. Test Methods for Evaluating Solid Waste, Office of Solid Waste, U.S. EPA, SW-846, November 1986, with updates.

5. United States Environmental Protection Agency, 1991. Preparation Aids for the Development of Category I Quality Assurance Project Plans. U.S. EPA/600/8-91/003, Risk Reduction Engineering Laboratory, Office of Research and Development, Cincinnati, Ohio. February.

6. United States Environmental Protection Agency, 1992. Specifications and Guidance for Contaminant-Free Sample Containers. OSWER Directive 9240.0-05A. April.

7. United States Environmental Protection Agency, 1993. Data Quality Objectives Process for Superfund Interim Final Guidance. U.S. EPA/540/R-93-071, Office of Solid Waste and Emergency Response (OSWER). September.

8. United States Environmental Protection Agency, 1999. EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations. EPA QA/R-5 Interim Final. November.

9. United States Environmental Protection Agency. U.S. EPA National Functional Guidelines for Organic Data Review. U.S. EPA 540/R-2017-002.

10. United States Environmental Protection Agency. U.S. EPA National Functional Guidelines for Organic Data Review. U.S. EPA 540/R-2017-001.

https://haleyaldrich.sharepoint.com/sites/BHWaltonLLC/Shared Documents/0214715.120 E 140th (301 Walton Avenue)/Deliverables/03. RIWP/Appendices/Appendix B - QAPP/2026-0114 HANY-120 E 140th (301 Walton Avenue)-QAPP_F.docx

TABLE

TABLE I

SUMMARY OF ANALYSIS METHOD, PRESERVATION METHOD, HOLDING TIME, SAMPLE SIZE REQUIREMENTS AND SAMPLE CONTAINERS

120 EAST 140TH STREET
BRONX, NEW YORK

Analysis/Method	Sample Type	Preservation	Holding Time	Volume/Weight	Container
Volatile Organic Compounds/8260C/5035	Soil	1 - 1 Vial MeOH/2 Vial Water, Cool, 4 ± 2 °C	14 days[1]	120 mL	3 - 40-mL glass vials
Semivolatile Organic Compounds/8270D	Soil	Cool, 4 ± 2 °C	14 days	250 mL	1 - 8 oz Glass
Metals/6010C	Soil	Cool, 4 ± 2 °C	180 days	60 mL	1 - 2 oz Glass
Polychlorinated Biphenyls/8082A	Soil	Cool, 4 ± 2 °C	14 days	250 mL	1 - 8 oz Glass
Pesticides (8081B)	Soil	Cool, 4 ± 2 °C	14 days	250 mL	1 - 8 oz Glass
PFAS 1633	Soil	Cool, 4 ± 2 °C	14 days	250 mL	1 - 8 oz Glass
1,4-Dioxane 8270	Soil	Cool, 4 ± 2 °C	14 days	250 mL	1 - 8 oz Glass
Volatile Organic Compounds/8260B	Groundwater	HCl, Cool, 4 ± 2 °C	14 days	120 mL	3 - 40-mL glass vials
Semivolatile Organic Compounds/8270C	Groundwater	Cool, 4 ± 2 °C	7 days	500 mL	2 - 250-mL amber glass
TAL Metals 6010/7471	Groundwater	HNO_3Cool, 4 ± 2 °C	180 days	500 mL	1 - 500-mL plastic bottle
Polychlorinated Biphenyls/8082	Groundwater	Cool, 4 ± 2 °C	365 days	2000 mL	2 - 1000-mL amber glass
Pesticides & Herbicides (8081B and 8151A)	Groundwater	Cool, 4 ± 2 °C	7 days	3000 mL	2 - 500-mL amber glass 2 - 1000-mL amber glass
PFAS 1633A	Groundwater	H2O Cool, 4 ± 2 °C	14 days	500 mL	2 - Teflon free 250 ml plastic containers
1,4-Dioxane 8270D	Groundwater	Cool, 4 ± 2 °C	7 days	500 mL	1 - 500-mL plastic bottle
Volatile Organic Compounds/TO-15	Soil Vapor	N/A	30 days	2.7 - 6 L	1 2.7 or 6 L Summa Canister

Notes:

1. Terracores and encores must be frozen within 48 hours of collection

2. Refer to text for additional information.

ATTACHMENT A
Project Team Resumes

HALEY ALDRICH

MARI C. CONLON

Senior Client Account Manager

EDUCATION

MS, Geology, Boston College

BS, Geology with a minor in Economics and Business, Lafayette College

PROFESSIONAL REGISTRATIONS

NY: Professional Geologist (License No. 000769)

PROFESSIONAL SOCIETIES

Big Apple Brownfield Awards, Co-Chair, 2018-2022

Big Apple Brownfield Awards Nomination Committee, 2016-2025

New York City Brownfield Partnership Executive Board, 2021-2025

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120)

10-Hour OSHA Construction Safety

8-Hour OSHA Supervisor of Hazardous Waste (29 CFR 1910.120 & 29 CFR 1926.65)

Mari is a senior client account manager with experience in soil, groundwater and soil vapor investigation and a focus on remedial design and implementation. She is also experienced in completion of numerous Phase I Environmental Site Assessments and Phase II Environmental Site Investigations, site characterization, hazardous materials analysis, regulatory closure reports as well as remedial design and implementation.

Mari has experience in composing site closure documentation including Remedial Closure Reports and Noise Installation Reports reviewed by the Office of Environmental Remediation as well as Final Engineering Reports and Site Management Plans reviewed by the New York State Department of Environmental Conservation. Mari has also worked on city rezoning proposals by performing work associated with and composing the Hazardous Materials Analysis chapter included in Final Environmental Impact Statements published by New York City Department of Planning. Analysis methods were performed in accordance with the City Environmental Quality Review (CEQR) guidelines for neighborhoods including East New York, Brooklyn, Jerome Avenue, Brooklyn, Inwood, and Manhattan.

Mari has managed the investigation, remedial design, remediation and closeout of multiple inactive Resource Conservation and Recovery Act (RCRA) hazardous waste sites, New York State Superfund sites and petroleum spill case sites. Her background includes developing and complying with approved site management plans overseeing the operation and maintenance of on-site engineering controls, such as soil vapor extraction systems, sub-slab depressurization systems, product recovery systems, etc., and ensuring the protection of human health and the environment.

RELEVANT PROJECT EXPERIENCE

State and City Agencies

School Construction Authority, Waste Characterization and Excavation Materials Disposal Plan, Brooklyn, New York. Project manager for consulting services for New York Public School 127. Services included composition of an Excavated Materials Disposal Plan, collection of waste characterization samples and preparation of and preparation of a findings and recommendations report.

Department of City Planning, Rezoning Environmental Impact Statement, Bronx, New York. Project lead for analysis and composing the Hazardous Materials Chapter as per City Environmental Quality Review (CEQR) Technical Manual guidelines included in the Final Environmental Impact Statement (FEIS) for an approximately 92-block area primarily along Jerome Avenue and its east-west commercial corridors in the Bronx. The review assessed the potential for the presence of hazardous materials in soil and/or groundwater at both the projected and potential development sites identified in the reasonable worst-case development scenario under the proposed East New York Rezoning Proposal. Procedures involved site inspections and review of historic Sanborn fire insurance maps, city directories and city/state regulatory databases. The assessment identified that each of the 146 projected and potential development sites has some associated concern regarding environmental conditions. As a result, the proposed zoning map actions include (E) designations (E-366) for all privately-held projected and potential development sites.

Department of City Planning, Rezoning Environmental Impact Statement, Brooklyn, New York. Project lead for performance analysis and composing the Hazardous Materials Chapter as per CEQR Technical Manual guidelines included in the FEIS for an approximately 190-block area of East New York, Cypress Hills, and Ocean Hill neighborhoods of Brooklyn, New York. The review assessed the potential for the presence of hazardous materials in soil and/or groundwater at both the projected and potential development sites identified in the reasonable worst-case development scenario under the proposed East New York Rezoning Proposal. Procedures involved site inspections and review of historic Sanborn fire insurance maps, city directories and city/state regulatory databases. The assessment identified that each of the 186 projected and potential development sites has some associated concern regarding environmental conditions. As a result, the proposed zoning map actions include (E) designations (E-366) for all privately-held projected and potential development sites.

Redevelopment and Remediation

Titan Equity Group, Hotel Redevelopment, Bronx, New York. Project manager for a hotel redevelopment in the south Bronx. The site has been assigned New York City Office of Environmental Remediation (NYC OER) E-Designation status for hazardous materials, noise, and air quality. Services included completion of a remedial investigation, composition of a Remedial Investigation Report and development of Hazardous Material Remedial Action Work Plan and Air Quality/Noise Remedial Action Plan as per NYC OER requirements.

The Related Companies, Chelsea Mixed-Use Redevelopment, New York, New York. Field geologist for oversight of the remediation of a mixed-use residential and commercial building, the second of a two-building development on 30th Street. Contaminants of concern included volatile and semi-volatile organic compounds associated with historic operations and underground storage tanks (USTs) located on the Site. The Site was given an E-designation (E-142) for hazardous materials and noise as part of the Highline/West Chelsea rezoning proposal. To satisfy the requirements of the E-designation program, soil was excavated to at least 12 feet below grade and bottom endpoint collected showing no contaminants of concern exceeding the New York State Department of Environmental Conservation (NYSDEC) Unrestricted Use Soil Cleanup Objectives (SCO). By achieving Unrestricted Use SCOs, no engineering controls were necessary, although the building slab was included as part of development, and removal of the hazardous materials E-designation was requested.

Tishman Speyer, Long Island City Residential Development, Long Island City, New York. Field geologist for remedial oversight and implementation of a Community Air Monitoring Program during concurrent remediation and development of three Brownfield Cleanup Program (BCP) sites located in Long Island City, New York. The Sites were grossly contaminated with creosote, a carcinogenic chemical formed from the distillation of various tars. Remediation strategies included soil excavation and in-situ soil stabilization. To prevent migration of groundwater off-site, a temporary and later a permanent capture well system was installed on the western boundary of the property. The BCP site located on the western portion of the property left residual contamination in place requiring installation of a sub-slab depressurization system.

Queens West Development Corporation, Queens Waterfront Development, Long Island City, New York. Field geologist for performance of site management post remedial action. Services included annual groundwater monitoring, evaluation of engineering and institutional controls completion and Period Review Reports. In addition to conducting annual site management activities, responsibilities included composing a work plan to evaluate the transition from active sub-slab depressurization systems to passive. Upon NYSDEC approval, active systems were shut down for 30 days prior to a sub-slab vapor sampling event evaluation soil vapor, indoor and outdoor air conditions for potential vapor intrusion risk. As results indicated no evidence of vapor intrusion, continued pressure monitoring was conducted for from the existing monitoring ports for one year assessing whether negative pressure was held by the existing slab by stack-effect or other passive processes.

Jim Beam Brands Co., Brownfield Cleanup Program Remediation Site, Long Island City, New York. Field geologist for oversight of the installation of an Electrical Resistive Heating (ERH) system implemented in order to remediate trichloroethylene groundwater plumes in shallow/intermediate and deep groundwater on- and off-site. The Site, a former stapler manufacturing facility, underwent various remedies, including a Soil Vapor Extraction system, air sparging, ozone injection and chemical oxidation using potassium permanganate injections, which resulted in little reduction to contamination levels and rebounding chlorinated solvents. Components of the ERH system installed included electrodes for delivery of steam, vapor recovery wells, and groundwater monitoring wells. The site is currently under remediation in the state BCP program.

Due Diligence and Site Characterization

Manufacturing Plants, Multiple Investors, Environmental and Compliance Assessment Portfolio United States. Project lead for completion of Phase I Environmental Site Assessments (ESAs) and Limited Compliance Reviews for multiple auto parts manufacturing facilities throughout the United States. Services included completion of Phase I ESAs in accordance with the American Society for Testing and Materials E1527-13 requirements and a limited review of each facility's compliance liabilities including issues pertaining to the Resource Conservation and Recovery Act, Greenhouse Gas Emission Standards and Tier II Emergency and Hazardous Chemical Inventory reporting requirements.

ARM Parking, Environmental Site Assessment and Subsurface Investigation, Brooklyn, New York. Project manager for site assessment and subsurface investigation of parking facility in Sunset Park neighborhood, Brooklyn, New York. Services included ground penetrating radar survey for former and current petroleum USTs, completion of a subsurface investigation of soils and composition of Limited Subsurface Investigation Report.

Spill Consulting

The Trump Organization, Spill Consulting Services, New York, New York. Project manager for consulting services provided after incidental release of calcium carbonate ice rink paint to the Central Park Pond from Wollman Rink. Services included liaising with NYSDEC regarding violations, consent order and required corrective action. Corrective action included designing alterations to the existing on-site drainage plans and routing all meltwater containing paint into the combined sewer system. Coordination was required with property owner, operations personnel, New York City Department of Parks and NYSDEC.

Richmond Gardens Apartments, Spill Management and Closure Services, Staten Island, New York. Project lead responsible for spill closure activities and reporting for Spill 1105661 located at the Richmond Gardens Apartment Complex in the Richmond neighborhood of Staten Island, New York. The spill was opened in 2011 when several underground storage tanks were identified adjacent to the apartments at Jersey Street and Hendricks Avenue. The tanks were cleaned and removed and impacted soils surrounding the tank area excavated to the extent possible. Excavation of all impacted material was not feasible due to the proximity of the tanks to the apartment buildings. Residual contamination in soil and groundwater remained and was monitored through 2016. Upon reviewing the groundwater monitoring data from over 12 consecutive quarters, it was apparent monitored natural attenuation was not a feasible option and an in situ chemical oxidation (ISCO) remedy was approved by NYSDEC. Due to success of the pilot test, the ISCO injection event was implemented utilizing pressure pulse technology to deliver the alkaline activated persulfate solution to the subsurface.

EMILY BUTLER

Project Manager, Geologist

EDUCATION

B.A., Geology, Geography, Colgate University

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120)
8-Hour OSHA Hazardous Waste Worker Refresher Training (29 CFR 1910.120)
30-Hour OSHA Construction Safety Training
10-Hour OSHA Construction Safety Training
LIRR Contractor Safety and Security Training
Amtrak Contractor Training
Metro-North Railroad Contractor Training, 2022
NYC DOB Site Safety Training, 2020-2025
First Aid/CPR/AED Certified

Emily is a geologist and project manager with 10 years of experience working in the environmental services and petroleum industries. She brings experience designing, implementing, and managing multiple large remediation, due diligence, and redevelopment projects across regulatory programs (e.g., New York State Brownfield Cleanup Program, New York City Office of Environmental Remediation Voluntary Cleanup Program, and New York State Superfund Program) with budgets ranging from $20k to $5M. Emily has led and coordinated project teams consisting of subcontractors, vendors, and junior staff. She has successfully negotiated with regulatory agencies and prepared technical reports to ensure compliance and progress of remediation efforts. In addition, she has managed investigations and remediations of complex contaminants, including petroleum, chlorinated solvents, and per-and polyfluoroalkyl substances (PFAS).

RELEVANT PROJECT EXPERIENCE

Lendlease, The Riverie, Brownfield Cleanup Program site, Brooklyn, New York. Emily was the project manager for a large redevelopment project located on the waterfront in the Greenpoint neighborhood of Brooklyn, New York. The 2.6-acre site is being redeveloped into a mixed-use development, including a residential tower with 800 residential units, retail space, and a shoreline esplanade with New York City Ferry terminal access. Project management responsibilities included management of field staff overseeing the remedial action, waste management and tracking, budget management, management of subcontractors and vendors, and communication with the client, the New York State Department of Environmental Conservation (NYSDEC), and site contractors. Emily negotiated with NYSDEC to maximize soil reuse, and developed and implemented a complex remedial design program and community air monitoring program. The remedy for the site included design of a sub-slab depressurization system (SSDS) to mitigate vapors beneath the future building, as well as negotiation with NYSDEC and the New York City Office of Environmental Remediation (NYCOER) to ensure 421a schedule requirements were achieved. This project will achieve the highest green and sustainable standards, and includes a massive, closed-loop geothermal system to provide heating and cooling. Once complete, this all-electric project will be the largest geothermal project in New York State to use a geothermal exchange system. Components of this system include, in part, a well field of over 320 vertical geothermal wells drilled to a depth of approximately 500 feet below land surface.

Confidential client, 85-89 Jane Street, New York, New York. Emily was the project manager of a NYCOER site redevelopment in lower Manhattan, New York, of a former garage and auto repair operation and a manufacturing facility on two adjacent lots into a multistory single-family residence. The site contains an E-designation and as such is going through the NYCOER Voluntary Cleanup Program (VCP). Project management responsibilities included management of field staff, waste management and tracking, budget management, management of laboratory subcontractors and vendors, and routine communication with NYCOER, client, and site contractors.

Cinemagic, NYSDEC BCP site, Long Island City, New York. Emily served as the project manager for a brownfield redevelopment in Long Island City for a former warehouse building/printing press under the NYSDEC Brownfield Cleanup Program (BCP). The redevelopment includes an interim remedial measure (IRM) installation of a retrofit SSDS for the building. The redevelopment will include sound stages for a movie studio.

Goodman, NYSDEC BCP site, Long Island City, New York. Emily was the project manager for a brownfield redevelopment of a former retail gasoline station and automobile dealership/service center under the NYSDEC BCP. The redevelopment includes two adjacent BCP sites that will be redeveloped into one industrial/commercial distribution warehouse. There is contamination of soil, groundwater, and soil vapor on the site related to its former use as a gasoline filling station and service center.

Amtrak, Sunnyside Yard, New York State Superfund site, Long Island City, New York. Emily served as project manager for multiple projects to support remediation activities at the Amtrak Sunnyside Yard State Superfund Site. Responsibilities included characterization of subsurface conditions, including polychlorinated biphenyls (PCB) and polycyclic aromatic hydrocarbons (PAH) soil and groundwater contamination. Emily oversaw the implementation of remediation activities, including soil excavation and off-site disposal.

F&T Group, Tangram Plaza, NYCOER cleanup site, Flushing, New York. Emily was the field manager for a remedial investigation and waste characterization program at a former mall. She was responsible for soil trucking and manifesting for proper disposal of over 300,000 cubic yards of soil to multiple off-site disposal facilities, including several sites enrolled into the NYCOER Clean Soil Bank. Daily excavation oversight included coordination with the general contractor, groundwater dewatering oversight, Community Air Monitoring Program implementation, inspection of vapor barrier and waterproofing installation, and daily reporting of site activity. Project management duties consisted of staff management, daily reporting to the NYCOER project manager, and communication with both the client and contractor.

Pfizer, NYSDEC Spills Program site, Brooklyn, New York. Emily was the field manager for a site in the NYSDEC Spills Program. This project included an in situ chemical oxidation injection program utilizing RegenOx™ oxidant compound, which was injected into 28 injection points throughout the site. Responsibilities included monitoring groundwater from influence from injections; subcontractor oversight; and providing health and safety oversight.

Forest City, Atlantic Terminal/Pacific Park Redevelopment Project, Brooklyn, New York. Emily served as field manager for a large redevelopment project including four buildings with E-designations. The project encompasses 22 acres including the Barclays Center. Project included oversight of in situ waste characterization sampling, excavation, and proper disposal of soil. Emily provided oversight of pre-demolition asbestos and hazardous materials surveys. She also provided environmental support for demolition and relocation of an active 9-acre 100-year-old railyard. Emily was responsible for oversight of remediation work at several NYSDEC spill sites within the project footprint, including underground storage tank (UST) removal and soil excavation.

Gotham Organization, NYSDEC BCP site, Queens, New York. Emily was the field manager for remediation of two parcels, as part of the NYSDEC BCP. This project included due diligence environmental assessment and investigation, development of NYSDEC-approved Remedial Investigation Work Plan and Remedial Action Work Plan, and remediation during construction of two mixed-use, affordable housing developments.

ExxonMobil, LNAPL evaluation, multiple sites, New York. Emily was the field manager for site-wide light nonaqueous phase liquid (LNAPL) transmissivity evaluation at multiple sites in New York including former refinery and petroleum storage terminal sites. Field investigation methods included baildown and manual skimming tests.

Triangle Equities, The Crossings at Brick Church Station, mixed-use development, East Orange, New Jersey. Emily served as field manager for the remedial investigation of a redevelopment site that contained seven former and one operating dry cleaner, three former fueling stations, and a former automotive repair shop. Responsibilities included oversight of New Jersey-specific monitoring well installation and collection of soil and groundwater samples for suspected contamination of chlorinated solvents.

Powerhouse Arts, former MGP site, **Brooklyn, New York.** Emily was the field manager responsible for the field implementation of a soil characterization work plan and a chlorinated solvent delineation work plan for a former manufactured gas plant (MGP) site. The operation of the MGP led to contamination of subsurface soil and groundwater by coal tar, a byproduct of the gas manufacturing process, and as a result, the NYSDEC issued a Record of Decision specifying the required remedy for the site. The remedy will include soil excavation and off-site thermal treatment, a sheet pile barrier wall, a vapor barrier, and basement ventilation system. A comprehensive air monitoring program was conducted during the fieldwork due to the concerns over coal tar residue emissions and odors on the surrounding community.

ExxonMobil, former petroleum refinery, Brooklyn, New York. Emily was a field staff member addressing the largest subsurface free-product plume in North America at a former petroleum refinery and terminal. Responsibilities included construction oversight of subcontractors, implementation of site-specific health and safety plan, construction management of infrastructure upgrades, soil investigation and sampling programs, installation of groundwater monitoring wells, classification of soil lithology, and collection and screening of soil, groundwater, and soil vapor samples.

Columbia Falls Aluminum Company, EPA Superfund site, Columbia Falls, Montana. Emily was the field manager for a 1,300-acre former aluminum smelter site under the federal Superfund program. Fieldwork included groundwater, surface water, and sediment sampling.

Multiple clients, oilfield services analyst, Gulf of Mexico. Emily was an oilfield services analyst in offshore well-site units on exploration drilling rigs for multiple clients in the Gulf of Mexico. She was responsible for collecting, processing, and analyzing geological samples and using various laboratory techniques to evaluate complex data for signs of oil or gas. Additionally, she operated, maintained, and monitored a real-time computer-based acquisition system that recorded drilling parameters as the first line of defense for the safety and efficiency of drilling operations.

HALEY ALDRICH

BRIAN FITZPATRICK, CHMM

Corporate Director, Health and Safety

EDUCATION

M.P.A., Environmental Policy, Syracuse University
B.S., Environmental Science, University of Massachusetts-Amherst
A.S., Chemistry, Valley Forge Military Junior College
Commissioned Officer, United States Army

CERTIFICATIONS

Certified Hazardous Materials Manager (Reg. No. 13454)
Certified Department of Transportation Shipper
Certified International Air Transport Authority Shipper

PROFESSIONAL SOCIETIES

Alliance of Hazardous Materials Professionals
Academy of Certified Hazardous Materials Managers, New England Chapter

SPECIAL STUDIES AND COURSES

Department of Transportation
International Air Transport Authority
Incident Commander
Confined Space Entry and Rescue
Radiation Safety Officer
RCRA Hazardous Waste
Massachusetts Industrial Waste Water Operator Grade 2I (expired)

AWARDS

Presidents Club Award (one million hours worked without a recordable injury, Cabot Corporation
Chancellors Award for Excellence, Syracuse University

Brian has over 25 years of experience in developing, implementing, and managing a wide range of environmental, health, and safety (EH&S) solutions for a variety of clients. Brian has served as the Health and Safety Manager and Incident Commander at several research and development sites and has managed extensive programs to maintain and clean contaminated sites under Federal and State regulatory programs. He has provided expertise in managing EH&S programs as a consultant, and has actively developed, implemented, and managed these programs as an EH&S professional for various industries.

Brian is currently working as the Chief Health and Safety Officer for Haley & Aldrich, Inc. He, and his staff, are involved in every project Haley & Aldrich, Inc. undertakes. Brian is involved on several projects, directly overseeing the health and safety on the project site of our staff, our contractors, and the public. Brian also acts as support for our on-site health and safety staff on other larger construction and remediation projects.

Through Brian's leadership our safety culture and focus extend from the top of our organization to each and every Haley & Aldrich employee as well as subconsultants and subcontractors. Utilizing a Behavior Based Safety approach, Haley & Aldrich expects every project team member to play an important role in making our projects safe and has given authority to every Haley & Aldrich employee, subconsultant, and subcontractor to stop any activity at any time for health or safety concerns. Our record illustrates that our hard work is paying off. The company has gone 4 years without a lost time injury, and our TRIR and EMR have consistently improved each of the last 3 years.

RELEVANT PROJECT EXPERIENCE

Haley & Aldrich, Inc., Burlington, Massachusetts. As Chief Health and Safety Officer, Brian has led and facilitated the development and implementation of corporate health and safety (H&S) improvement plans to enhance compliance and improve H&S performance. In Brian's time with Haley & Aldrich, Inc., the company has realized dramatic improvement on H&S goals and in Key Performance Indicators. Brian is responsible for developing a risk competence culture, where our staff are empowered to look for and engage to address risk before anyone is injured. Brian oversees the development, implementation and continuous improvement of all H&S programs for the company. Additional responsibilities include:

- Developing a safety culture through incident reporting, root cause analysis, behavior-based safety, hazard recognition and risk assessment, communication, and developing leaders;
- Monitoring proposed and existing SH&E regulations and legislation to determine their impact on operations and to ensure continued compliance;
- Overseeing the safety, industrial hygiene, and toxicology programs for over 600 staff members engaged in remediation, construction, health and safety, consulting, and general office work across 28 offices in the United States and on assignment to international project sites;
- Continuously seeks to improve H&S performance as measured by the OSHA Incident Rating (IR) and Worker's Compensation Experience Modification Rating (EMR), as well as Leading Indicators developed with the management team; and
- Participating in the corporate audit program as an auditor or lead auditor;

Energy Client, California. As Chief Health and Safety Officer, Brian led and facilitated the Alliance Partnership Safety Council in 2017, is still an active contributor to the council, and hosts routine contractor safety forums for the client. Brian is actively involved in the development and implementation of program safety, health, and environmental (SH&E) plans to ensure safe operations on project sites. Brian developed permits and Health and Safety Plans for large projects and routinely audits the site safety. Additional responsibilities include:

- Driving reporting and behavior-based safety initiatives to support our internal safety culture and developing monthly summary reports to illustrate performance to our client.
- Develop, assess and continuously improve site safety plans and practices, including specific safety protocols for working safely over and around water.
- Worked as an extension of the client's organization to provide assurance that the remedy was completed safely and consistent with client-specific requirements.
- Support on-site safety personnel in ensuring the health and safety of the general public, our staff, and our sub-contracted employees.
- Audits and visits sites to ensure compliance with our internal policies and client-specific requirements.

Energy Client, Ohio. As Chief Health and Safety Officer, Brian supports the project team in developing and executing client and project specific health and safety measures, such as a site specific Health and Safety Plan, Job Hazard Analyses, Industrial Hygiene program, and site specific training. Brian also routinely visits the site to assess current practices and condition and to ensure continuous improvement. Additional responsibilities include:

- Develop, assess, and continuously improve site safety plans and practices, including specific safety protocols to comply with supplemental EH&S requirements such as the Duke Health and Safety Handbook, Environmental Supplemental, and EHS Keys to Life.
- Develop, assess, and continuously improve site safety plans and practices to address the risks associated with the work being performed on site, as well as the environmental conditions and simultaneous operations, including trenching and excavation, hot work, work over and near water, heavy equipment, HAZWOPER, etc.
- Worked as an extension of the client's organization to provide assurance that the remedy was completed safely and consistent with client-specific requirements.
- Support on-site safety personnel in ensuring the health and safety of the general public, our staff, and our sub-contracted employees.
- Audits and visits site to ensure compliance with our internal policies and client-specific requirements.

BRIAN A. FERGUSON

Senior Engineer

EDUCATION

M. S. Geotechnical Engineering, Tufts University, Medford, Massachusetts; 2012
B. S. Civil Engineering, State University of New York - Environmental, Science, and Forestry, Syracuse, New York; 2000
Ass. Science Degree in Applied Science and Technology (Nuclear Engineering), Thomas A. Edison State College, Trenton, New Jersey; 2000

PROFESSIONAL SOCIETIES

Order of the Engineer – 2000
Boston Society of Civil Engineers (BSCE)
American Society of Civil Engineers (ASCE)

SPECIAL STUDIES AND COURSES

American Concrete Institute – Certified Field Technician Certified Grade 1
Radiation Safety and Operations of Nuclear Testing Equipment – Troxler
40-Hour OSHA Hazardous Waste Operations Training (+ 8-Hour annual refresher)
10-Hour OSHA Construction training
Confined Space Entry Training
16-Hour Asbestos Operations and Maintenance

Mr. Ferguson has over six years of experience serving as project engineer on a variety of real estate development projects. His project experience has included monitoring field investigations and performing construction oversight, performing due diligence and engineering analyses, performing geotechnical analyses and developing geotechnical recommendations, and preparing geotechnical reports and project specifications.

In addition to providing engineering design support, Mr. Ferguson has managed and participated in a number of field service activities. Field work has included construction monitoring and documentation of contractors' deep and shallow foundation related construction, including slurry walls, caissons, pile driving, pile cap installation, earthwork, backfilling and compaction, installation of soldier pile and wood lagging support systems, installation of tie backs, reading inclinometers, conducting in-place field unit weight tests, tie-back load testing, seismograph installation, monitoring, and evaluating, and preparation of footing bearing surfaces. Other responsibilities have included site development activities, including placement of utilities and subgrade preparation for roads; observations and testing to determine that work is completed in compliance with contract documents; on-site soil management; sampling of soil and groundwater for chemical laboratory testing and conducting in situ field screening; maintenance of job records including pile driving logs, results of field density tests, records of caisson and footing installations; preparation of daily field reports; in contact with key personnel; and resolution of field related problems.

RELEVANT PROJECT EXPERIENCE

St. Elizabeths Hostpital – West Campus Forensic Evaluations, Washington, D.C. Project Engineer for forensic evaluations on the adaptive reuse of former hospital buildings. Responsibilities included coordination of a field exploration program, including test borings and test pits to obtain subsurface information for project design and construction, overseeing multiple field personnel, subcontractors, assisting with project management, reviewing subcontractors invoices, reviewing and summarizing subsurface data and writing data reports.

TUFTS University, New Central Energy Plant, Medford, MA. Project engineer for a new Central Energy Plant that will house new co-generation steam boilers, centralized chilled water and electrical transformer switchgear that is planned to occupy approximately 20,000 square feet across two or three levels. Responsibilities included coordination of construction monitoring, observing SOE and footing installation, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

Lahey Hospital and Medical Center – Stilts Infill Project, Burlington, MA Project Engineer for an addition to the existing Stilts building on the Lahey campus. Responsibilities included coordination and overseeing geotechnical and environmental subsurface investigations, coordination of construction monitoring, observing footing installation, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

Gloucester Beauport Hotel, Gloucester, MA Project engineer for a four story hotel with a seawall constructed adjacent to tidal beach. Responsibilities included coordination and overseeing geotechnical and environmental subsurface investigations, coordination of construction monitoring, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings, design and implementation of a sub-slab gas mitigation system.

275 Wyman Street, New Office Building, Waltham, MA. Project engineer for a new office building and parking garage founded on a shallow foundation system. Responsibilities included preparing proposals, assisting with management and planning of a subsurface investigation program, summarizing subsurface data and reviewing geotechnical test boring logs, coordination of construction monitoring and instrumentation monitoring programs, reviewing weekly field construction reports, reviewing and responding to specialty geotechnical design submittals and RFIs by others and attending project meetings.

Suffolk University - 20 Somerset Street, Boston, MA Project engineer for design of 8-story academic building with two levels of below grade finished space. Responsibilities included coordination of construction monitoring, observing SOE and footing installation, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

Worcester State University, New Student Housing, Worcester, MA Project engineer for design and construction of a 7-story residence/dining hall with a single level basement and a major site retaining wall structure. Responsibilities included overseeing geotechnical subsurface investigations, provided foundation recommendations and specifications, and prepared a retaining wall contract document. Responsibilities included coordination of construction monitoring, excavation and construction of footings, and soil reuse and management, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

University of Massachusetts Boston, General Academic Building No.1, Boston, MA. Project engineer responsible for assisting project manager in preliminary foundation engineering recommendations and construction considerations for a new academic building on a part of Columbia Point, a historic landfill area. Assisted in design phase services that included preparing foundation support design recommendations including the use of high allowable stresses for 190-ft long end-bearing H-piles and application of Slickcoat coating to address downdrag concerns and reduce foundation costs.

Waltham Watch Factory, Waltham, MA project engineer for redevelopment of former watch factory. Responsibilities included construction oversight of new precast parking garage, utilitiy upgrades, soil remediation and management, installation of gas mitigation systems, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

Massachusetts Green High Performance Computing Center, Holyoke, MA. Project engineer for 60,000 sq. ft high level computing center and associated support utilities. Redevelopment of the site included recycling 50,000 cy of construction debris into the site fills at this historic site along the Connecticut River. Responsibilities included coordinating geotechnical and environmental field investigations, coordination of construction monitoring, seismic analysis, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals and attending project meetings.

The Shops at Riverwood, Hyde Park, MA. The project consisted of the redevelopment of a colonial era paper mill. The multi-building complex was demolished and the concrete and brick from the previous buildings were recycled. The project involved crushing 50,000 cy of brick and concrete and placement of excavated soils and recycled brick and concrete as compacted fill materials to support proposed buildings, pavement areas, and achieve 5 to 9 ft. raises in grade. Field Representative was responsible for management and reuse of brick and concrete stockpiles, in-place density testing, coordination of test pits, installation of soldier pile and versa-lok walls, and backfilling of underground vaults. Remedial activities included: excavation of 5,000 cy of petroleum contaminated soils, on-site cement batching in a pug mill, and placement of compacted recycled materials in roadway areas; delineation, excavation and off-site disposal of TSCA-regulated PCB contaminated soils associated with historical Askarel transformers and dioxin-contaminated soils associated with historical bleaching operations; and disposition of 1,000 tons of paper mill sludge encountered within an abandoned granite-walled sluiceway structure. In addition, assisted with weekly project meetings, maintaining a record of material reuse, and providing weekly field reports.

Harvard Law School, Cambridge, MA. The Harvard Law School project is located on Massachusetts Avenue in Cambridge. The project consisted of a multistory building above ground with 5 levels below ground for a parking garage. Field Representative was responsible for overseeing the installation of slurry walls into bedrock and LBEs with three installation rigs while monitoring the removal of urban fill and transfer to several different receiving facilities from another portion of the site. The slurry walls were constructed into bedrock. Other Field Representative activities were: testing of the slurry, management of the excavated soils, and record keeping of the Contractor’s obstruction and down time of the equipment. In addition, assisted with weekly project meetings, maintaining a record of obstruction and machine time, and providing weekly field reports.

NICOLE MOONEY

Project Geologist

EDUCATION

BS, Earth and Environmental Science with a minor in Oceanography, University of Michigan-Ann Arbor

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120)
8-Hour OSHA Hazardous Waste Worker Refresher Training (29 CFR 1910.120)
8-Hour OSHA HAZWOPER Supervisor for Construction Training
OSHA 10-Hour Construction Safety
OSHA 30-Hour Construction
NYC SST-307 8-Hour Fall Prevention for Construction
NYC SST-302 2-Hour Drug and Alcohol Awareness for Construction
DOT Hazmat Employee & RCRA Hazardous Waste Generator Training
American Red Cross Adult First Aid/CPR/AED Training and Bloodborne Pathogens Training
USACE Construction Quality Management for Contractors
Level I Antiterrorism Awareness Training

Nicole is a geologist with over four years of experience in site characterization and investigation, subsurface investigations, preparation of technical reports and work plans, and data collection and analysis. She has extensive experience conducting Phase I Environmental Site Assessments (ESAs), Phase II Environmental Site Investigations (ESIs), and other aspects of environmental due diligence. She has experience with preparation and overseeing execution of remedial investigation and actions at sites within the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) and the New York City Mayor's Office of Environmental Remediation (NYCOER). She has performed soil, groundwater, and soil vapor sampling events and has drafted various site investigation plans and reports.

RELEVANT PROJECT EXPERIENCE

Environmental Investigation, Site Characterization, and Remediation

340 Myrtle Development LLC, 340 Myrtle Avenue, Brooklyn, New York. As a project geologist, Nicole coordinated and managed implementation of the Remedial Action Work Plan (RAWP) at the approximately 8,828 square foot site enrolled in the NYSDEC BCP. The remedial action included excavation and off-site disposal of soil, installation of an active sub-slab depressurization system (including cover system), installation of injection wells, and reinstallation of permanent monitoring wells for post-remedy groundwater monitoring. Nicole was responsible for the preparation of the Final Engineering Report (FER) and the Site Management Plan (SMP) which are undergoing review by the NYSDEC. Construction for the new development is currently ongoing and, when completed, the site will be improved with a new eight-story mixed-use commercial and residential building with a full cellar level.

B Contractors Group, LLC, 711-713 East 214th Street, Bronx, New York. As a project geologist, Nicole was responsible for coordinating and managing the implementation of the NYCOER-approved Remedial Action Plan (RAP) and preparing the Remedial Closure Report (RCR) for the approximately 6,252 square foot site. The redevelopment included a new eight-story residential building with a full cellar level.

650 Southern Blvd Bronx LLC, 650 Southern Boulevard, Bronx, New York. As a project geologist, Nicole was responsible for preparation and implementation of the Remedial Investigation Work Plan (RIWP), which included the installation of eleven soil borings, seven permanent groundwater monitoring wells (some of which extended into bedrock), and seven soil vapor points, and the collection of soil, groundwater, and soil vapor samples. Nicole was also responsible for preparation of the Citizen Participation Plan (CPP), Remedial Investigation Report (RIR), and RAWP. The site is in the pre-construction phase.

Degraw Holdings LLC, 563 Sackett Street Site, Brooklyn, New York. As a project geologist, Nicole was responsible for due diligence during acquisition, including preparation of the Phase I ESA and Limited Phase II ESI. The initial Limited Phase II ESI and delineation sampling have been completed and the Limited Phase II ESI Delineation Report, Brownfield Cleanup Agreement (BCA) Major Amendment Application, and Supplemental Remedial Investigation Report (SRIR) are being drafted.

291 Wallabout Realty LLC, 291 Wallabout Street, Brooklyn, New York. As a project geologist, Nicole was responsible for the due diligence during acquisition of the property, including preparation of a Phase I ESA, Phase II ESI, BCP Application, and RIWP.

401 West 207th Realty LLC, 401 West 207th Street, New York, New York. As a project geologist, Nicole was responsible for oversight during implementation of the RAWP under the NYSDEC BCP. During remediation, Nicole observed and documented the excavation and proper disposal of on-site soil required for installation of the foundational elements. Nicole oversaw the proper cleaning and removal of two underground storage tanks encountered during excavation.

BCP Applications and Remedial Investigation Work Plans for NYSDEC. Nicole has prepared several BCP Application packages for various clients in New York State, which requires reviewing the site's history, including any previous investigation reports available, to assist with entry into the BCP to be remediated and redeveloped in accordance with applicable NYSDEC requirements. Nicole also prepares an RIWP to be submitted to the NYSDEC either concurrently or following submittal of the BCP Application for full investigation of the site to facilitate proper remedial action.

Excavation Oversight and CAMP Monitoring, Various Sites, Bronx, Brooklyn, and Queens, New York. As a project geologist, Nicole completed remedial oversight for several projects in the NYCOER cleanup program and NYSDEC BCP. Her responsibilities included excavation oversight, air monitoring, truck logging during off-site disposal of excavated materials, collection of endpoint and/or documentation samples, vapor barrier inspection, and oversight of installation of post-remedy groundwater monitoring wells.

Multiple Clients, Phase I ESAs and Due Diligence, Multiple Locations in New York. As a project geologist, Nicole completed several Phase I ESAs for buyers of properties in New York. She has extensive experience completing site reconnaissance and reviewing historical site documentation to identify potential environmental concerns at properties.

Multiple Clients, Phase II ESIs, Multiple Locations in New York. As a project geologist, Nicole conducted several Phase II ESIs for projects in New York, including oversight of the installation of soil borings, groundwater monitoring wells, and soil vapor points and the collection of soil, groundwater, and soil vapor samples. She assisted with the development of sampling plans based on previous environmental investigations and due diligence findings.

Former Grissom Air Force Base, Kokomo, Indiana. As a project geologist, Nicole was responsible for coordinating and performing quarterly groundwater sampling and/or Land Use Control (LUC) inspections in accordance with the deeds and Decision Documents for nine sites (FT001, FT002, SS190, SS035, SS053, SS058, LF003, LF004, and SS049) located on the 2,722-acre former Grissom Air Force Base under the Base Realignment and Closure (BRAC)/Environmental Construction Optimization Services (BECOS) program. Nicole was also responsible for the coordination and implementation of a Data Gap Investigation (DGI) at the SS035, SS053, and SS058 sites and a Site Investigation (SI) at the former Navy Skeet Range (site SR406). Nicole prepared LUC Inspection reports, Annual Groundwater Monitoring Reports, an SI Report, a DGI Report, and the Five-Year Review Report for this work.

HALEY ALDRICH

KATHERINE R. MILLER

Project Manager

EDUCATION

B.S., Chemistry, University of Arizona

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120 and 40 CFR 265.16)
8-Hour OSHA Refresher Training (29 CFR 1910.120)
Level IV Data Validation Training

AWARDS

Pinnacle Award, 2009
Pathfinder Award, 2014

In her 10 years at Haley & Aldrich, Katherine has worked on soil and groundwater environmental investigations and the preparation of environmental reports for private, industrial, and government-based project clients. She is a qualified Data Validator capable of performing various levels of validation on laboratory water quality data according to U.S. Environmental Protection Agency (EPA) National Functional Guidelines and to U.S. Department of Energy radiochemical guidelines. She also has experience designing and maintaining databases for project-specific needs.

Project management responsibilities for a $1.5 million per year stormwater project include preparation of subcontractor bids and contracts; preparation of cost estimates, proposals, and reports; coordination of field testing programs; and interpretation of chemical testing results. She has interacted with local regulatory agencies.

RELEVANT PROJECT EXPERIENCE

Confidential Aerospace Manufacturer, Groundwater Monitoring, Western U.S. Katherine served as project manager for the comprehensive stormwater management program. Responsibilities included project finance management and data management including quality assurance/quality control (QA/QC) and interpretation of chemical testing results. Evaluated QA/QC of groundwater quality data, prepared reports and managed data for the site. Performed data validation of quarterly water quality data from over 300 locations according to EPA National Functional Guidelines and to DOE radiochemical guidelines over a six-year period. Also, responsible for updating and maintaining the integrity of over 200,000 records during that time period. Assisted with management of sampling, analysis, and reporting of constituents of concern, ensured compliance with post-closure permit monitoring and reporting requirements, Data Management Plan, QAPP, and Environmental Data Management System, and ensured and maintained 100% compliance with the QAPP and Data Management Plan. Additionally, prepared groundwater data summaries for proposed extraction wells including comparisons to site NPDES outfall limits in support of Groundwater Interim Measures planning.

Asarco Hayden Plant Site, Hayden, Arizona. Katherine assisted with field preparation, QA/QC of analytical data, and data validation as part of the Remedial Investigation/Feasibility Work Plan including soil, sediment, air, process water, surface water, and stormwater.

Former MGP Site, California. Katherine assisted with report preparation, QA/QC of soil and/or groundwater quality data, and data validation for the investigation of three large former MGP sites in an urban, residential setting; includes over 200 residential properties.

General Manufacturing, Leitchfield, Kentucky. Katherine assisted with report preparation, QA/QC of soil and/or groundwater quality data, and data validation for a soil and groundwater RCRA site. Groundwater monitoring is conducted annually at more than 50 locations for volatile organic compounds (VOCs), including 1,4-dioxane and semi-volatile organic compound (SVOCs).

Skyworks Solutions, Inc., Newbury Park, California. Katherine assisted with report preparation, QA/QC of soil and/or groundwater quality data, and data validation at groundwater remediation site. She monitored for VOCs, including 1,4-dioxane, and inorganic chemicals, including hexavalent chromium.

Teledyne Scientific Company, Thousand Oaks, California. Katherine assisted with report preparation for this groundwater assessment site. Monitored natural attenuation has been instituted as the long-term site remedy.

Port of Redwood City, Permitting and Sediment Characterization, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

Kiewit Infrastructure West, Sediment Quality Study, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

Aeolian Yacht Harbor, Permitting, Eel Grass Conservation and Sediment Characterization, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

Marin County, Paradise Cay Permitting and Sediment Characterization, California. Katherine assisted with report preparation, QA/QC of sampling data, and data validation.

APPENDIX C
NYSDEC Emerging Contaminant Field Sampling Guidance

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

Under NYSDEC's Part 375 Remedial Programs

April 2023

www.dec.ny.gov

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April 2023

Department of Environmental Conservation

ERRATA SHEET for

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

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Data Assessment and Application to Site Cleanup Page 3	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	Until such time as Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published	3/28/2023
Water Sample Results Page 3	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below.	NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These guidance values also include criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt).Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.	3/28/2023
Soil Sample Results Page 3	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6. Until SCOs are in effect, the following are to be used as guidance values:	NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:	3/28/2023
Protection of Groundwater Page 3	PFOA (ppb) 1.1 PFOS (ppb) 3.7	PFOA (ppb) 0.8 PFOS (ppb) 1.0	3/28/2023

Citation and Page Number	Current Text	Corrected Text	Date
Footnote 2 Page 3	The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	3/28/2023
Testing for Imported Soil Page 4	If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.	If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.	3/28/2023
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020

Citation and Page Number	Current Text	Corrected Text	Date
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020
Water Sample Results Page 10	PFAS should be further assessed and considered as a potential contaminant of concern in groundwater or surface water (…) If PFAS are identified as a contaminant of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water (…) If PFOA and/or PFOS are identified as contaminants of concern for a site, they should be assessed as part of the remedy selection process in accordance with Part 375 and DER-10.	9/15/2020

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

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

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil…	In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil…	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021
Water Sample Results Page 9	"In addition, further assessment of water may be warranted if either of the following screening levels are met: a. any other individual PFAS (not PFOA or PFOS) is detected in water at or above 100 ng/L; or b. total concentration of PFAS (including PFOA and PFOS) is detected in water at or above 500 ng/L"	Deleted	6/15/2021

Citation and Page Number	Current Text	Corrected Text	Date
Routine Analysis, Page XX	Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP)… criteria set forth in the DER's laboratory guidelines for PFAS in non-potable water and solids (Appendix H - Laboratory Guidelines for Analysis of PFAS in Non-Potable Water and Solids).	Deleted	5/31/2022
Analysis and Reporting, Page XX	As of October 2020, the United States Environmental Protection Agency (EPA) does not have a validated method for analysis of PFAS for media commonly analyzed under DER remedial programs (non-potable waters, solids). DER has developed the following guidelines to ensure consistency in analysis and reporting of PFAS.	Deleted	5/31/2022
Routine Analysis, Page XX	LC-MS/MS analysis for PFAS using methodologies based on EPA Method 537.1 is the procedure to use for environmental samples. Isotope dilution techniques should be utilized for the analysis of PFAS in all media.	EPA Method 1633 is the procedure to use for environmental samples.	
Soil Sample Results, Page XX	Soil cleanup objectives for PFOA and PFOS will be proposed in an upcoming revision to 6 NYCRR Part 375-6	Soil cleanup objectives for PFOA and PFOS have been proposed in an upcoming revision to 6 NYCRR Part 375-6	
Appendix A	"Include in the text… LC-MS/MS for PFAS using methodologies based on EPA Method 537.1"	"Include in the text ….EPA Method 1633"	
Appendix A	"Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101"	Deleted	
Appendix B	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	

Citation and Page Number	Current Text	Corrected Text	Date
Appendix C	“Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1”	“Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633”	
Appendix D	“Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1”	“Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633”	
Appendix G		Updated to include all forty PFAS analytes in EPA Method 533	
Appendix H		Deleted	
Appendix I	Appendix I	Appendix H	
Appendix H	“These guidelines are intended to be used for the validation of PFAS analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report.”	“These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER).”	
Appendix H	“The holding time is 14 days…”	“The holding time is 28 days…”	
Appendix H, Initial Calibration	“The initial calibration should contain a minimum of five standards for linear fit…”	“The initial calibration should contain a minimum of six standards for linear fit…”	
Appendix H, Initial Calibration	Linear fit calibration curves should have an R^2 value greater than 0.990.	Deleted	
Appendix H, Initial Calibration Verification	Initial Calibration Verification Section	Deleted	
Appendix H	secondary Ion Monitoring Section	Deleted	
Appendix H	Branched and Linear Isomers Section	Deleted	

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

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

Objective

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

Applicability

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

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

Field Sampling Procedures

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

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

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

Analysis and Reporting

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

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

Routine Analysis

EPA Method 1633 is the procedure to use for environmental samples. Reporting limits for PFOA and PFOS in aqueous samples should not exceed 2 ng/L. Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg. Reporting limits for all other PFAS in aqueous and solid media should be as close to these limits as possible. If laboratories indicate that they are not able to achieve these reporting limits for the entire *PFAS Analyte List*, site-specific decisions regarding acceptance of elevated reporting limits for specific PFAS can be made by the DER project manager in consultation with the DER chemist. Data review guidelines were developed by DER to ensure data comparability and usability (Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids).

Additional Analysis

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

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

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

Impacted materials can be made up of PFAS that are not analyzable by routine analytical methodology. A TOP Assay can be utilized to conceptualize the amount and type of oxidizable PFAS which could be liberated in the environment, which approximates the maximum concentration of perfluoroalkyl substances that could be generated if all polyfluoroalkyl substances were oxidized. For example, some polyfluoroalkyl substances may degrade or transform to form perfluoroalkyl substances (such as PFOA or PFOS), resulting in an increase in perfluoroalkyl substance concentrations as contaminated groundwater moves away from a source. The TOP Assay converts, through oxidation, polyfluoroalkyl substances (precursors) into perfluoroalkyl substances that can be detected by routine analytical methodology.[1]

[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances.

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

Data Assessment and Application to Site Cleanup

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

Water Sample Results

NYSDEC has adopted ambient water quality guidance values for PFOA and PFOS. Groundwater samples should be compared to the human health criteria of 6.7 ng/l (ppt) for PFOA and 2.7 ng/l (ppt) for PFOS. These human health criteria should also be applied to surface water that is used as a water supply. This guidance also includes criteria for surface water for PFOS applicable for aquatic life, which may be applicable at some sites. Drinking water sample results should be compared to the NYS maximum contaminant level (MCL) of 10 ng/l (ppt). Analysis to determine if PFOA and PFOS concentrations are attributable to the site should include a comparison between upgradient and downgradient levels, and the presence of soil source areas, as defined below.

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

Soil Sample Results

NYSDEC will delay adding soil cleanup objectives for PFOA and PFOS to 6 NYCRR Part 375-6 until the PFAS rural soil background study has been completed. Until SCOs are in effect, the following are to be used as guidance values:

Guidance Values for Anticipated Site Use	PFOA (ppb)	PFOS (ppb)
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	0.8	1.0

PFOA and PFOS results for soil are to be compared against the guidance values listed above. These guidance values are to be used in determining whether PFOA and PFOS are contaminants of concern for the site and for determining remedial action objectives and cleanup requirements. Site-specific remedial objectives for protection of groundwater can also be presented for evaluation by DEC. Development of site-specific remedial objectives for protection of groundwater will require analysis of additional soil parameters relating to leachability. These

[2] The Protection of Groundwater values are based on the above referenced ambient groundwater guidance values. Details on that calculation are available in the following document, prepared for the February 2022 proposed changes to Part 375 (https://www.dec.ny.gov/docs/remediation_hudson_pdf/part375techsupport.pdf). The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the guidance value for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).

additional analyses can include any or all the parameters listed above (soil pH, cation exchange capacity, etc.) and/or use of SPLP.

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

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above the ambient water quality guidance values for groundwater, then the soil is not acceptable.

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

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

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

General Guidelines in Accordance with DER-10

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

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by EPA Method 1633
- Include the list of PFAS compounds to be analyzed (*PFAS Analyte List*)
- Include the laboratory SOP for PFAS analysis
- List the minimum method-achievable Reporting Limits for PFAS
    - Reporting Limits should be less than or equal to:
        - Aqueous – 2 ng/L (ppt)
        - Solids – 0.5 µg/kg (ppb)
- Include the laboratory Method Detection Limits for the PFAS compounds to be analyzed
-
- Include detailed sampling procedures
    - Precautions to be taken
    - Pump and equipment types
    - Decontamination procedures
    - Approved materials only to be used
- Specify that regular ice only will be used for sample shipment
- Specify that equipment blanks should be collected at a minimum frequency of 1 per day per site for each matrix

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

General

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

Laboratory Analysis and Containers

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

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

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix D - Sampling Protocols for PFAS in Surface Water

General

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

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633.

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

Equipment

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

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

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

- stainless steel cup

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

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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

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.

APPENDIX D
Climate Screening Checklist

Climate Screening Checklist

Background Information

- Project Manager: Pending BCP Acceptance
- Site Name:120 East140th Street Redevelopment
- Site Number: Pending BCP Acceptance
- Site Location:120 East 140th Street, Bronx, New York
- Site Elevation (average above sea level):28 ft
- ClimAID Region (Responding Climate Change in New York State (ClimAID) - NYSERDA): Region 4
- Remedial Stage/site classification:Pending BCP Acceptance

- Contamination - Media Impacted/ Contaminants of Concern:
  Chlorinated volatile organic compounds in soil, groundwater, and soil vapor;
  heavy metals and polycyclic aromatic hydrocarbons in soil
- Proposed/Current Remedy: To be determined - site enterting BCP at investigation phase.

- What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years?
  Remedy anticipated for completion in approximately 2 years. If required, engineering controls will remain in place, be maintained or replaced as needed for duration of requirement under future site management.
- Is the site in proximity to any sensitive receptors? (e.g. wetlands, waterbodies, residential properties, hospitals, schools, drinking water supplies, etc.)
  Yes, multiple schools, daycares, parks and medical facilities

Is the site in a disadvantaged community (DAC) or potential environmental justice area (PEJA) (Use DECinfolocator: DECinfo Locator (ny.gov))?

■ **Yes** ☐ **No**

If the site is in a DAC or PEJA, will climate impacts be magnified? If yes, list how and why.

☐ **Yes** ■ **No**

Should thresholds of concern be lowered to account for magnification of impacts? If yes, indicate how lower thresholds will be used in the screening.

☐ **Yes** ■ **No**

Climate Screening Table*

Potential Climate Hazards	**Relevant to the Site Location** (Y/N/NA)[1]	**Projected Change** (Reference data source/Model)[3]	**Potential to Impact Remedy** (Y/N)	**Is remedy/site already resilient?** (Y/N)[4]
Precipitation	Potentially		N/A	N/A
Temperature[2] (Extreme Heat or Cold Weather Impacts)	Y	Y (Resilience Analysis and Planning Tool-RAPT)	Y	Future remedy will evaluate
Sea Level Rise	N	N/A (NOAA Relative Sea Level Trends)	N/A	N/A
Flooding	N	N/A (FEMA FloodMapper)	N/A	N/A
Storm Surge	N	N/A (NWS Storm Surge Hazard Map)	N/A	N/A
Wildfire	N	N/A (NYSDEC Fire Danger Map)	N/A	N/A
Drought	N	N/A (NYSDEC Drought Condition Map)	N/A	N/A
Storm Severity	Y	Y (Resilience Analysis and Planning Tool-RAPT)	Y	Future remedy will evaluate
Landslides	N	N	N/A	N/A
Other Hazards:	N/A	N/A	N/A	N/A

* Links to potential data sources can be found on the following page

[1] If the first column is N --> The rest of the columns will be N/A, the hazard is not applicable to the site.

[2] Extreme Heat: periods of three or more days above 90°F- Extreme Cold: Individual days with minimum temperatures at or below 0 degrees F (NYSERDA ClimAID report)

[3] List the projected change in specific terms or units e.g. inches of rain fall, feet of sea level rise, etc.

[4] If final column is Y, provide reasoning, if the final column is N --> Climate Vulnerability Assessment (CVA) required.

Required Next Steps (If no further action is required, provide justification):

Upon development of the future remedy, more robust analysis of elements needed to aid in resiliency planning for the redevelopment will be incorporated into a Climate Vulnerability Assessment.

Potential Data Sources (not an exhaustive list)- from Superfund Climate Resilience: Vulnerability Assessment | US EPA

NYSERDA ClimAID report- Responding Climate Change in New York State (ClimAID) - NYSERDA

FEMA- National Flood Hazard Layer | FEMA.gov

NOAA- National Storm Surge Risk Maps - Version 3 (noaa.gov)

Department of Agriculture Forest Service Wildfire Risk to Communities

EPA Climate Change Indicators in the United States

EPA Climate Resilience Evaluation & Awareness Tool (CREAT) | U.S. Climate Resilience Toolkit

EPA National Stormwater Calculator

National Integrated Drought Information System U.S. Drought Portal

National Interagency Coordination Center National Interagency Fire Center

National Oceanic and Atmospheric Administration Coastal Services Digital Coast

- Resources to help communities assess coastal hazards, such as the Sea Level Rise Viewer for visualizing community-level impacts of flooding or sea level rise and downloadable LIDAR data

National Oceanic and Atmospheric Administration National Centers for Environmental Information website

National Oceanic and Atmospheric Administration Sea Level Trends

National Weather Service Climate Prediction Center

National Weather Service National Hurricane Center

National Weather Service Sea, Lake, and Overland Surges from Hurricanes (SLOSH)

National Weather Service Storm Surge Hazard Maps

U.S. Federal Government Climate Resilience Toolkit: The Climate Explorer

U.S. Army Corps of Engineers Climate Prepardness and Resilience

U.S. Geological Survey Coastal Change Hazards Portal

U.S. Geological Survey Landslide Hazards Program

U.S. Geological Survey National Ground-water Monitoring Network Data Portal

U.S. Geological Survey National Climate Change Viewer

U.S. Geological Survey National Water Dashboard

U.S. Geological Survey StreamStats

NYS Department of State- Assess | Department of State (ny.gov)

NYSERDA NY Costal Floodplain Mapper- Home Page (ny.gov)

NYSDEC Costal Erosion Hazards- Coastal Areas Regulated By The CEHA Permit Program - NYDEC

NYSDOH Heat Index- health.ny.gov/environmental/weather/vulnerability_index/county_maps.htm

APPENDIX E
Green Sustainable Remediation Documentation

H & A OF NEW YORK ENGINEERING
AND GEOLOGY, LLP
213 W. 35th Street
7th Floor
New York, NY 10001
646.277.5685

January 14, 2026
File No. 0213924

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
47-40 21st Street
Long Island City, New York 11101

Subject: Green Site Remediation
120 East 140th Street
Redevelopment NYSDEC SITE TBD
120 East 140th Street
Bronx, New York

H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York) presents the following environmental footprint analysis[1] in accordance with U.S. Environmental Protection Agency (EPA) 542-R-12-002 for the proposed Remedial Investigation (RI) of the above-referenced site located at 120 East 140th Street, Bronx, NY (Site).

120 EAST 140th STREET INVESTIGATION

The RI is anticipated to result in estimated totals of:

- 94.4 Metric Million British Thermal Units (MMBtus) of energy used;
- 6.9 tons of total greenhouse gas emissions (CO2e [includes consideration of carbon dioxide, methane, and nitrous oxide emissions]);
- 290.6 pounds (lbs) of nitrogen oxides (NOx) + sulfur oxides (SOx) + particulate matter (PM) emissions; and,
- 16.0 lbs of hazardous air pollutant (HAP) emissions.

Energy

- 23.95 MMBtus used for on-site activities, such as excavation, drilling, and the use of air handlers to create a negative pressure enclosure.
- 0.056 MMBtus used for grid electricity generation.
- 32.82 MMBtus used for transportation of personnel, remedy materials, and waste disposal.

[1] *Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019.*

- 37.62 MMBtus used for off-site activities.

Greenhouse Gas Emissions (CO2e)

- 1.76 tons of CO2e will be produced from on-site activities, such as excavation and drilling.
- 0.00 tons of CO2e will be produced from grid electricity generation.
- 2.40 tons of CO2e will be produced from the transportation of personnel, remedy materials, and waste disposal.
- 2.10 tons will be produced from off-site activities.

Overall, the estimated environmental footprint of the RI is dominated by off-site activities, which includes off-site laboratory analysis. Transportation of personnel, equipment, and materials are the next largest contributor to the environmental footprint of the RI with an anticipated generation of 5,292 tons of CO2e and use 33 MMbtus of energy. Off-site energy use is anticipated to comprise of 39.83% of all energy use and off-site greenhouse gas emissions to comprise 33.58% of all emissions for the investigation. All estimations are subject to change; totals are expected to fluctuate in the event of complications with drilling or due to unanticipated equipment use to facilitate work and safety of personnel. Additionally, the destination of investigation derived waste cannot be confirmed until representative samples are reviewed by potential disposal facilities and export is approved.

Sincerely yours,
H & A OF NEW YORK ENGINEERING AND GEOLOGY, LLP

Mari Cate Conlon

Mari C. Conlon, P.G.
Senior Associate

Environmental Footprint Summary

Core Element		Metric	Unit of Measure	Footprint: Remedial Investigation						Total
Materials & Waste	M&W-1	Refined materials used on-site	Tons	1.8	0.0	0.0	0.0	0.0	0.0	1.8
	M&W-2	% of refined materials from recycled or reused material	%	0.0%						0.0%
	M&W-3	Unrefined materials used on-site	Tons	0.000	0.000	0.000	0.000	0.000	0.000	0.0
	M&W-4	% of unrefined materials from recycled or reused material	%							
	M&W-5	On-site hazardous waste disposed of off-site	Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M&W-6	On-site non-hazardous waste disposed of off-site	Tons	2.3	0.0	0.0	0.0	0.0	0.0	2.3
	M&W-7	Recycled or reused waste	Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M&W-8	% of total potential waste recycled or reused	%	0.0%						0.0%
Water (used on-site)	W-1	Public water use	MG	0.00015	0.0	0.0	0.0	0.0	0.0	0.0
	W-2	Groundwater use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-3	Surface water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-4	Reclaimed water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-5	Storm water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-6	User-defined water resource #1	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-7	User-defined water resource #2	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-8	Wastewater generated	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy	E-1	Total energy used (on-site and off-site)	MMBtu	94.4	0.0	0.0	0.0	0.0	0.0	94.4
	E-2	Energy voluntarily derived from renewable resources								
	E-2A	On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-2B	Voluntary purchase of renewable electricity	MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-3	Voluntary purchase of RECs	MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-4	On-site grid electricity use	MWh	0.008	0.000	0.000	0.000	0.000	0.000	0.0
Air	A-1	On-site NOx, SOx, and PM emissions	Pounds	30.8	0.0	0.0	0.0	0.0	0.0	30.8
	A-2	On-site HAP emissions	Pounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	A-3	Total NOx, SOx, and PM emissions	Pounds	290.6	0.0	0.0	0.0	0.0	0.0	290.6
	A-3A	Total NOx emissions	Pounds	123.5	0.0	0.0	0.0	0.0	0.0	123.5
	A-3B	Total SOx emissions	Pounds	143.3	0.0	0.0	0.0	0.0	0.0	143.3
	A-3C	Total PM emissions	Pounds	23.8	0.0	0.0	0.0	0.0	0.0	23.8
	A-4	Total HAP emissions	Pounds	16.0	0.0	0.0	0.0	0.0	0.0	16.0
	A-5	Total greenhouse gas emissions	Tons CO2e*	6.9	0.0	0.0	0.0	0.0	0.0	6.9
Land & Ecosystems		Qualitative Description								

** Total greenhouse gases emissions (in CO2e) include consideration of CO2, CH4, and N2O (Nitrous oxide) emissions.*
"MMBtu" = millions of Btus
"MG" = millions of gallons
"CO2e" = carbon dioxide equivalents of global warming potential
"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions of Watt-hours)
"Tons" = short tons (2,000 pounds)

The above metrics are consistent with EPA's Methodology for Understanding and Reducing a Project's Environmental Footprint (EPA 542-R-12-002), February 2012

Notes:

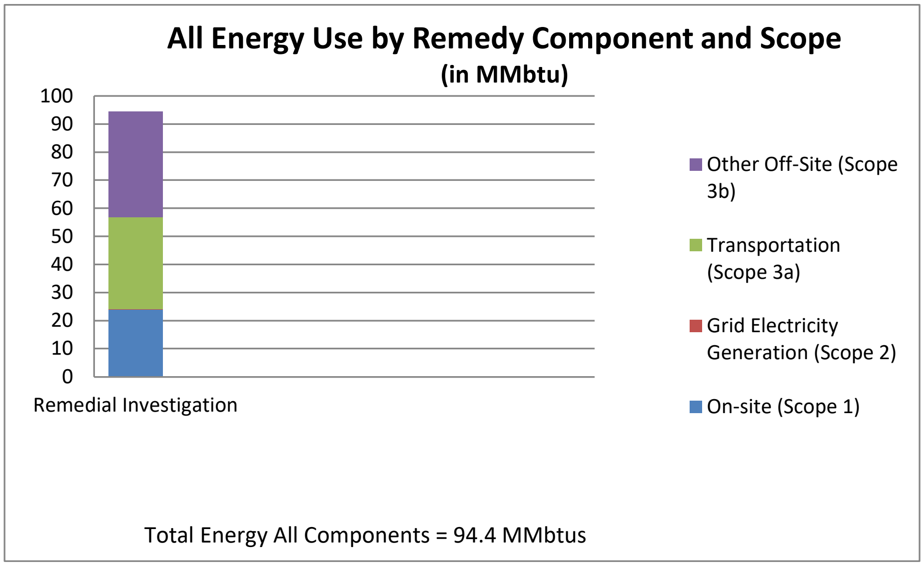
All - Energy & Air Compiled Results

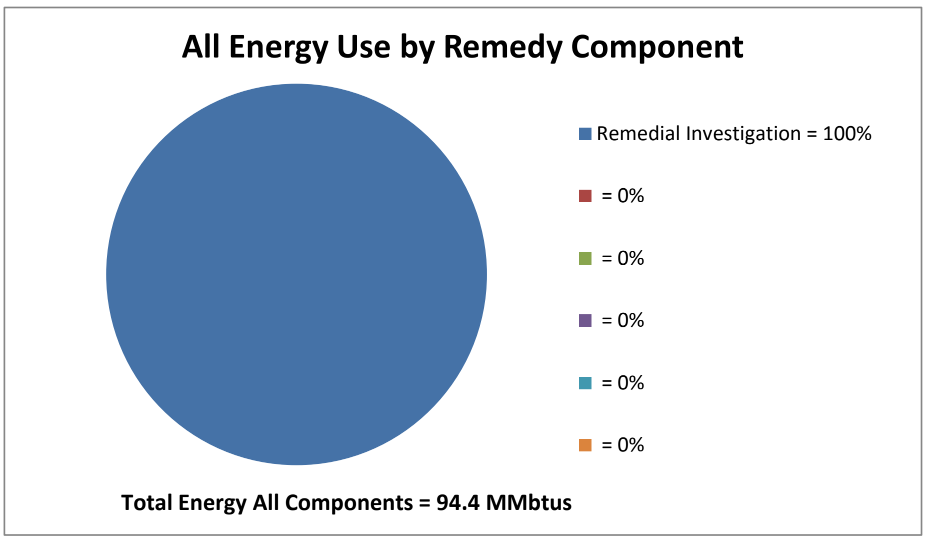
Category	Total Energy	GHG	NOx	SOx	PM	NOx + SOx + PM	HAPs
	MMbtus	lbs CO2e	lbs	lbs	lbs	lbs	lbs
On-site (Scope 1)	**24**	**3,873**	**29**	**1**	**1**	**31**	**0**
Grid Electricity Generation (Scope 2)	**0.056**	**8**	**0**	**0**	**0**	**0**	**0**
Transportation (Scope 3a)	**33**	**5,292**	**31**	**1**	**1**	**33**	**0**
Other Off-Site (Scope 3b)	**38**	**4,637**	**63**	**141**	**22**	**227**	**16**
Remedy Totals	**94**	**13,810**	**123**	**143**	**24**	**291**	**16**

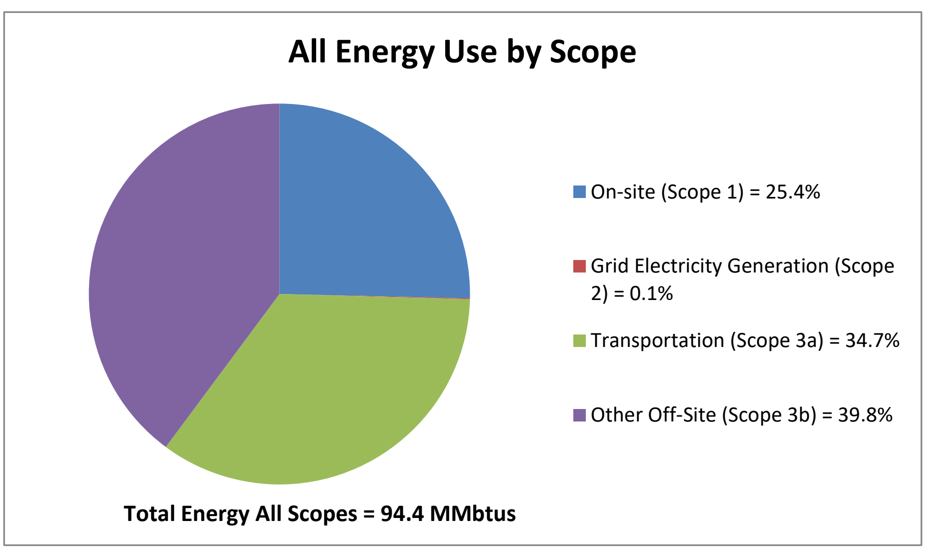
Values that are forwarded to the "Summary" tab are indicated in orange.

Voluntary Renewable Energy Use	Unit	Quantity	
On-site renewable energy generation or use	MMBtu	**0**	
On-site biodiesel use	MMBtu	**0**	
Biodiesel and other renewable resource use for transportation	MMBtu	**0**	
On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	**0**	*(This value is the sum of the three rows above)*
Voluntary purchase of renewable electricity	MWh	**0**	
Voluntary purchase of RECs	MWh	**0**	

This worksheet is not intended for user input. Values on this worksheet are obtained from the following file:
SEFA_calculations_(121718).xlsx


All Energy Use by Remedy Component and Scope
(in MMbtu)
100
90
80
70
60
50
40
30
20
10
0
Remedial Investigation
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
Total Energy All Components = 94.4 MMbtus


All Energy Use by Remedy Component
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%
Total Energy All Components = 94.4 MMbtus

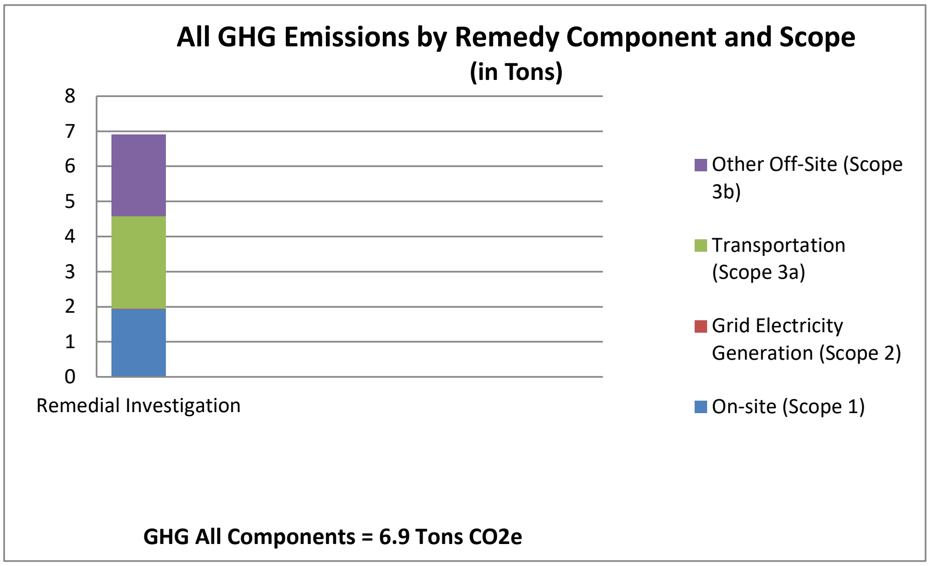

All Energy Use by Scope
On-site (Scope 1) = 25.4%
Grid Electricity Generation (Scope 2) = 0.1%
Transportation (Scope 3a) = 34.7%
Other Off-Site (Scope 3b) = 39.8%
Total Energy All Scopes = 94.4 MMbtus

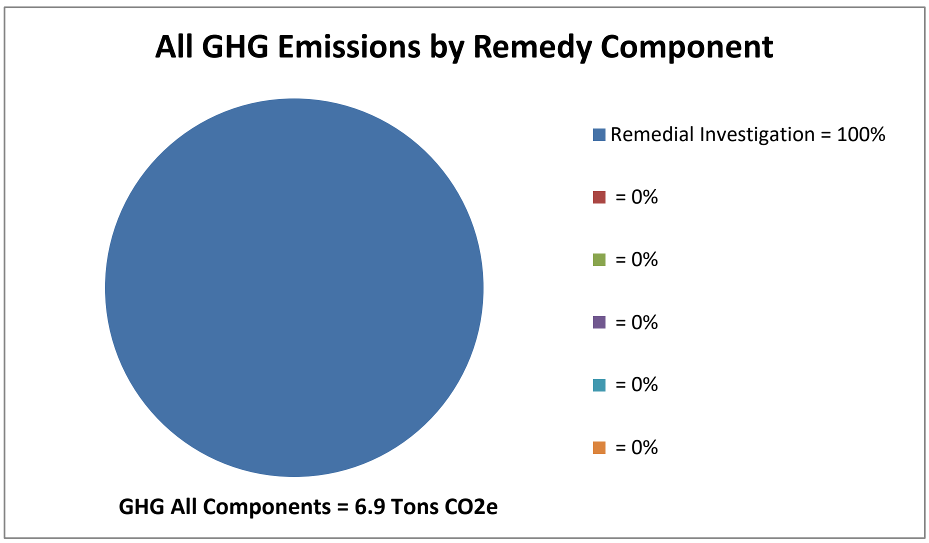
Total Energy MMbtus	Remedial Investigation						Total	
On-site (Scope 1)	24.0	0.0	0.0	0.0	0.0	0.0	24.0	
' Generation (Scope 2)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	d Electricity
ısportation (Scope 3a)	32.8	0.0	0.0	0.0	0.0	0.0	32.8	Trar
ıer Off-Site (Scope 3b)	37.6	0.0	0.0	0.0	0.0	0.0	37.6	Oth
Total	94.4	0.0	0.0	0.0	0.0	0.0	94.4	

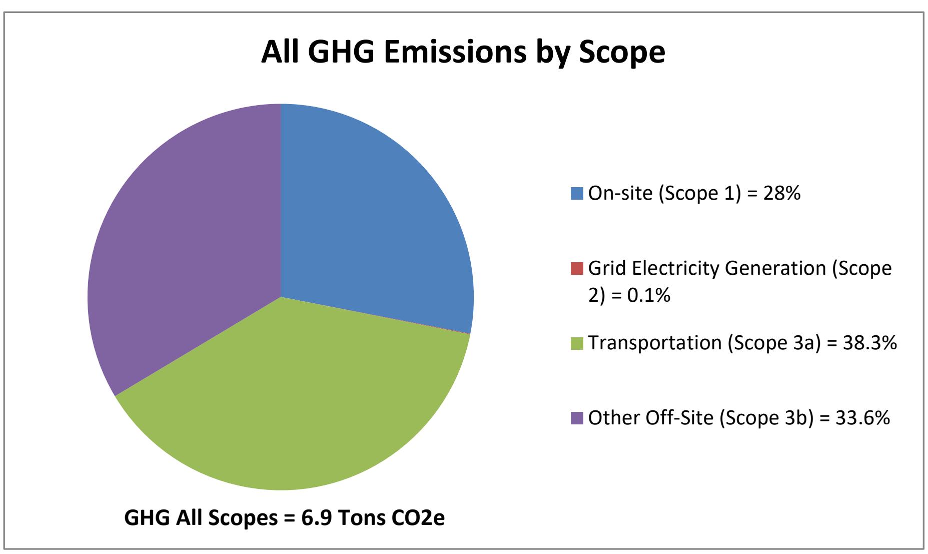
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%

On-site (Scope 1) = 25.4%
Grid Electricity Generation (Scope 2) = 0.1%
Transportation (Scope 3a) = 34.7%
Other Off-Site (Scope 3b) = 39.8%

Total Energy All Components = 94.4 MMbtus
Total Energy All Scopes = 94.4 MMbtus


All GHG Emissions by Remedy Component and Scope
(in Tons)
8
7
6
5
4
3
2
1
0
Remedial Investigation
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
GHG All Components = 6.9 Tons CO2e


All GHG Emissions by Remedy Component
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%
GHG All Components = 6.9 Tons CO2e

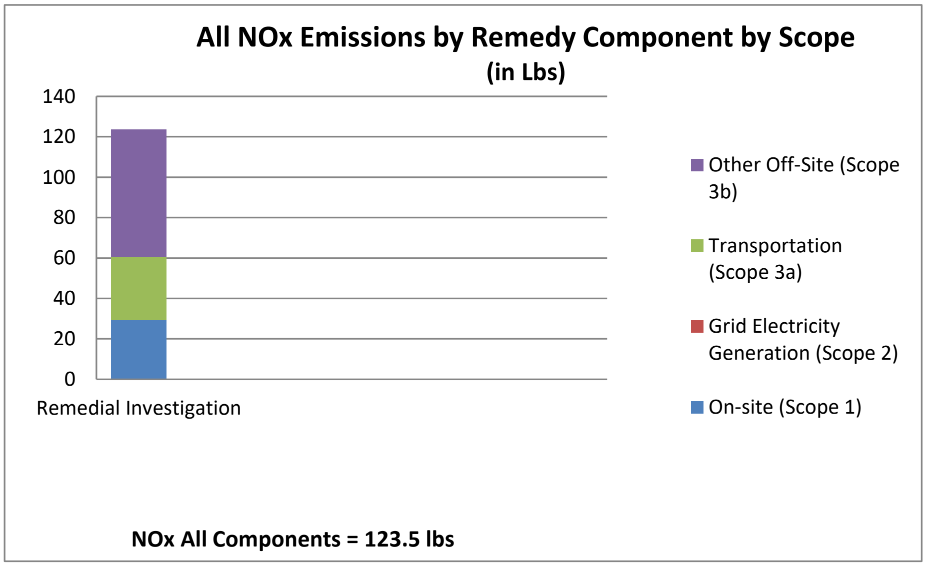

All GHG Emissions by Scope
On-site (Scope 1) = 28%
Grid Electricity Generation (Scope 2) = 0.1%
Transportation (Scope 3a) = 38.3%
Other Off-Site (Scope 3b) = 33.6%
GHG All Scopes = 6.9 Tons CO2e

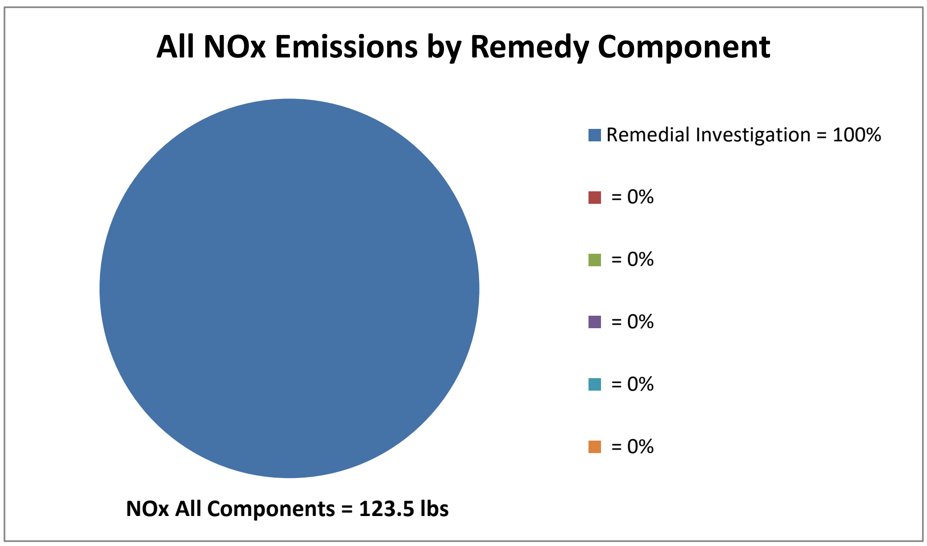
GHG Tons CO2e	Remedial Investigation						Total	
On-site (Scope 1)	1.9	0.0	0.0	0.0	0.0	0.0	1.9	
' Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	d Electricity
ısportation (Scope 3a)	2.6	0.0	0.0	0.0	0.0	0.0	2.6	Trar
ıer Off-Site (Scope 3b)	2.3	0.0	0.0	0.0	0.0	0.0	2.3	Oth
Total	6.9	0.0	0.0	0.0	0.0	0.0	6.9	

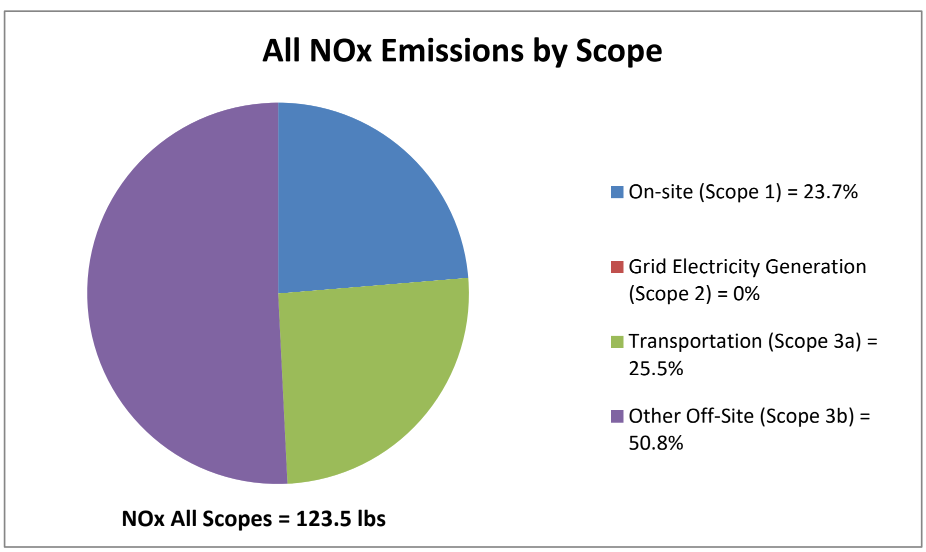
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%

On-site (Scope 1) = 28%
Grid Electricity Generation (Scope 2) = 0.1%
Transportation (Scope 3a) = 38.3%
Other Off-Site (Scope 3b) = 33.6%

GHG All Components = 6.9 Tons CO2e
GHG All Scopes = 6.9 Tons CO2e


All NOx Emissions by Remedy Component by Scope
(in Lbs)
140
120
100
80
60
40
20
0
Remedial Investigation
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
NOx All Components = 123.5 lbs


All NOx Emissions by Remedy Component
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%
NOx All Components = 123.5 lbs

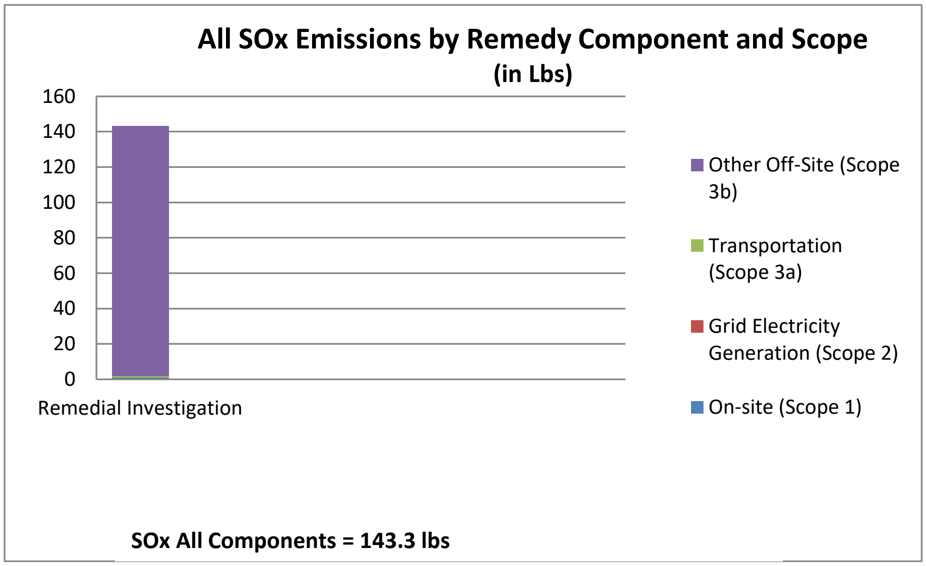

All NOx Emissions by Scope
On-site (Scope 1) = 23.7%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 25.5%
Other Off-Site (Scope 3b) = 50.8%
NOx All Scopes = 123.5 lbs

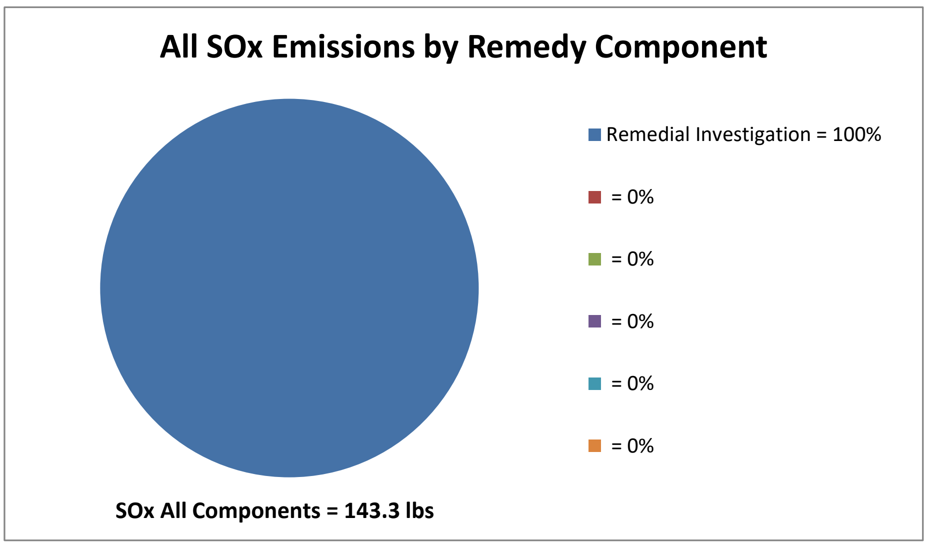
NOx lbs	Remedial Investigation						Total	
On-site (Scope 1)	29.3	0.0	0.0	0.0	0.0	0.0	29.3	
' Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	d Electricity
ısportation (Scope 3a)	31.5	0.0	0.0	0.0	0.0	0.0	31.5	Trar
ıer Off-Site (Scope 3b)	62.7	0.0	0.0	0.0	0.0	0.0	62.7	Otł
Total	123.5	0.0	0.0	0.0	0.0	0.0	123.5	

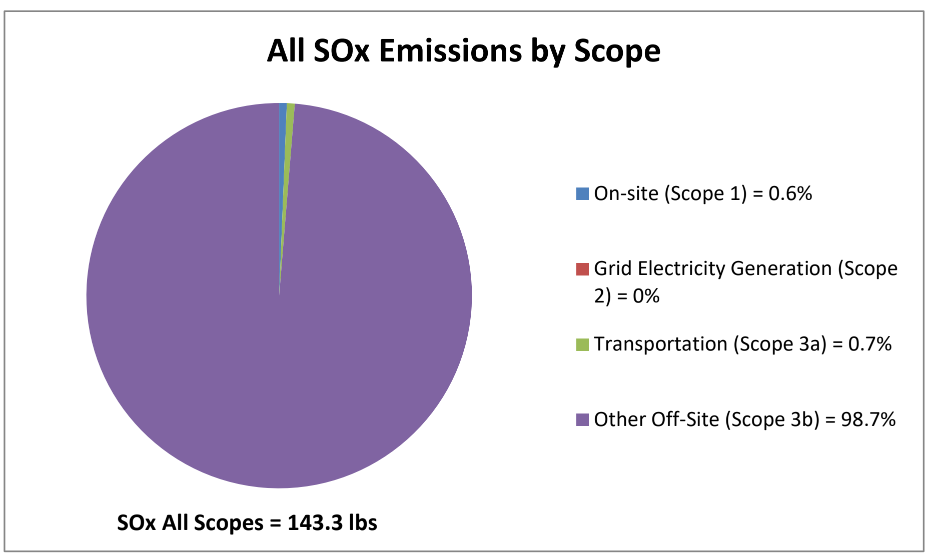
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%

On-site (Scope 1) = 23.7%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 25.5%
Other Off-Site (Scope 3b) = 50.8%

NOx All Components = 123.5 lbs
NOx All Scopes = 123.5 lbs


All SOx Emissions by Remedy Component and Scope
(in Lbs)
160
140
120
100
80
60
40
20
0
Remedial Investigation
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
SOx All Components = 143.3 lbs


All SOx Emissions by Remedy Component
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%
SOx All Components = 143.3 lbs

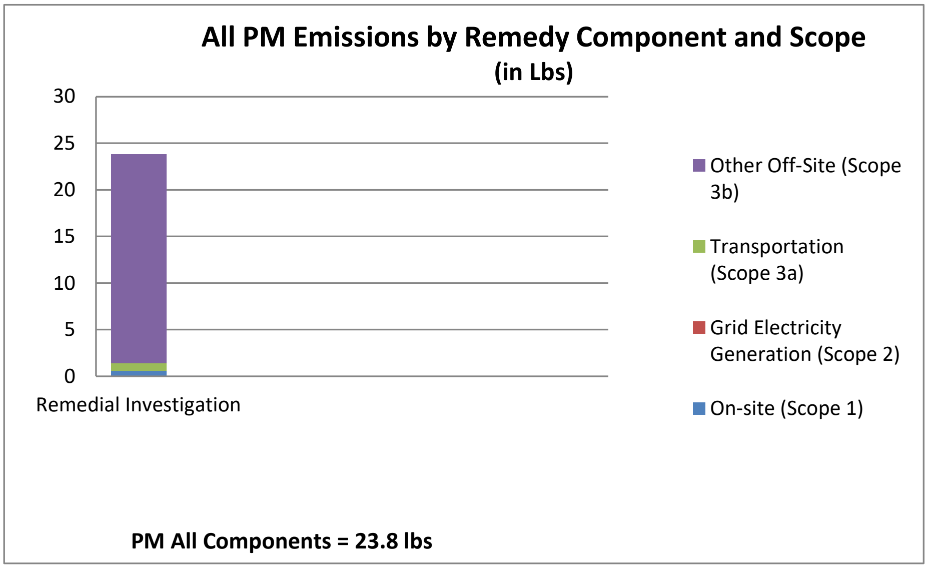

All SOx Emissions by Scope
On-site (Scope 1) = 0.6%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 0.7%
Other Off-Site (Scope 3b) = 98.7%
SOx All Scopes = 143.3 lbs

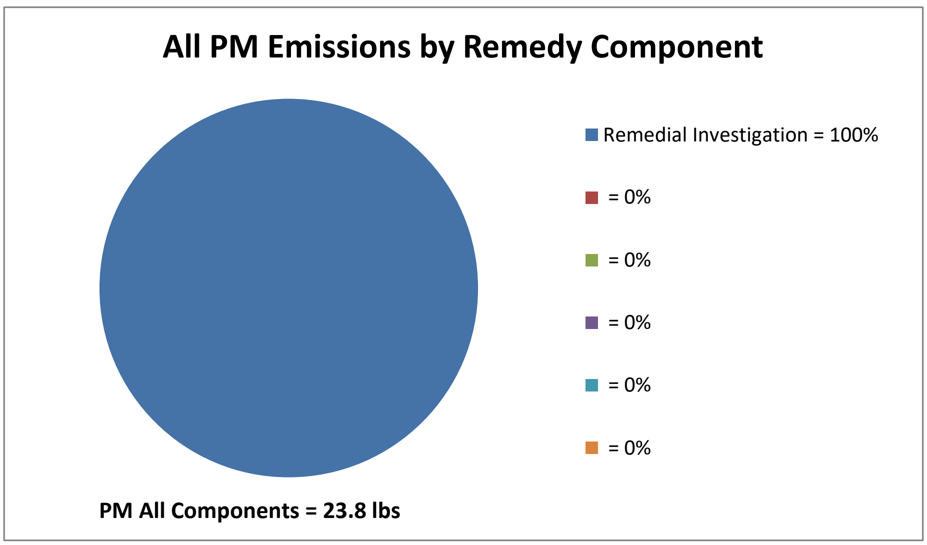
SOx lbs	Remedial Investigation						Total	
On-site (Scope 1)	0.9	0.0	0.0	0.0	0.0	0.0	0.9	
' Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	d Electricity
ısportation (Scope 3a)	1.0	0.0	0.0	0.0	0.0	0.0	1.0	Trar
ıer Off-Site (Scope 3b)	141.4	0.0	0.0	0.0	0.0	0.0	141.4	Oth
Total	143.3	0.0	0.0	0.0	0.0	0.0	143.3	

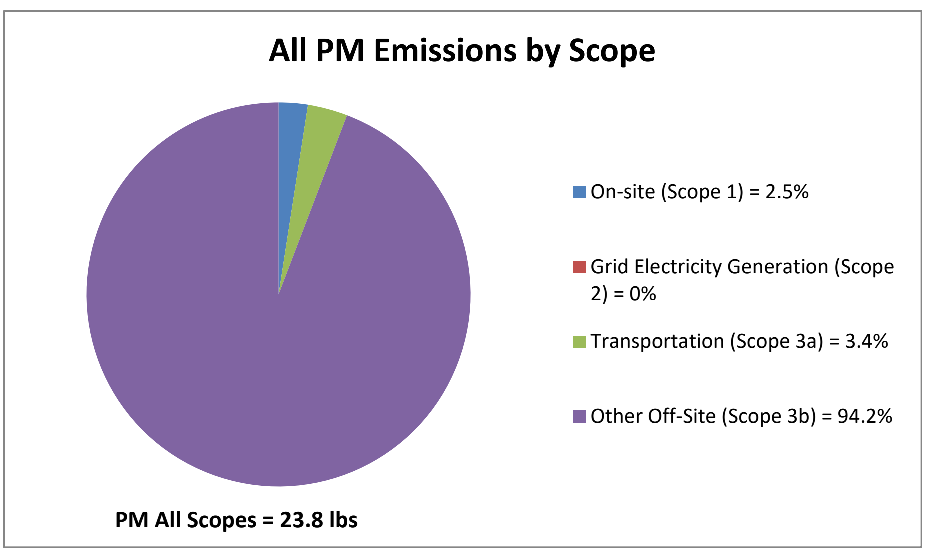
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%

On-site (Scope 1) = 0.6%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 0.7%
Other Off-Site (Scope 3b) = 98.7%

SOx All Components = 143.3 lbs
SOx All Scopes = 143.3 lbs


All PM Emissions by Remedy Component and Scope
(in Lbs)
30
25
20
15
10
5
0
Remedial Investigation
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
PM All Components = 23.8 lbs


All PM Emissions by Remedy Component
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%
PM All Components = 23.8 lbs


All PM Emissions by Scope
On-site (Scope 1) = 2.5%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 3.4%
Other Off-Site (Scope 3b) = 94.2%
PM All Scopes = 23.8 lbs

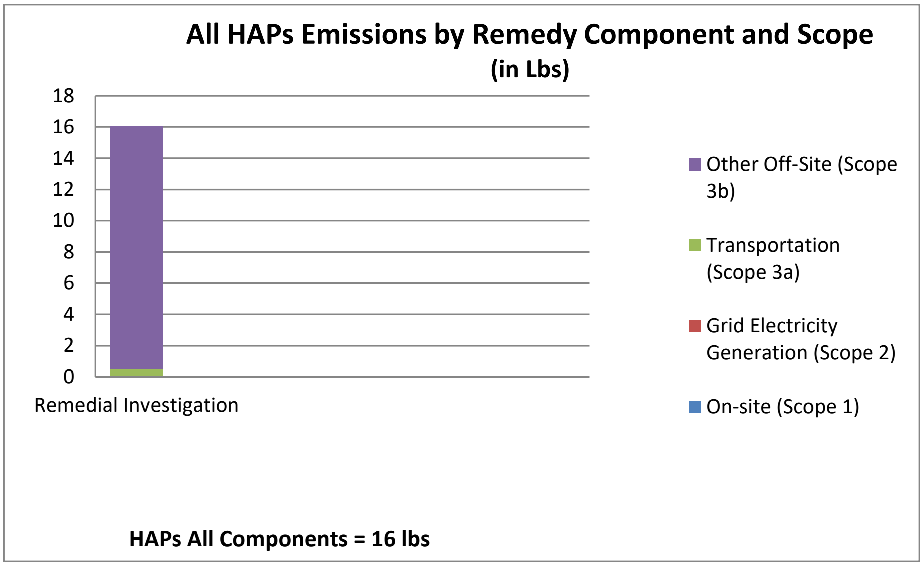
PM
lbs

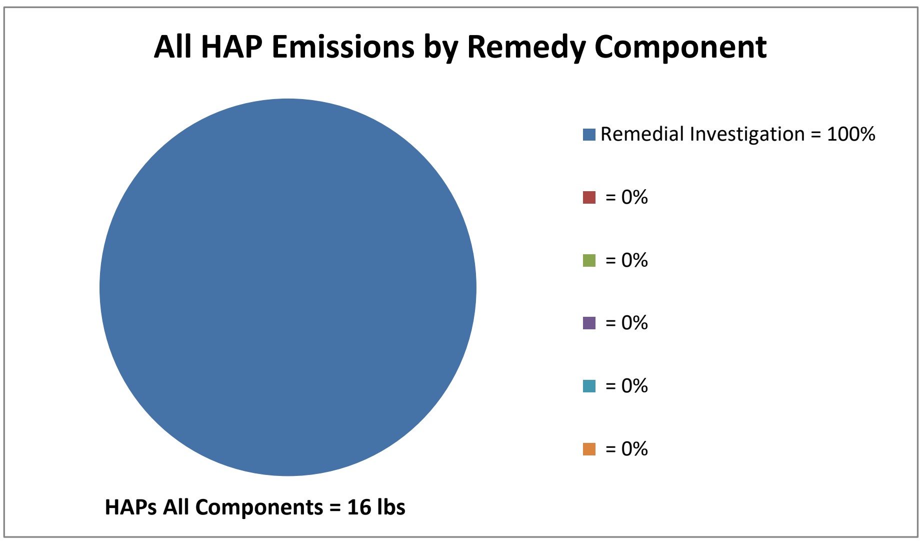
	Remedial Investigation						Total	
On-site (Scope 1)	0.6	0.0	0.0	0.0	0.0	0.0	0.6	
' Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	d Electricity
ısportation (Scope 3a)	0.8	0.0	0.0	0.0	0.0	0.0	0.8	Trar
ıer Off-Site (Scope 3b)	22.4	0.0	0.0	0.0	0.0	0.0	22.4	Oth
Total	23.8	0.0	0.0	0.0	0.0	0.0	23.8	

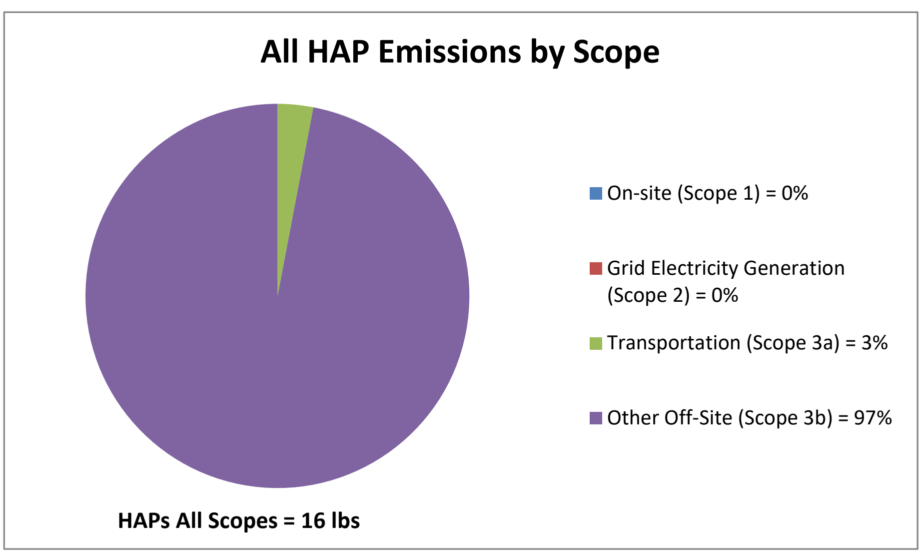
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%

On-site (Scope 1) = 2.5%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 3.4%
Other Off-Site (Scope 3b) = 94.2%

PM All Components = 23.8 lbs
PM All Scopes = 23.8 lbs


All HAPs Emissions by Remedy Component and Scope
(in Lbs)
18
16
14
12
10
8
6
4
2
0
Remedial Investigation
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
HAPs All Components = 16 lbs


All HAP Emissions by Remedy Component
Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%
HAPs All Components = 16 lbs


All HAP Emissions by Scope
On-site (Scope 1) = 0%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 3%
Other Off-Site (Scope 3b) = 97%
HAPs All Scopes = 16 lbs

HAPs lbs	Remedial Investigation						Total
On-site (Scope 1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
nsportation (Scope 3a)	0.5	0.0	0.0	0.0	0.0	0.0	0.5
ner Off-Site (Scope 3b)	15.6	0.0	0.0	0.0	0.0	0.0	15.6
Total	16.0	0.0	0.0	0.0	0.0	0.0	16.0

Remedial Investigation = 100%
= 0%
= 0%
= 0%
= 0%
= 0%

On-site (Scope 1) = 0%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 3%
Other Off-Site (Scope 3b) = 97%

HAPs All Components = 16 lbs
HAPs All Scopes = 16 lbs

APPENDIX F
Health and Safety Plan

PROJECT-SPECIFIC JOB HAZARD ANALYSIS

1.0 GENERAL INFORMATION	
Project name: 120 East 140th Street Development	Client: BH Walton LLC
Site name and location: 120 East 140th Street, Bronx, New York	Project #: 0214715
Field work start date: 3/1/2026	Anticipated field work end date: 5/1/2026
Reviewed and approved by Alternate Project Contact: Mari Conlon	Date: 1/13/2026
Reviewed and approved by H&S: Luke J. McCartney, P.G.	Date: Click here to enter date approved.

2.0 PROJECT TEAM

	Office Phone #	Cell Phone #
Client/Site Contact: Shimon Greenfield	347.489.0542	347.489.0542
H&A Project Manager: Mari Conlon	646.277.5688	347.271.1521
Alternate Project Contact: Alison Reach	646.413.6968	929.761.1900
H&A Regional Safety Manager: Brian Ferguson	617.886.7439	617.908.2761
H&A Site Safety Officer: Kaitlyn Moses	646.413.6970	914.874.7171
Subcontractor Information: Loraine Kelly – Lakewood Environmental Services Corp	631.257.5321	631.796.7810

3.0 EMERGENCY ACTION PLAN

Emergency Contact List

In the event of an emergency, contact 911 immediately. If it is not an emergency, contact Accuity at 1-888-397-8099 for support.

Contact	Name	Location	Phone
Hospital	NYC Health + Hospitals/Lincoln Emergency Room	213 East 149th Street, Bronx, NY 10451	844.692.4692
Police	New York Police Department – Service Area 7	737 Melrose Avenue, Bronx, NY 10451	718.292.6161
Fire	FDNY Engine 71/Ladder 55	720 Melrose Avenue, Bronx, NY 10455	718.999.2000

Liberty Mutual Claim Policy – WC6-Z11-254100-035

3.0 EMERGENCY ACTION PLAN

Required Site Maps

Complete and add site map(s) to safety folder in Teams, indicating the site perimeter and work zones (e.g., exclusion zone, decontamination zone), evacuation routes, and primary and secondary muster points.

4.0 SCOPE OF WORK

☐ Is this a HAZWOPER project? If yes, you must edit and attach personal monitoring plans and decontamination JHA task pages.

The scope of work includes conducting a ground penetrating radar (GPR) survey to identify subsurface features, followed by the installation of three to five soil borings, three temporary groundwater monitoring wells, and four soil vapor sampling points. Soil, groundwater, and soil vapor samples will be collected for laboratory analysis to assess potential environmental impacts. The work will involve the use of geophysical and drilling equipment, with potential exposure to environmental hazards, including contaminated soil, groundwater, and vapor.

SITE OVERVIEW - *Use this space to provide a description of the site, historical data, current uses, surrounding neighborhood, etc.*

The Site is identified as Block 2344, Lot 75 on the New York City tax map . The Site is approximately 5,227 square feet (0.12 acres) and is currently an undeveloped parking lot. The Site is bounded to the north by East 140th Street followed by a multi-story educational building occupied by Health Opportunities High School; to the east by a four-story manufacturing building followed by Walton Avenue, and to the south by a three-story commercial and office building occupied in part by Stanley Ruth (HVAC contractor); and to the west by Gerard Avenue followed by Highway 87.

The Site was first developed as early as 1908 with a four-story manufacturing/industrial building. Throughout the 20th century, Sanborn maps and city directories show the property and surrounding area in commercial, industrial, and manufacturing use, including nearby lumber yards, warehouses, garages, and, later, an automobile servicing facility on the adjacent eastern property.

Previous investigations have identified metals and polycyclic aromatic hydrocarbons in soil indicative of urban fill. In addition, chlorinated volatile organic compounds have been identified in soil, groundwater and soil vapor.

5.0 SITE HAZARDS

Use this table to identify risks in our work. Use the Energy Wheel to deeply consider all risks that may be present and attach applicable site hazard sheets to the JHA package.

TASKS AND HAZARDS THAT MAY BE INCLUDED IN THIS SCOPE OF WORK OR SIMULTANEOUS OPERATIONS:

REQUIRES ADDITIONAL TRAINING, PLANNING, PERMITS, AND/OR MEDICAL SURVEILLANCE

☐ Air monitoring plan ☐ Heat injury and illness prevention plan ☒ Underground utility clearance checklist	☒ Decontamination ☐ Traffic control plan ☒ Respiratory protection ☐ Nuclear density gauge	☐ X-ray fluorescence analyzer ☐ Subpart Z chemicals (e.g., lead, silica, inorganic arsenic, asbestos, hexavalent chromium, benzene, etc.)	☐ Confined space entry permit ☐ Critical lift plan	☐ Hot work permit ☐ Fall protection plan ☐ Work over water

SITE HAZARDS – note that this is not a comprehensive list of hazards that may be on your site. For a full list of hazards, see the appendices of the Company HASP. All boxes checked must be present in either task or site JHA attachments.

GRAVITY	MOTION	MECHANICAL	ELECTRICAL	PRESSURE
☒ Work overhead (e.g., lifting, dropped objects, loading, unloading, suspended loads) ☒ Uneven work surfaces, slips, trips, falls ☐ Other	☒ Traffic (vehicle, pedestrian, heavy equipment, plant operations) ☒ Driving (e.g., vehicle, UTV) ☐ Projectiles ☒ Congested area ☐ Other	☐ Rotating equipment ☐ Line of fire ☒ Sharp objects ☐ Other	☒ Extension cords ☒ Overhead utilities ☒ Energized equipment ☒ Inadequate lighting ☒ Batteries ☐ Other	☒ Compressed gases ☒ Line of fire (hydraulics, etc.) ☐ Other
SOUND	**RADIATION**	**BIOLOGICAL**	**CHEMICAL**	**TEMPERATURE**
☒ Loud equipment (e.g., impact noise, noise from tools) ☐ Other	☒ Sun ☐ Welding ☐ Lasers ☐ Naturally occurring radioactive material ☐ Other	☒ Mammals (large and small) ☒ Insects (biting and stinging) ☐ Poisonous plants ☐ Poisonous snakes ☒ Droppings (human and animal)	☒ Chemicals ☒ Hazardous materials ☒ Wastes ☒ Dusts ☐ Flammable and combustible vapors	☐ Cold stress ☒ Extreme weather (tornado, tsunami, lightning, high winds, blizzard, hurricane) ☒ Wildfire and air quality

5.0 SITE HAZARDS *Use this table to identify risks in our work. Use the Energy Wheel to deeply consider all risks that may be present and attach applicable site hazard sheets to the JHA package.*				
		☐ Needles ☐ Bacteria ☐ Contaminated water ☐ Disease (e.g., BBP, hepatitis, legionnaires) ☒ Mold	☐ Toxic compounds ☒ Potential ACM	☐ Fire ☐ Hot surfaces ☐ Other

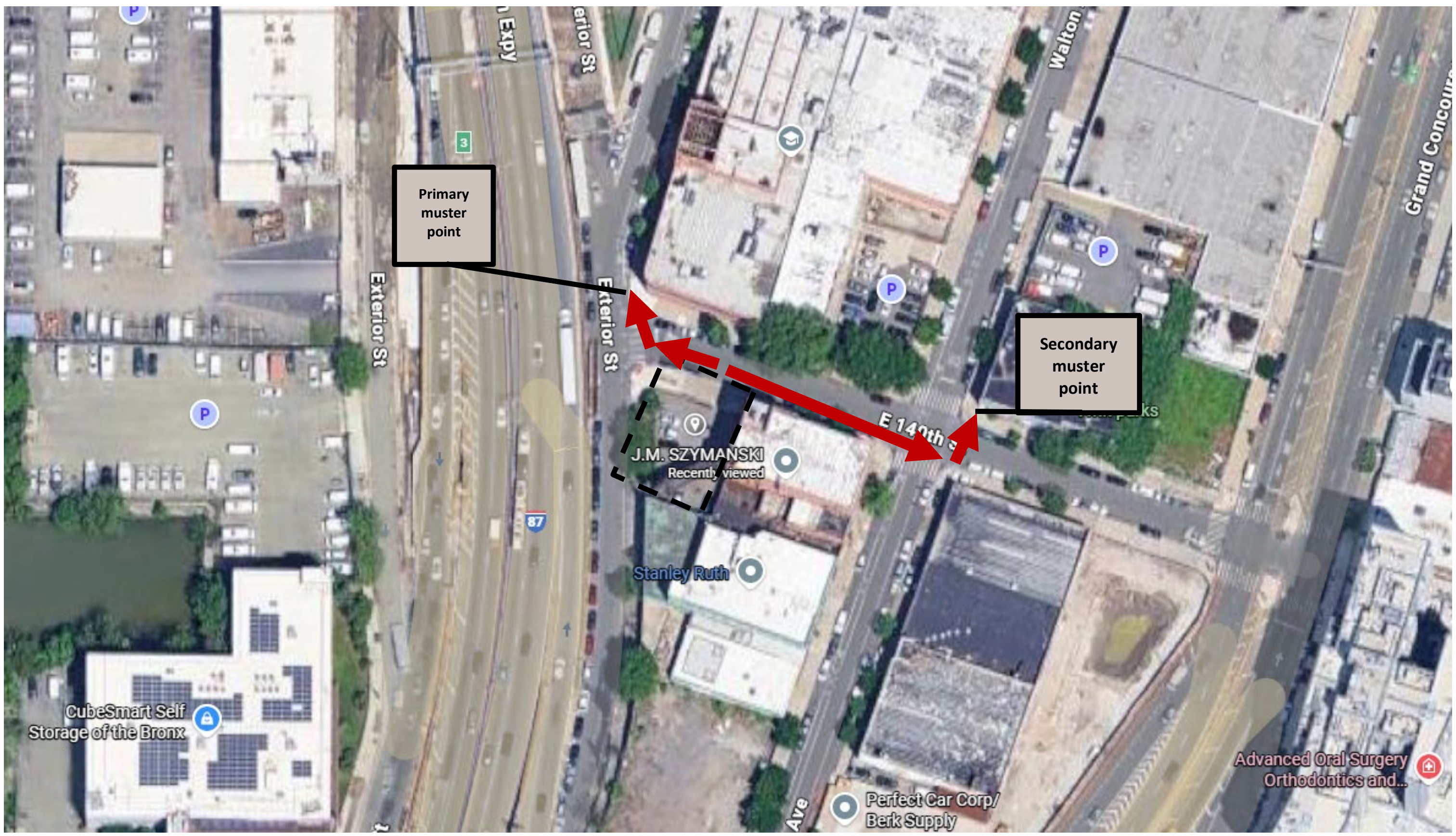
ACKNOWLEDGEMENT PAGE

Staff Member Name	Staff Member Signature	Date
Click or tap here to enter text.		Click dropdown arrow to add date
Click or tap here to enter text.		Click dropdown arrow to add date
Click or tap here to enter text.		Click dropdown arrow to add date

REQUIRED SITE MAPS

Add a site map and indicate the following items as needed. **Drag and drop icons onto the map!**

Site Perimeter (to change shape, click box, select "shape format", and "edit shape")	Exclusion Zone	Contamination Reduction Zone	Support Zone	Evacuation Routes	Primary Muster Point	Secondary Muster Point
					Primary muster point	**Secondary muster point**



HEALTH & SAFETY TAILGATE MEETING FORM

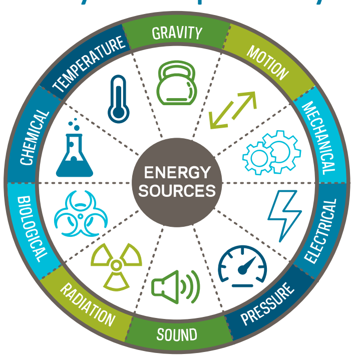
Staff members at meeting:	Click or tap here to enter text.	**Meeting date:** Click or tap to enter a date.

What tasks are being performed today?

List the tasks being performed today and review JHAs. Do JHAs correspond with tasks? Are any subcontractors performing the work we are responsible for?

Click or tap here to enter text.

What hazards do you anticipate today?



Consider not just the hazards of tasks you are performing, but also the hazards present around you (e.g., weather, simultaneous operations, ticks or insects, slips, trips, falls, repetitive motion, etc.).

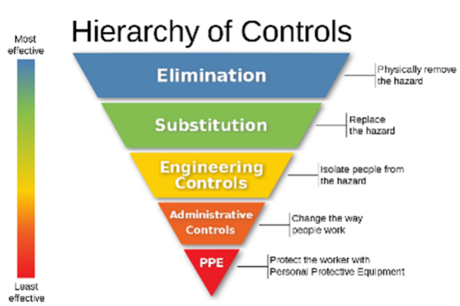
Click or tap here to enter text.

What risk do these hazards present?

How likely are the hazards you have identified to impact you? What do you need to be most concerned about today? Have these hazards changed since you performed work yesterday?

Click or tap here to enter text.

What controls are you using?



Discuss how you are mitigating the hazards you have identified. Use your JHA as a resource, but ensure you have mitigated changed conditions (e.g., weather, SIMOPS, etc.) that were not identified in the original plans.

Click or tap here to enter text.

Everyone has Stop Work Authority	Use identified PPE from JHAs	Review emergency procedures	Share experiences through reporting

6. JOB HAZARD ANALYSIS

Job/Operation Title: Utility Locate

Task/Step	Hazard/Energy Source	Risk/Impact	Recommended Safe Job Procedures
1. Observe Private Locator While They Are Determining and Marking Underground Utility Locations. **Verify USA ticket number(s) are valid.**	Pressurized Paint Can	Injury from Contents Under Pressure Illness from Odor	• Consult Safety Data Sheet (SDS) for safe handling procedures and first aid measures for marking paint; keep face away from spray nozzle. • Consult SDS for appropriate storage. Can contents are under pressure and should not be exposed to heat above 120 degrees Fahrenheit. If the can contents freeze due to cold weather, do not try to quickly heat up the can by placing it over a vehicle defroster as it can explode. • Consult the following color guide for 811 markings and their meaning. White – Proposed Excavation Pink – Temporary Survey Markings Red – Electric Power Lines, Cables, Conduit, and Lighting Cables Yellow – Gas, Oil, Steam, Petroleum, or Gaseous Materials Orange – Communication, Alarm or Signal Lines, Cables, or Conduit Blue – Potable Water Purple – Reclaimed Water, Irrigation, and Slurry Lines Green – Sewers and Drain Lines
	Energized Equipment	Electric Shock/Fire	• All equipment should be inspected prior to being brought on site. • Additionally, ensure subcontractors perform a pre-use inspection. • Equipment must be operated and maintained in accordance with manufacturers guidelines.

Task/Step	Hazard/Energy Source	Risk/Impact	Recommended Safe Job Procedures
1. Observe Private Locator While They Are Determining and Marking Underground Utility Locations. **Verify USA ticket number(s) are valid.**	Underground Utilities Overhead Utilities	Utility Strike/Injury	• Ensure that the appropriate tools are used to identify potential underground utilities (e.g., Concrete Scanner, Ground Penetrating Radar, Electromagnetic Locator). • Concrete scanner should be used when work requires coring through, drilling, or otherwise removing concrete. • Scan the work area for potential markers of underground utilities (stub ups, drains, etc.) • A minimum 50-foot radius around work locations should be scanned by a private utility locator to determine what could be leading into the work area. • Ensure utility locator verifies markings made by utility providers. • Visually check area to validate overhead clearance, utility mark outs, and for visual indicators of utilities.

7.0 TASK-SPECIFIC HAZARD CONTROL MEASURES (as needed in addition to Level D)		
PPE Type:	Choose item or enter text.	

HALEY ALDRICH	6.0 JOB HAZARD ANALYSIS
	Job/Operation Title: Mobilization/Demobilization

Task/Step	Hazard/Energy Source	Risk/Impact	Recommended Safe Job Procedures
1. Set Up/Break Dow Work Zone	Struck-By	Physical Injury	• Set up work zones and use spotters/traffic control to direct traffic around loading and unloading areas. • Designate travel path and stop/direct traffic during moving of equipment and supplies. • Always maintain awareness of traffic flow and swing radius of large equipment. • Ensure to get visible/verbal confirmation from operators and spotters before approaching or crossing in path of heavy equipment (e.g., nod, hands-off-controls signal).
2. Unloading/Loading Equipment	Manual Lifting	Muscle Strains/Sprains	• Keep load in close to the body; keep hips and shoulders aligned (no twisting); maintain stability (keep a balanced position) and use two people for lifts greater than 50 pounds. • Reduce travel distance when there is a need to carry/lift materials and make use of utility carts/dollies.
	Pinch	Physical Injury	• Avoid placing hands/body parts in pinch points.
	Hand Tools	Pinch/Puncture/Cut Points	• Inspect all tools prior to use and tag out or discard defective tools. • Avoid placing hands in pinch points.
	Noise	Hearing Loss	• Personnel will wear ear plugs or muffs (NRR 33) within 25 feet of any operating equipment and implement a system of hand signals understood by all.
	Caught Between / Vehicle Collision	Serious Injury or Fatality (SIF)	• Review loading/unloading plan with delivery drivers. Verbalize plan for truck staging, loading/unloading process, hand signal communication, and roles/responsibilities. • Utilize spotter and/or flaggers to maintain safe exclusion zone during loading/unloading activities.

7.0 TASK-SPECIFIC HAZARD CONTROL MEASURES (as needed in addition to Level D)	
PPE Type:	

HALEY ALDRICH	6.0 JOB HAZARD ANALYSIS
	Job/Operation Title: Soil Vapor Sampling

Task/Step	Hazard/Energy Source	Risk/Impact	Recommended Safe Job Procedures
1. Set Up Exclusion Zone **2. Calibrate and Inspect Air Monitoring Equipment**	Unauthorized Access	Public Safety	• Establish an exclusion zone to prevent unauthorized access during sampling activities.
	Compressed Gases	Release/Fire	• **Complete the Compressed Gas Safety Checklist in OP1048 prior to using or transporting the cylinder.** • Handle compressed gases with care. Ensure canisters of compressed gas are stored upright. • Keep the cylinder clear of all electrical circuits, flame, and sparks. Consult Safety Data Sheet (SDS) for storage and handling procedures. • Use compressed gas only with an appropriately fitting regulator. • Use appropriate material such as chain, plastic-coated wire cable, commercial straps to properly secure the cylinders for transportation. And utilize protective caps to cover valves when transporting the cylinder or when not in use. • Protect cylinders from striking against each other or other surfaces. Never drag, slide, or roll a cylinder. • Do not use the valve cover to lift the cylinders. • Tag out empty containers and continue to handle with care.
	Tools/Energized Equipment	Pinch/Puncture/Cut Points/Electric Shock	• Inspect all tools prior to use and tag out or discard defective tools. • Avoid placing hands in pinch points. • Ensure powered tools are connected to a Ground Fault Circuit Interrupter (GFCI). • Ensure type ABC, fully charged fire extinguisher is within 25 feet of work area. • Do not run power cord through water or other liquids.

Task/Step	Hazard/Energy Source	Risk/Impact	Recommended Safe Job Procedures
3. Use of Helium/Compressed Gas Cylinders	Compressed Gases	Physical Injury, Release, Improper Handling	• American National Standards Institute (ANSI) Z87 face shield must be worn when connecting and disconnecting regulators and lines. • Inspect to ensure the cylinder is equipped with the correct regulator and inspect the regulator for any deficiencies. Cylinders should not be transported with the regulators attached. • Only use wrenches or tools that are provided by the cylinder supplier to open/close valve. If the valve is frozen and cannot be operated by hand, return the cylinder to the rental facility. • Maintain cylinders in an appropriate stand during sampling to prevent them from tipping or being knocked over. • Use the cylinder valve for turning gas off and not the regulator.
4. Purge Air from Sampling Port **5. Collect Soil Vapor Sample**	Chemical Exposure	Illness from Inhalation	• Ensure to follow the project specific air monitoring plans. • Air monitoring should be conducted at your breathing zone during all activities of concern.
	Hand Tools	Hand Injuries/Strain	• 10-mil nitrile gloves can be used instead of cut-resistant gloves when putting together small fittings to reduce potential for hand fatigue. • Cut tubing away from body and any bystanders and do not use excessive force when cutting the tubing. Tubing cutters or scissors are the preferred tool. Blades that are not self-retracting are not permitted to be used. • Use caution in drawing soil gas sample with a syringe to avoid piercing injuries.

7.0 TASK-SPECIFIC HAZARD CONTROL MEASURES (as needed in addition to Level D)

PPE Type:	Choose item or enter text.	Choose item or enter text.	Choose item or enter text.

HALEY ALDRICH

6.0 JOB HAZARD ANALYSIS

Job/Operation Title: Drilling Oversight

<table>
<tr><th>Task/Step</th><th>Hazard/Energy Source</th><th>Risk/Impact</th><th>Recommended Safe Job Procedures</th></tr>
<tr>
<td>1. Verify Lines of Evidence Near Drilling Locations

Verify USA ticket number(s) are valid prior to any ground disturbance and utility/site owners have marked utilities before the start of any ground disturbance task.</td>
<td>Underground Utilities

Overhead Utilities</td>
<td>Utility Strike/Physical Injury</td>
<td>

Ensure utility clearance is conducted in accordance with procedures outlined in OP1020 Working Near Utilities.
Visually inspect work area to confirm overhead clearance, utility mark outs, and visual indicators of marked utilities.
The buffer zones below comply with Occupational Safety and Health Administration (OSHA) 1962.1408(h) Power Line Safety.

<table>
<tr><th>Voltage
(Nominal, kV, alternating current)</th><th>Required Minimal Radial Clearance Distance (feet)</th></tr>
<tr><td>Up to 50</td><td>10</td></tr>
<tr><td>Over 50 to 200</td><td>15</td></tr>
<tr><td>Over 200 to 350</td><td>20</td></tr>
<tr><td>Over 350 to 500</td><td>25</td></tr>
<tr><td>Over 500 to 750</td><td>35</td></tr>
<tr><td>Over 750 to 1,000</td><td>45</td></tr>
<tr><td>Over 1,000</td><td>Established by utility owner operator or registered PE qualified with respect to electrical power</td></tr>
</table>
</td>
</tr>
<tr>
<td>2. Confirmation of Drill Rig Inspection</td>
<td>Heavy Equipment</td>
<td>Serious Injury or Fatality (SIF)/Spill-Release</td>
<td>

Ensure a drill rig inspection is completed prior to use.
Inspect for signs of wear, damage, or other defects.
Ensure emergency shut-off switches are functional and a spill kit is readily available.

</td>
</tr>
<tr>
<td>3. Position and Setup Drill Rig</td>
<td>Drilling Equipment</td>
<td>Struck By</td>
<td>

Keep body parts clear of rig when adjusting and raising mast, drill rods, or hammer assembly.
Inspect rods and sampler prior to and while equipment is operating, remove damaged equipment from use.
Keep clear of drive caps, thread connections, and sampler shoe when assembling/disassembling the tool string, advancing, and withdrawing the sampler.
Individuals who are not involved in the work activity should remain clear of the work zone by 25 feet.

</td>
</tr>
</table>

Task/Step	Hazard/Energy Source	Risk/Impact	Recommended Safe Job Procedures
3. Position and Setup Drill Rig	Overhead Hazards	Tip Over/Loss of Control of Equipment/Electric Shock	• Ensure adequate clearance from drill rig mast and potential overhead utilities, trees, and architectural features, etc. • Discuss plans to move rig prior to movement and scan proposed path for potential hazards. • Ensure a spotter is monitoring during movement of the drill rig and mast. Stop work and adjust boring location as needed to avoid overhead hazards.
4. Advance Boring **5. Backfill Boring Location/ Surface Completion**	Noise	Hearing Loss	• Personnel will wear ear plugs or muffs (NRR 33) within 25 feet of any operating equipment and implement a system of hand signals understood by all.
	Energized/Rotating Equipment	Electric Shock/Fire/Physical Injury	• Ensure type ABC, fully charged fire extinguisher is within 25 feet of work area. • Stay away and keep hands clear from moving parts and wear fitted clothing to reduce likelihood of being caught in rotating equipment. • If necessary to work around moving parts, driller is to disengage and stop moving part while keeping hands off controls until work is completed. • Stay upwind and a minimum of 15 feet away from augers when they are being pulled out.
	Chemical Exposure	Illness from Inhalation Irritation to Skin/Eyes	• Chemical hazards may be present in the subsurface. • Ensure to follow the project specific air monitoring plans. • Air monitoring should be conducted in the breathing zone during ground disturbance activities. • Safety glasses with side shields, and nitrile gloves shall be worn. • Consult SDS for chemical specific first aid measures and exposure controls.

Task/Step	Hazard/Energy Source	Risk/Impact	Recommended Safe Job Procedures
4. Advance Boring **5. Backfill Boring Location/ Surface Completion**	Slip Trip Fall / Silica Inhalation	Physical Injury	• Stay upwind and minimum 15 feet away from grout mixing activities and tremie removal in the event of pressure build up. • Maintain awareness of slip/trip/fall hazard from grout on ground. • Ensure open boreholes are appropriately backfilled and or covered before leaving the site. • Mark open boreholes with a cone or other visible marker to prevent trips and/or ankle injuries. • For skin or eye contact with concrete or grout, immediately wash/ flush area per the SDS first aid measures.

7.0 TASK-SPECIFIC HAZARD CONTROL MEASURES (as needed in addition to Level D)			
Personal Protective Equipment (PPE)	1. **Use appropriate PPE** 2. **Don PPE correctly**	• Exposure to potential mold • Exposure due to cross contamination	• Wear gloves, eye protection (goggles), and an N-95 or P-100 respirator prior to advancing borings and/or nearing the potential mold area. • Ensure PPE is put on prior to advancing borings and/or nearing the potential mold area, and taken off properly to avoid contamination.

HALEY ALDRICH	6.0 JOB HAZARD ANALYSIS
	Job/Operation Title: Groundwater Sampling

Task/Step	Hazard/Energy Source	Risk/Impact	Recommended Safe Job Procedures
1. Tailgate **2. Set Up Sampling Area and Work Zone** **3. Inspect/Calibrate Sampling Equipment** **4. Open/Close Well Covers**	Exclusion Zone	Unauthorized Access	• Delineate work zone to prevent unauthorized access during sampling activities.
	Equipment Hazards	Hand Injury/Pinch Point	• Check all equipment to ensure it is in proper working order and has been calibrated to manufacturer's standards. • Avoid placing hands in pinch points. • Use open face wrench/socket wrench when opening closing well covers. • Ensure area is clear before moving or rotating equipment.
5. Well Gauging **6. Sample Collection** **7. Pack Samples in Coolers**	Chemical Exposure	Illness from Inhalation	• Ensure to follow the project specific air monitoring plans. • If applicable, air monitoring should be conducted at your breathing zone during groundwater sampling activities. Reference Personal Air Monitoring JHA for air monitoring plan details.
		Irritation to Skin/Eyes	• Safety glasses with side shields, and nitrile gloves shall be worn. • Face shields will be worn if splash hazards are likely. • Consult chemical safety card for chemical specific first aid measures and exposure controls.
		Illness from Ingestion	• No eating or drinking in the work area; designated areas will be made available.
	Contact with Preservation Solution	Irritation to Skin/Eyes	• Nitrile gloves shall be worn while handling acid preserved bottles. Avoid contact with skin, eyes, and clothes. • Maintain the portable emergency eyewash station/bottle within reach of sample preservation activities in the event that employee's eyes come into contact with preservation solution. • If preservation solution is splashed onto skin or in eyes, immediately flush per first aid measures described in the Safety Data Sheet (SDS).

Task/Step	Hazard/Energy Source	Risk/Impact	Recommended Safe Job Procedures
5. Well Gauging **6. Sample Collection** **7. Pack Samples in Coolers**	Loss of Containment	Spill/Release	• Site will be examined for any sensitive receptors and if observed, will be protected. • Sampling activities as feasible, should be conducted over secondary containment. • Containers containing liquids should be placed in secondary containment when not in use.
	Energized Equipment	Electric Shock/Fire	• All equipment will be inspected prior to being brought on site. • Additionally, prior to each use, personnel will perform a pre-use inspection of wiring, clamps, cables; avoid arcing.
	Ergonomics	Muscle Strains/Sprains	• Use knee pads if kneeling for extended periods of time. • Take adequate breaks when working in positions that require bending, reaching, carrying, or working in one position. • Avoid working in awkward postures; when possible, try to work in a neutral position (shoulders down and relaxed, arms close to sides, elbows bent, wrists and hands straight).
	Manual Lifting	Muscle Strains/Sprains	• Limit weight in coolers to 50 lbs. or less when packing samples for shipment. • Keep load in close to the body; keep hips and shoulders aligned (no twisting); maintain stability (keep a balanced position) and use two people for lifts greater than 50 pounds. • Reduce travel distance when there is a need to carry/lift materials and make use of utility carts/dollies.

7.0 TASK-SPECIFIC HAZARD CONTROL MEASURES (as needed in addition to Level D)

Personal Protective Equipment (PPE)	1. **Use appropriate PPE** 2. **Don PPE correctly**	• Exposure to potential mold • Exposure due to cross contamination	• Wear gloves, eye protection (goggles), and an N-95 or P-100 respirator prior to advancing borings and/or nearing the potential mold area. • Ensure PPE is put on prior to advancing borings and/or nearing the potential mold area, and taken off properly to avoid contamination.

HALEY ALDRICH	6.0 JOB HAZARD ANALYSIS
	Job/Operation Title: Decontamination

Location of decontamination areas, including showers and changing rooms:

Contact with soil

Location of where contaminated materials can be disposed:

Click or tap here to enter text.

DECONTAMINATION SUPPLIES

All decontamination should be conducted at the project site in designated zones or as dictated by Client requirements. Decontamination should not be carried out on Haley & Aldrich owned or leased premises.

☐ Acetone	☒ Distilled Water	☐ Polyethylene Sheeting
☒ Alconox Soap	☐ Drums	☐ Pressure/Steam Cleaner
☐ Brushes	☐ Hexane	☐ Tap Water
☒ Disposal Bags	☐ Methanol	☐ Wash Tubs
☒ 5 Gallon Buckets	☐ Paper Towels	☐ Other: Click here to enter text.

STANDARD SMALL EQUIPMENT DECONTAMINATION

Process	Mitigations
Pretreatment of heavily contaminated equipment may be conducted as necessary: • Remove gross contamination using a brush or wiping with a paper towel. • Soak in a solution of Alconox and water (if possible). • Wipe off excess contamination with a paper towel. Standard decontamination procedure: • Wash using a solution of Alconox and water. • Rinse with potable water. • Rinse with methanol (or equivalent). • Rinse with distilled/deionized water. Inspect the equipment for any remaining contamination and repeat as necessary	

STANDARD PERSONAL DECONTAMINATION PROCEDURES	
Process	**Mitigations**
Outer gloves and boots should be decontaminated periodically as necessary and at the end of the day. Brush off solids with a hard brush and clean with soap and water or another appropriate cleaner whenever possible. Remove inner gloves carefully by turning them inside out during removal. Wash hands and forearms frequently. It is good practice to wear work-designated clothing while on-site which can be removed as soon as possible. Non-disposable overalls and outer work clothing should be bagged onsite prior to laundering. If gross contamination is encountered on-site, contact the Project Manager (PM) and Regional Safety Manager (RSM) to discuss proper decontamination procedures. The steps required for decontamination will depend upon the degree and type of contamination, but will generally follow the sequence below. • Rinse boots and gloves of gross contamination. • Scrub boots and gloves clean. • Rinse boots and gloves. • Remove outer boots (if applicable). • Remove outer gloves (if applicable). • Remove and wipe clean hard hat. • Remove Tyvek coverall (if applicable). • Remove respirator, wipe clean and store (if applicable). • Remove inner gloves (if outer gloves were used).	

7.0 TASK-SPECIFIC HAZARD CONTROL MEASURES

PPE Type:	Choose item or enter text.	Choose item or enter text.	Choose item or enter text.

HALEY ALDRICH	6.0 JOB HAZARD ANALYSIS
	Job/Operation Title: Personal Monitoring Plans

Exposures to airborne substances shall be fully characterized throughout project operations to ensure that exposure controls are effectively selected and modified as needed.

SITE CHEMICAL HAZARDS

Source of information about contaminants: Select

Contaminant of Concern	Location/Media	Concentration	Units
Choose an item.	Select Media.		Select Units

Choose Chemical Language from drop-down list

MONITORING EQUIPMENT

Select Monitoring Equipment

The required equipment listed above must be on site. Work shall not commence unless the equipment is present and in working order.

MONITORING PLANS

The air monitoring plans included below are general and not comprehensive for each project. Please consult with H&S to develop a site-specific monitoring plan.

Choose a monitoring plan from drop-down list

7.0 TASK-SPECIFIC HAZARD CONTROL MEASURES

PPE Type:			

SITE HAZARD SHEET

ELECTRICAL	
Batteries	• Battery inspection: Determine the functionality and potential damage of each battery cell. • Voltage checks: Implement procedures to check battery voltage before and after charging. • Discharge prevention: Shut down the battery's ability to discharge below 20 volts. • Alarm fixes: Improve the specificity of "battery abnormality" alarms and raise the threshold for maximum charge alarms. • Standard work: Develop a Standard Operating Procedure (SOP), Job Hazard Analysis (JHA), or other standard work guidance for infrequent activities. • Workplace exams: Conduct regular workplace examinations and eliminate hazardous conditions. • Proper training: Train staff in the correct use and care of lithium battery-powered equipment, including appropriate personal protective equipment (PPE) usage. • Follow instructions: Adhere to the manufacturer's guidelines for the storage, use, charging, and maintenance of lithium batteries. • Fire safety: Keep fire extinguishing equipment readily available and ensure a smoke or heat alarm is installed in areas where devices are charged or stored.
Energized equipment	• Document process to de-energize or isolate energy sources. • Ensure staff are appropriately trained to conduct work requiring lockout/tagout. • Affix log or tag to equipment to ensure improper start-up or release of energy. • Execute an Energy Isolation Permit. • Electrical equipment and power tools must be operated and maintained in accordance with manufacturers' requirements. • Electrical equipment, tools, switches, and outlets must be protected from environmental elements. • Check manufacturers' requirements.
Extension cords	• Maintain order on project sites to avoid tripping hazards. Equipment, tools, extension cords, coolers and supplies must be kept away from areas with foot traffic. These items must be put away and stored in a safe manner at the end of the workday. • Extension cords with three-pronged grounding plugs must be plugged into a three-pronged outlet when using grounded tools.

SITE HAZARD SHEET

ELECTRICAL

Inadequate lighting

- Some work may need to occur in areas that are not well lit.
- To reduce hazards of working in low light, temporary lighting can be used to brighten the site, such as flashlights or headlamps, if possible.
- Clear safety glasses should be worn under these conditions.
- If conditions are dark and visibility is poor, staff members should pause work and work with project teams to implement mitigations or postpone work until lighting is better.

Overhead utilities

Before beginning equipment operations, the contractor will identify the work zone and determine if any part of the equipment, load line, or load could get closer than 20 vertical or horizontal feet to a power line. If so, the contractor will:

- Determine the line's voltage and maintain clearance distances both vertical and horizontal in accordance with the table below, or
- Arrange with the utility to de-energize and ground the power line, or
- Modify the work to maintain a 20-foot clearance distance by implementing the measures specified in 29 CFR 1926.1408(b) including conducting a planning meeting, erecting and maintaining an elevated warning line, barricade or line of signs in view of the operator equipped with high visibility markings at the minimum clearance distance, using a proximity alarm, dedicated spotter or range limiting device.

Equipment Travel Clearance Distances for Uninsulated Power Lines

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1000	As established by the utility owner operator or registered PE who is a qualified person with respect to electrical power transmission and distribution

SITE HAZARD SHEET

GRAVITY	
Uneven work surfaces, slips, trips, falls	• Keep site and walking pathways clear of obstacles and debris. • Keep work surfaces dry where possible. • Wear appropriate footwear for the conditions. Add traction devices (ice cleats, 'Yaktrax', etc.) to footwear as needed. • Take your time, stay alert, and be aware of the conditions. • Carry lightly: Avoid carrying heavy loads that could affect your balance. • Reduce your walking speed to allow for better balance and reaction time. • In mixed vegetation, rubble or debris, or walking over snow/ice use a walking stick/staff to 'investigate the ground' of your path. Or, lightly tap the ground with your foot to assess its stability.
Work overhead (e.g., lifting, dropped objects, loading, unloading)	• Always approach heavy equipment with an awareness of the swing radius and traffic routes of each piece of equipment and never go beneath a hoisted load. • Install barriers, shields, or screens around unsafe areas. • Identify and maintain safe walking areas. • Address overhead work concerns and avoid unsafe zones. • Keep a safe distance between you and any suspended loads, heavy equipment, or other line of fire hazards. • Never stand under a suspended load. • Avoid areas where there is potential for dropped objects. • Remain aware of stored energy, and where equipment or objects may fall when energy is released.

SITE HAZARD SHEET

MECHANICAL	
Sharp objects	• Staff members are required to wear ANSI cut score A2 gloves whenever there is potential for cutting hazards on site.

SITE HAZARD SHEET

MOTION	
Congested area	• Project sites may present congested working areas with other subcontractors and moving equipment. • Be mindful of the work happening around you, paying attention to the hazards beyond those of just the task you are performing. • Stay clear of vehicle pathways. • Remain visible to operators and receive confirmation before moving across the pathway of any heavy equipment.
Driving (e.g., vehicle, UTV)	• Always wear seat belts when operating vehicles or heavy equipment, unless the equipment is designed for stand-up operation or lacks a rollover protective structure. • Check vehicles and equipment before each shift to ensure all parts and accessories are in safe working condition. • Obey all traffic laws and any additional on-site vehicle rules. • Do not use cell phones or other distractions while driving. • Allow adequate travel time to avoid speeding. • Only drive on roadways or grades that are safely constructed and maintained. • Do not exceed a vehicle’s rated load or lift capacity. • Do not carry passengers unless the vehicle is equipped with a designated and safe seating area. • Operators must meet all requirements (e.g., licenses, certifications, training) for the specific equipment they are using. • Do not drive in reverse with an obstructed rear view unless the vehicle has an audible reverse alarm or a spotter signals it is safe. • Use a dedicated spotter when operating or maneuvering heavy equipment. • Set parking brakes when vehicles are parked, and chock wheels if on an incline. • Lower or block buckets and place all controls in neutral when equipment is not in use. • Ensure all vehicles have adequate braking systems and safety devices. • Use traffic signs, barricades, or flaggers when working near public roadways. • Clearly define work zones using reflective tape, traffic cones, or similar markers. • Use orange flashing lights to alert drivers to hazards or changes in traffic patterns. • Workers must wear high-visibility clothing.

SITE HAZARD SHEET

MOTION	
Traffic (vehicle, pedestrian, heavy equipment, plant operations)	• Stay clear of traffic patterns and high-traffic areas. • Watch for debris that may be kicked up by passing vehicles. • Avoid inhaling exhaust fumes from heavy equipment. • Obey all traffic laws and on-site vehicle rules. • Use traffic signs, barricades, or flaggers when working near public roadways. • Wear high-visibility clothing. • Always establish eye contact with the equipment operator before entering a work zone. • The operator must place the equipment in a neutral energy state (e.g., stop coring or rotating) and remove hands from the controls. • Only approach once the equipment is neutralized and the operator's hands are off the controls. • The operator must keep hands off the controls while anyone is in the work zone. • Maintain visual contact with the operator at all times. • Stay out of the equipment's strike zone and swing radius. • Never position yourself between a fixed object and moving equipment or two pieces of moving equipment. • Use a spotter or backer when moving equipment, if possible. • Be especially alert near heavy equipment due to the risk of mechanical failure or breakage.

SITE HAZARD SHEET

PRESSURE	

Compressed gases	Compressed gases pose both physical and chemical hazards, depending on the type of gas. These gases can range from inert and non-reactive to highly toxic, flammable, or explosive. Due to the high pressure inside cylinders, any physical damage or exposure to high temperatures can result in serious incidents.
	• All compressed gas cylinders must be:
	  – Clearly labeled with the name of their contents in accordance with the Occupational Safety and Health Administration (OSHA) and other applicable regulations.
	  – Accompanied by a Safety Data Sheet (SDS), which must be obtained and maintained for each type of gas.
	• Always store, transport, and use cylinders upright with the valve facing up. Secure them using appropriate supports such as racks, straps, chains, or stands to prevent tipping or falling.
	• Protect cylinder valves with standard caps when not in use—this applies to both full and empty cylinders.
	• Never force a cap or regulator; caps should be hand-tightened only.
	• Avoid exposing cylinders to excessive moisture, corrosive chemicals, or fumes.
	• Do not store cylinders near combustible materials or in areas subject to extreme temperatures.
	• Never transfer gases from one cylinder to another (except for dry ice or cryogenic materials). Do not attempt to refill compressed gas cylinders.
	• Before use, slowly “crack” the valve to clear dust or debris—ensure the opening is pointed away from people. Take extra precautions with toxic or flammable gases.
	• Do not stand in front of the regulator gauge when opening the valve.
	• Always use the correct pressure regulator for specific gas. Never operate a cylinder without a regulator.
	• Before opening the cylinder, ensure the regulator’s adjusting screw is released. Never allow gas to enter the regulator suddenly.
	• If a leak occurs between the cylinder and regulator, close the valve before attempting to tighten the union nut.
	• Never strike an electric arc on a cylinder.
	• Do not use damaged, corroded, or leaking cylinders. Remove them from service immediately and contact the supplier for a return or replacement.

SITE HAZARD SHEET

PRESSURE	
Line of fire (hydraulics, etc.)	• Prior to work on hydraulic or pneumatic systems, the energy source shall be turned off and existing pressure drained. • Install barriers, shields, or screens around unsafe areas. • Identify and maintain safe walking areas. • Injection hoses operating under pressure may release stored energy if connections fail or hoses otherwise become dislodged. • Oversight personnel may be sprayed with injection chemicals and/or be injured by violent hose movements. • Staff members shall maintain a safe distance from connection points during injection activities and wear safety glasses. • Should the need arise to stand closer to connection points, a face shield should be worn over safety glasses. • Contractors should be using whip checks to secure hoses that may become loose or dislodged.

SITE HAZARD SHEET

RADIATION	
Sun	• Exposure to ultraviolet light from working outdoors can cause sunburn and can lead to skin cancer. Staff members are encouraged to liberally apply sunscreen, with a minimum sun protection factor of SPF 30. when working outdoors. Sunscreen selected should protect against both ultraviolet A/ultraviolet B (UVA/UVB) rays. Staff members should work in the shade whenever practical. • Prevention of over-exposure and sunburn will be completed by wearing appropriate clothing and using sunscreen. Long-sleeve breathable shirts are recommended to avoid sun exposure to the arms. All staff members are required to wear long pants and boots as part of their PPE and will eliminate sun exposure to legs and feet. • Additionally, staff wear safety glasses offering protection from UVA/UVB rays.

SITE HAZARD SHEET

SOUND	
Loud equipment (e.g., impact noise, noise from tools)	• Wear appropriate hearing protection, such as earplugs or earmuffs in high-noise areas. • Check the Noise Reduction Rating (NRR) of your hearing protection to ensure it provides adequate protection for the noise levels you're exposed to. • Maintain distance from loud equipment whenever possible to reduce noise exposure. • Take regular breaks in quiet areas to give your ears time to recover from prolonged noise exposure. • Use tools like the National Institute for Occupational Safety and Health (NIOSH) Sound Level Meter app to monitor and understand noise levels on-site and assess the need for hearing protection. • Be aware of the potential for sudden loud noises. While it’s best to wear hearing protection at all times in noisy environments, always follow posted signage indicating when hearing protection is required.

TEMPERATURE

Extreme weather (high winds, hurricanes, lightning, snowstorms, tornados, tsunami)

High winds

Work Activity	Wind Speed Stop Work Action Levels	
	Sustained[1]	Instantaneous
General Site Work	25 mph	40 mph or greater
High Risk Activities		
Working at Heights	15 mph	25 mph or greater
Critical Lifting Operations	15 mph	25 mph or greater
Lifting Operations	25 mph	35 mph or greater
Over Water Work	25 mph	35 mph or greater
Heavy Equipment with Elevated Masts	25 mph	35 mph or greater

- The table above summarizes the stop work action levels for general site work and various high-risk project activities with respect to wind speed.
  - It should be noted that when using specific heavy equipment that the manufacturer's recommended wind speed for cease of operations (if defined) supersedes the wind speed action levels stated above if the manufacturer's guidelines are more restrictive.
  - Task specific Job Hazard Analysis (JHAs) must reflect manufacturer's specific guidelines, or if exact make and model of equipment is not known during initial JHA development, they will be updated in the field to reflect requirements.

Hurricanes

- Pay attention to emergency information and alerts.
- If you live in a mandatory evacuation zone and local officials tell you to evacuate, do so immediately.
- Determine how best to protect yourself from high winds and flooding.
- Take refuge in a designated storm shelter or an interior room for high winds.
- Go to the highest level of the building if you are trapped by flooding. Do not climb into a closed attic. You may become trapped by rising flood water.
- Do not walk, swim or drive through flood waters. Turn Around. Don't Drown! Just 6 inches of fast-moving water can knock you down, and 1 foot of moving water can sweep your vehicle away.

TEMPERATURE	

Extreme weather (high winds, hurricanes, lightning, snowstorms, tornados, tsunami) *(continued)*	**Lightning storms**
	• If lightning is observed to be within 6 miles of the project, suspend operations, depending on the speed of storm approach.
	• You can use “Spark” by WeatherBug, or another recognized lightning warning app to track lightning.
	• National Severe Storms Laboratory (NSSL) recommends the "Flash to Bang" method. Simply count the seconds from the time the lightning is sighted to when the clap of thunder is heard.
	• Divide the number by 5 to obtain how far away in miles the lightning is occurring.
	  – For example, if the lightning flash is seen and then 15 seconds later the bang of thunder is heard, the lightning is 3 miles away. It is important site personnel monitor not only how far away the lightning is but also how fast it is approaching.
	• The NSSL recommends by the time the Flash to Bang count reaches 30 seconds, all individuals should have left the site and reached a safe structure, such as a building or job trailer.
	• If caught in the open by an electrical storm, immediately seek shelter in a vehicle on land.
	• If a vehicle is inaccessible: move to a topographically low area away from tall objects and conductors (e.g., trees, transformers, fences, pipelines, power lines, metal sheds) and wait for the storm to leave the area.
	• If you feel your hair stand on end (an indicator lightning is about to strike), drop to your knees and bend forward, putting your hands on your knees. Do not lie flat on the ground (be wary of seeking shelter in washes, ravines, or gullies during heavy downpours because of the risk of flash floods).
	• In the event of extreme weather conditions which may pose a health and/or safety risk to workers, field activities will cease until the Site Safety Officer (SSO) determines conditions are safe to resume operations.
	• Wait at least 30 minutes after the last lightning strike within 6 miles before resuming work.
	Snowstorms
	• Assess the weather before traveling and ensure emergency supplies are packed in the vehicle.
	• Provide sufficient time for travel delays due to snow/ice covered roads or accidents.
	• Inform someone of your travel plans and expected time of arrival.
	• Wear layered clothing, including jackets, hats, and mittens, or keep these items in the vehicle.
	• If you get stuck inside your vehicle:
	  – Stay inside the vehicle.
	  – Run the heater periodically but be cautious of carbon monoxide poisoning.

TEMPERATURE	
Extreme weather (high winds, hurricanes, lightning, snowstorms, tornados, tsunami) *(continued)*	**Tornadoes** • Watch areas where tornadoes could become present. • Review and discuss your emergency plans, communication/sirens in case of emergency and review shelter locations. • If site is prone to tornadoes, monitor weather reports during work shifts. • Act quickly if a warning is issued or you suspect a tornado is approaching. • If a tornado has been sighted or indicated by weather radar, imminent danger to life and property exists. • Go to shelter locations listed in Safety Plan. Go immediately underground to a basement, storm cellar or an interior room (closet, hallway or bathroom). • If caught outdoors when a tornado is threatening, seek shelter in a basement or a sturdy building. If one is not within walking distance, try to drive to the nearest shelter. • If flying debris is encountered while in a vehicle, there are two options: – Stay in the vehicle with the seat belt on, keep your head below the windows, and cover it with your hands or a blanket, or – If there is an area that is noticeably lower than the roadway, lie in that area and cover your head with your hands. **Tsunami** • If you are under a tsunami warning: – Know evacuation routes (often are marked by a wave with an arrow in the direction of higher ground) and follow them to higher ground. – Contact your project manager when it is safe to do so to inform them that you have evacuated. – Leave immediately if you are told to do so. Evacuation routes often are marked by a wave with an arrow in the direction of higher ground. – If you are in the water, then grab onto something that floats, such as a raft or tree trunk. – If you are in a boat, face the direction of the waves and head out to sea. If you are in a harbor, go inland.

SITE HAZARD SHEET

TEMPERATURE

Wildfire and air quality

- Monitor and assess the air quality index (AQI) for particulate matter at 2.5 microns (PM 2.5) utilizing AirNow.
- Utilize engineering or administrative controls to limit staff member exposure to an AQI level of 150 or lower if possible.
- Review our Wildfire Smoke and Air Quality program materials.
- Ensure all staff members have completed Air Quality Training.

AQI for PM 2.5	Response Action
0 to 50	Normal working conditions. Monitor PM 2.5 conditions and forecasts.
51 to 100	Normal working conditions. Sensitive groups should begin to monitor physical condition. Notify staff of air quality conditions. Ensure only trained staff members are working in the field.
101 to 150	NIOSH approved N95 respirators will be available in all offices for staff members that have completed the voluntary use form. Engineering controls and administrative controls will be implemented. Sensitive groups should continue to monitor conditions.
151 to 200	NIOSH approved N95 respirators will remain available in all offices for staff members that have completed the voluntary use form. Monitor physical conditions throughout the day and remain aware of immediate health impacts of smoke inhalation. PMs should begin discussions about rescheduling work. Recommended that outdoor staff take frequent breaks in areas where filtered AQI is less than 101.
201 to 250	Respirators will remain available for all staff if voluntary use form is completed. All outdoor staff are required to take frequent breaks in areas where filtered AQI is less than 101. Sensitive persons are not to work outdoors in these conditions.
251+	All outdoor projects will be stopped in the impacted areas until the AQI has dropped below 251. Outdoor project work will be rescheduled.

SITE HAZARD SHEET

BIOLOGICAL	
Droppings (human and animal)	• Do not touch droppings with unprotected hands. • Avoid disturbing the droppings and generating dust. • Staff member work practices and dust control measures that eliminate or reduce dust generation during removal of manure from a building will also reduce risks of infection and development of disease. • Use an industrial vacuum cleaner with a high-efficiency (HEPA) filter to bag contaminated material.
Insects (biting and stinging)	**Bees, Wasps, and Hornets** • Bees generally fly in straight lines between flower and hive, hence collisions with unsuspecting individuals occur. • If a single bee approaches, STAY STILL, do not try to swat the insect as this may cause it to react. • If it lands, gently try to blow it off the skin. • If a swarm of bees approach, run for shelter. Bees release a chemical when they sting, which may attract other bees to sting. • If stung, try to look for the stinger and carefully remove it by flicking it or scratching it out of the skin from the stinger sack. • Stings to the head and neck are more dangerous. • When stung, immediately apply ice or cold compresses to the sting site.

BIOLOGICAL	
Insects (biting and stinging) *(continued)*	**Bees, Wasps, and Hornets** *(continued)* • Life threatening reactions are more likely to occur in people who are already known to be very allergic to bee venom, older people with pre-existing heart and chest complaints, or with multiple stings. • Wasps and bees are drawn to flower fragrances and clothing with bright colors (white is safest), perfumes, fruit juices and eating fruit outdoors, hair tonics, suntan lotions, and floral odors. • Hornets are drawn to food and sources of moisture. • Carefully shake out any clothing left on the ground. • Cover open containers and any food outdoors. • Individuals who are prone to severe reactions to bee stings should notify the Site Safety Officer (SSO) and carry their prescribed medication(s) with them for self-administration. • Emergency medical treatment should be sought immediately for individuals who are allergic to bee stings or other individuals who exhibit severe reactions described above. **Mosquitoes** • Take appropriate precautions to minimize the potential transmission of viruses carried by mosquitoes. • Use of PPE techniques is essential to prevent mosquito bites especially when working at sites where mosquitoes may be active and biting. • Use repellents containing DEET, picaridin, IR3535, and some oil of lemon eucalyptus and para-menthane-diol products provide longer-lasting protection. To optimize safety and effectiveness, repellents should be used according to the label instructions. • Cover as much of your skin as possible by wearing shirts with long sleeves, long pants, and socks whenever possible. • Avoid use of perfumes and colognes when working outdoors during peak times when mosquitoes may be active; mosquitoes may be more attracted to individuals wearing perfumes and colognes. • Treat bites by cleaning the affected area with warm soapy water. • Place an ice pack on the affected area to reduce swelling. • Take or apply an antihistamine to reduce itchiness. • Avoid scratching the bite to reduce risk of infection.

BIOLOGICAL	
Insects (biting and stinging) *(continued)*	**Ticks** • Wear light-colored clothing so ticks stand out and long-sleeved shirts and long pants to reduce skin exposure. • Tuck your shirt into your pants and tuck your pants into your socks to close gaps. • Use repellent containing 20-30% DEET (N, N-diethyl-m-toluamide) on exposed skin and clothing. • Avoid hands, eyes, and mouth and wash off repellent when back indoors. • Treat clothing with or purchase clothing with products containing 0.5% permethrin. • Conduct frequent tick checks on clothing and skin. Have others check your back, scalp, and behind your ears and check gear for "hitchhikers." • As soon as you return indoors, take a bath or shower and do a full-body inspection using a mirror. • Wash field clothes and tumble dry on high to kill any ticks that may be hidden. • If working in an area of significant tick habitat, PPE may need to be upgraded to a Tyvek suit. • Implementation of controls is crucial to minimize or eliminate the possibility of a tick bite. • If a staff member has been bitten contact Corporate H&S and Work Care at 888-449-7787 to initiate the Tick Management Protocol. Once bitten, it takes approximately 48 hours to transmit Lyme Disease. • For removal, a fine-tipped tweezer is recommended for tick removal tool and should be in the first-aid kit. • Follow these steps: – Pull upward with steady, even pressure. – Do not twist or jerk the tick; this can cause mouth parts to break off and remain in the skin. – If this happens, remove the parts with tweezers. – If unable to remove easily with tweezers, leave them alone and let the skin heal. – After removing the tick, thoroughly clean the bite area and hands with rubbing alcohol, iodine scrub, or soap & water. – Dispose of live ticks by submersal in alcohol, placing it in a sealed bag/container, wrap it tightly in tape, or flush it down the toilet. – Never crush ticks with your fingers. – Do not attempt to use nail polish remover, petroleum jelly, lotion, or heat to try to get the tick to exit skin. – Swift removal is key.

SITE HAZARD SHEET

BIOLOGICAL	
Insects (biting and stinging) *(continued)*	**Venomous spiders** • Inspect or shake out any clothing, shoes, towels, or equipment before use. • Wear protective clothing such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials. • Minimize the empty spaces between stacked materials. • Remove and reduce debris and rubble from around the outdoor work areas. • Trim or eliminate tall grasses from outdoor work areas. • Store apparel and outdoor equipment in tightly closed bags. • Keep tetanus boosters up to date (every 10 years). • Spider bites can become infected with tetanus spores. • Additional information in the case of bites can be obtained from the Poison Center (1-800-222-1222).
Mammals (large and small)	**Large mammals** • Avoid contact with animals whenever possible. • If an animal displays aggressive behavior and charges, do not run or turn your back. • When confronted by a large mammal it is important not to run or exhibit any behavior that may be construed as a challenge (e.g., looking the animal in the eyes, showing your teeth, etc.). • Stand still and place your work bag between you and the animal and then begin to move slowly away from the animal, while not turning your back. **Small mammals** • Avoid contact with rodents, if possible. • Avoid contact with rodent excrement. • Do not eat food or water that may have encountered rodent excrement. • If exposed, wash hands and avoid touching your face with your hands.

SITE HAZARD SHEET

BIOLOGICAL	
Potential Mold	**Mold** • Avoid contact with mold, if possible • Limit field personnel activity in areas where potential mold is present • An exhaust fan should be operational during drilling activities in areas with potential mold, and set up near the personnel door so they are exhausting/blowing outwards and not circulating air through the building • Respiratory protection training and respirator fit test certifications are required • A half-face respirator with P100 filers is required for H&A field personnel during work around areas with potential mold
Potential ACM	**Potential Asbestos Containing Materials** • Avoid contact with ACM • Avoid disrupting ACM and do not drill in or around areas with potential ACM • Use a spray bottle and/or water to dampen boring locations prior to drilling in order to prevent dust generation

SITE HAZARD SHEET

CHEMICAL	
Chemicals	• Chemical hazards must be identified and addressed on a project-by-project basis. • Include Safety Data Sheets (SDS) for all applicable chemicals. • Project-specific air monitoring plans shall be developed and described in the project-specific JHA. • Additionally, other routes of exposure to chemical hazards (e.g., absorption, injection, ingestion) and associated controls must be addressed in a Job Hazard Analysis (JHA). • All project-specific or task-specific JHAs are to be modified when new chemical hazards are identified.
Dusts	**Dust control** • Minimize the escape of dust from process equipment or ventilation systems; • Use dust collection systems and filters; • Utilize surfaces that minimize dust accumulation and facilitate cleaning; • Provide access to all hidden areas to permit inspection; • Inspect for dust residues in open and hidden areas, at regular intervals; • Clean dust residues at regular intervals; • Use cleaning methods that do not generate dust clouds, if ignition sources are present; • Only use vacuum cleaners approved for dust collection; • Locate relief valves away from dust hazard areas; and • Develop and implement a hazardous dust inspection, testing, housekeeping, and control program (preferably in writing with established frequency and methods).

CHEMICAL	
Dusts *(continued)*	**Silica dust** • Use of wet methods must be utilized to minimize dust production and ensure enough water is supplied. • Water-integrated delivery system that supplies water to cutting surface will be a requirement for stationary mason saws, hand-held power saws, walk behind saws, drivable saws, rig mounted core saw/drills, jackhammers, and hand-held grinders. • All water must be collected for sampling and disposal off-site. • All drain inlets will need to be identified and secured with plastic sheeting and absorbent snakes or sandbags and will need to be identified by the use of a cone or delineator. • Personnel must ensure drain valve is safely secured and washed soils will be shoveled from the unit and will be transported into appropriate labeled drums. • Evaluation must be completed to determine whether dusk mask/respirator is required to prevent inhalation of particles (based on equipment used – see below). • The slurry from utilizing the wet methods must be removed before it dries to prevent the dried material from generating dust that can spread to other areas of the Site.

CHEMICAL	
Wastes	**Handling Drums** Only employees who have completed U.S. Department of Transportation (DOT) certification training can handle drums. If you do not maintain the appropriate training, or your training has expired, please complete a training request ticket to H&S to be enrolled in a new DOT training course. Hazardous substances and contaminated soils, liquids, and other residues shall be handled, transported, labeled, and disposed of in accordance with the following procedures: • Drums and containers used during the clean-up shall meet the appropriate DOT, Occupational Safety and Health Administration (OSHA), and U. S. Environmental Protection Agency (EPA) regulations for the wastes that they contain. • When practical, drums and containers shall be inspected, and their integrity shall be assured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions (i.e., buried beneath the earth, stacked behind other drums, stacked several tiers high in a pile, etc.) shall be moved to an accessible location and inspected prior to further handling. • Unlabeled drums and containers shall be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled. • Site operations shall be organized to minimize the number of drums or containers moved. • Prior to movement of drums or containers, all staff members exposed to the transfer operation shall be warned of the potential hazards associated with the contents of the drums or containers. • DOT specified salvage drums or containers, and suitable quantities of proper absorbent shall be kept available and used in areas where spills, leaks, or ruptures may occur. • Where major spills may occur, a spill containment program shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred. • Drums and containers that cannot be moved without rupture, leakage, or spillage shall be emptied into a sound container using a device classified for the material being transferred. • A ground-penetrating system or other type of detection system or device shall be used to estimate the location and depth of buried drums or containers. • Soil or covering material shall be removed with caution to prevent drum or container rupture. • Fire extinguishing equipment shall be on hand and ready for use to control incipient fires.

CHEMICAL	
Wastes *(continued)*	**Opening Drums and Containers** The following procedures shall be followed in areas where drums or containers are being opened: • Where an airline respirator system is used, connections to the source of air supply shall be protected from contamination and the entire system shall be protected from physical damage. • Staff members not actually involved in opening drums or containers shall be kept a safe distance from the drums or containers being opened. • If staff members must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation shall be placed between the staff member and the drums or containers being opened to protect the staff member in case of accidental explosion. • Controls for drum or container opening equipment, monitoring equipment, and fire suppression equipment shall be located behind the explosion-resistant barrier. • When there is a reasonable possibility of flammable atmospheres being present, material handling equipment and hand tools shall be of the type to prevent sources of ignition. • Drums and containers shall be opened in such a manner that excess interior pressure will be safely relieved. If pressure cannot be relieved from a remote location, appropriate shielding shall be placed between the staff member and the drums or containers to reduce the risk of staff member injury. • Staff members shall not stand upon or work from drums or containers. **Radioactive Wastes** Drums and containers containing radioactive wastes shall not be handled until their hazard to staff members is properly assessed. • If handling radioactive wastes is necessary, staff members must coordinate with Health & Safety to ensure that proper controls are in place to mitigate as much exposure as possible.

SITE HAZARD SHEET

CHEMICAL	
Wastes *(continued)*	**Shock Sensitive Wastes** Drums and containers containing shock sensitive wastes shall not be handled until their hazard to staff members is properly assessed. • If handling shock sensitive wastes is necessary, staff members must coordinate with Health & Safety to ensure that proper controls are in place to mitigate as much exposure as possible. **Laboratory Waste Packs** The following precautions shall be taken, as a minimum, when handling laboratory waste packs (lab packs): • Lab packs shall be opened only when necessary and then only by an individual knowledgeable in the inspection, classification, and segregation of the containers within the pack according to the hazards of the wastes. • If crystalline material is noted on any container, the contents shall be handled as a shock-sensitive waste until the contents are identified.

Company HASP

Revision Number	Revision Date	Summary of Changes	Approved By
0	8/1/2025	Initial	Brian Fitzpatrick
1	11/3/2025	Revise WorkCare to Acuity	Maggie Cahoon

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1. PURPOSE

The purpose of this Company Health and Safety Plan (HASP) is to address site-specific hazards for work activities that Haley & Aldrich undertakes on Hazardous Waste Operations and Emergency Response (HAZWOPER) sites. This document identifies appropriate mitigations and control measures to help eliminate or reduce identified risks or directs staff to complete project Job Hazard Analysis (JHA) to further document the risks and mitigations specific to that site. Project JHAs and task-specific JHAs are used to augment this document to provide more detailed information on risk and mitigations. Project JHAs provide directions on site-specific risks such as, but not limited to, simultaneous operations, security, and emergency response. JHAs task pages are used to identify the tasks associated with the project work, and the risks and mitigations specific to that task.

Included in this document are references to Haley & Aldrich Operating Procedures (OPs) and policies related to the work performed at project sites.

2. EXPECTATIONS

2.1 FOUNDATIONAL SAFETY BEHAVIORS

The Foundational Safety Behaviors are designed to advance and streamline safety across the organization. These behaviors were developed through extensive feedback, collaboration, and engagement across the company.

These behaviors are not just guidelines, but must be integrated into daily operations of all staff members to ensure consistency across the organization. By taking ownership of these behaviors, every staff member contributes to a safer work environment, ultimately advancing the overall safety culture at Haley & Aldrich.

2.2 STOP WORK AUTHORITY

In accordance with Haley & Aldrich OP1035 - Stop Work Authority, any individual has the right to refuse to perform work that they believe to be unsafe without fear of retaliation. They also have the authority, obligation, and responsibility to stop others from working in an unsafe manner. Stop Work does not always mean to stop all work on a project, but it can also mean that you are stopping a task or activity to ensure that everyone is working safely.

- **Stop** working immediately when perceiving a dangerous situation.
- **Notify** coworkers, supervisors, and any other relevant individuals of the stop-work action.
- **Investigate** the situation and come to an agreement on whether work should resume or be suspended until the risk is mitigated.
- **Necessary corrections** shall be made and inspected by qualified experts to verify that the issue has been resolved and that work can proceed safely.
- **Resume work** once the relevant authority has approved of the situation and issued a notice that corrective actions have been implemented.
- **Follow up** from management in the form of investigations, improvements, or relevant reports.

STOP Work Authority is the stop work policy for all personnel and subcontractors on the site. When work has been stopped due to an unsafe condition, Haley & Aldrich site management (e.g., Project Manager [PM], Site Safety Officer [SSO], Regional Safety Manager [RSM], etc.) will be notified immediately.

Reasons for issuing a Stop Work order include, but are not limited to:

- The belief/perception that injury to personnel or accident-causing significant damage to property or equipment is imminent.
- A Haley & Aldrich subcontractor is in breach of site safety requirements and/or their own site HASP.
- Identifying a substandard condition (e.g., severe weather) or activity that creates an unacceptable safety risk as determined by a qualified person.

Work will not resume until the unsafe act has been stopped OR sufficient safety precautions have been taken to remove or mitigate the risk to a degree of which work can resume safely. Any instances of stopping work will be documented through Health & Safety's digital reporting tool. Once work has been stopped, only the Haley & Aldrich PM or SSO can give the order to resume work. Haley & Aldrich senior management is committed to support anyone who exercises their "Stop Work" authority.

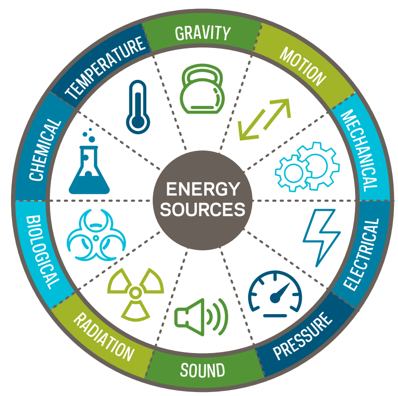
2.3 HEALTH AND SAFETY REPORTING

All staff members are required to use Health & Safety's digital reporting tool to document any safety events occurring at work, or related to work. Forms are available for various purposes, including events, injuries, and sensitive information. Staff must report safety events promptly, and the Health & Safety team is responsible for collaborating with both onsite and supporting staff to address safety concerns and feedback in a timely manner.

3. ISSUANCE AND COMPLIANCE

The Company HASP was developed in accordance with Occupational Safety and Health Administration (OSHA) regulations 29 CFR 1910.120 and 1926.65. This document outlines general requirements and information related to our project work. Project-specific documents, such as the JHAs, are developed by those most familiar with the work and are reviewed and approved prior to starting work by the Haley & Aldrich RSM and PM. These documents must be reviewed and modified regularly as site conditions change.

- All Haley & Aldrich JHAs must be signed by Haley & Aldrich personnel involved in the implementation of the Scope of Work (SOW).
- Haley & Aldrich's subcontractors must have their own project health and safety documents which address hazards specific to their trade. All subcontractor JHAs must be signed by subcontractor personnel involved in the implementation of their respective SOW.
- The Company HASP, electronic or printed, must be accessible at all times when Haley & Aldrich staff are present.
- If changes are necessary based on the presence of high energy hazards, the RSM and PM must approve updates to the JHA. Any revision to the JHA requires staff members and subcontractors to be informed of the changes so that they understand the requirements of the change. Staff members and subcontractors must sign the applicable JHAs associated with their work following any revisions.



- Deviations from the JHA are permitted with approval from the Haley & Aldrich RSM and PM. Unauthorized deviations may constitute a violation of Haley & Aldrich company procedures/policies and may result in disciplinary action.
- Project JHAs will be relied upon by Haley & Aldrich staff, subcontractors, and visitors to the site. This document will also be available for review but is not intended to be the sole source of project safety. This HASP and all project-specific JHAs will be made available for review to Haley & Aldrich's subcontractors and other interested parties (e.g. facility personnel and regulatory agencies) prior to commencing work, to ensure that Haley & Aldrich has properly informed our subcontractors and others of the potential hazards associated with the implementation of the SOW to the extent that Haley & Aldrich is aware.

This Company HASP provides required information in alignment with OSHA regulations. General safety and health compliance programs in support of this HASP and project documents (e.g., injury reporting, medical surveillance, personal protective equipment [PPE] selection, etc.) are described in the Haley & Aldrich Corporate Health and Safety Program Manual and within Haley & Aldrich's Operating Procedures (OPs). Copies of project documents must be readily available on site and reviewed daily. Both the manual and SOPs can be located on the Haley & Aldrich's Company Intranet. Users of this HASP and other project documents should always refer to these resources and incorporate to the extent possible. The manual and SOPs are available to clients and regulators upon request.

4. ROLES AND RESPONSIBILITIES

4.1 PROJECT STAFF ROLES AND RESPONSIBILITIES

Project teams consist of multiple staff members working together to provide support to those executing work in the field. Below are general responsibilities of team members that contribute to project support.

4.1.1 Haley & Aldrich Project Manager (PM)

The Haley & Aldrich PM has the overall responsibility for the health and safety of Haley & Aldrich project personnel. The PM is responsible for ensuring the following to properly implement this HASP:

- Sufficient resources and materials are available.
- Day-to-day field investigation activities are planned and executed in a manner consistent with project-specific JHAs.
- Only staff who are properly trained and experienced are placed on a project site.
- Sufficient resources and materials are allocated to implement this HASP and are properly used.
- Site staff understand how to access a copy of the project-specific JHA through printed resources and project files, and this HASP electronically.
- All relevant company policies, procedures, and expectations are followed.

4.1.2 Haley & Aldrich Site Safety Officer (SSO)

The Haley & Aldrich SSO, or their designee, will be present during the execution of work. The SSO may perform additional roles on-site but will be responsible for Haley & Aldrich's health and safety and that of contracted subcontractors. The SSO will be responsible for administration of the site safety program and will ensure the elements of this HASP are properly implemented and understood by site personnel. The senior person for Haley & Aldrich on-site is the SSO, unless otherwise designated. The SSO will be named in the project-specific JHA.

4.1.3 Haley & Aldrich Regional Safety Manager (RSM)

The RSM, or their designee, is the safety lead for all Company projects within their designated region. The RSM is a full-time Haley & Aldrich staff member, trained as a safety and health professional. They will review and approve the site-specific safety documents and any required amendments, and lead the project teams in their safety efforts. The RSM is active in identifying and mitigating any potential safety and health issues. RSMs are available for site visits and play an active role as a resource for field staff members with any questions or concerns regarding site safety.

4.1.4 Haley & Aldrich Health & Safety Team

When the "Health & Safety Team" is referenced in this document it means, the Chief H&S Officer, Corporate H&S staff, RSMs, and/or their designees.

4.1.5 Haley & Aldrich Subcontractors

When Haley & Aldrich is the controlling employer, we expect each subcontractor will provide a qualified representative who will act as their Safety Lead, unless otherwise denoted in the contract. This person will be responsible for the planning, coordination, and safe execution of subcontractor tasks. This includes the preparation of a site-specific HASP, JHAs, performing daily safety planning, and coordinating directly with the Haley & Aldrich SSO for other site safety activities. This person will play a lead role in safety planning for subcontractor tasks, and in ensuring all their staff members and lower-tier subcontractors are in adherence with applicable local, state, and/or federal regulations, and/or industry- and project-specific safety standards or best management practices.

The subcontractors' safety documentation will be at least as stringent as the health and safety requirements of the Haley & Aldrich HASP and JHAs. This will be verified by Haley & Aldrich prior to the start of work.

If any field staff working for the subcontractors do not speak English, their supervisor/foreman must be bilingual and be present in all safety meetings for translations. Appropriate multi-language signs must also be utilized in accordance with each worker's native language.

5. SCOPE OF WORK (SOW)

5.1 GENERAL AND PROJECT TASKS

The SOW for each project can be found on the project's JHA cover page. Attached task-specific JHA pages will detail tasks that are to be performed by all Haley & Aldrich staff members and will allow supporting Health & Safety team members to guide the project team through the process of planning for and mitigating possible hazards. These files are in safety folders under each project's Teams page.

When Haley & Aldrich is the controlling employer, we expect that project-specific tasks performed by subcontractors will be identified and evaluated by Haley & Aldrich through the review of their JHAs, unless otherwise denoted in the contract. General hazards associated with work performed on site can be identified through Section 7 Hazard Assessment.

6. SITE OVERVIEW

6.1 SITE CHARACTERIZATION AND ANALYSIS

An evaluation of work activities is performed for each project including a hazard assessment for each task or activity to identify associated hazardous conditions, appropriate staff member protection methods, and PPE. The evaluation of potential site conditions and hazards is ongoing and continues throughout the duration of the project. Site characterization information can be found in the project-specific JHA with additional information regarding the SOW. All hazard assessment and mitigations are selected and documented through project-specific JHAs.

6.1.1 Preliminary Evaluation

A preliminary evaluation of a site's characteristics shall be approved by a qualified person familiar with site conditions to aid in the selection of appropriate protection methods prior to site entry. The qualified person is an individual who possesses extensive knowledge, training, and experience in relation to the possible characteristics and hazards of the site, and has demonstrated their ability to resolve problems related to the subject matter, work, or project.

A more detailed evaluation of the site's specific characteristics shall be performed by the RSM and PM to further identify existing site hazards and to further aid in the selection of the appropriate engineering controls and PPE for the tasks to be performed.

6.2 SITE DESCRIPTION AND WORK AREAS

A site description and identified work areas will be outlined in the scope of associated JHAs. Project teams are to provide this information on project documents to assist the RSM reviewing the documents with identifying hazards and appropriate mitigations.

6.3 REQUIRED INFORMATION

The information listed below, to the extent of which is available, shall be obtained by Haley & Aldrich project teams prior to completing the JHA and allowing any staff members to enter the site:

- Location and approximate size of the site.
- Description of the activities or job tasks being performed.
- Duration of planned staff member activity.
- Site topography and accessibility by air and roads.
- Safey and health hazards expected at the site.
- Pathways for hazardous substance dispersion.
- Present status and capabilities of emergency response teams that would aid hazardous waste clean-up site at the time of an emergency.
- Hazardous substances and health hazards involved or expected at the site, and their chemical and physical properties.

7. HAZARD ASSESSMENT

7.1 HAZARD ASSESSMENT

Hazard assessments are performed as part of project preparation for all projects that Haley & Aldrich performs. A hazard assessment is intended to identify and describe safety and health hazards associated with site work. All project teams are expected to identify hazards associated with the site, the tasks, and simultaneous operations. Assessments are performed through a JHA. All JHAs are to be included in project safety folders, provided to all on-site personnel for their applicable tasks, and reviewed by field staff prior to mobilization. Modifications to JHAs are to be communicated with the entire project team as soon as they occur, and JHAs are to be reviewed daily during the execution of the work associated with the JHA. With this information, risks are then eliminated or effectively controlled.

All project-specific and task-specific JHAs are to be modified when:

- The SOW is changed by adding, eliminating, or modifying tasks.
- New methods of performing site tasks are selected.

- Observation of the performance of site tasks results in a revised characterization of the hazards.
- New hazards are identified.
- Exposure data indicate changes in the concentration and/or likelihood of exposure.
- Change in personnel or subcontractors.
- When a near miss or incident occurs.

7.2 CHEMICAL HAZARDS

Haley & Aldrich staff members have the potential to interact with a variety of chemical hazards while working in the field. Chemical hazards must be identified and addressed on a project-by-project basis. Project-specific personal air monitoring plans shall be developed and described in the project-specific JHA. Additionally, other routes of exposure to chemical hazards (e.g., absorption, injection, ingestion) and associated controls will be addressed in either project-specific or task-specific JHAs. Personal air monitoring plans and JHAs must be reviewed and approved by a RSM. All project-specific or task-specific JHAs are to be modified when new chemical hazards are identified.

For more information on chemical hazards and exposure limits, see Appendix A – Chemical Hazards or appropriate Safety Data Sheets.

7.3 PHYSICAL HAZARDS

Haley & Aldrich staff members have the potential to interact with a variety of physical hazards while working in the field. Physical hazards will be identified and addressed in either project-specific or task-specific JHAs. JHAs must be reviewed and approved by a RSM and PM. All project-specific or task-specific JHAs are to be modified when new physical hazards are identified.

For more information on physical hazards, see Appendix B – Physical Hazards.

7.4 WEATHER HAZARDS

Haley & Aldrich staff members have the potential to interact with a variety of weather-related hazards while working in the field. Weather-related hazards will be identified and addressed in either project-specific or task-specific JHAs. JHAs must be reviewed and approved by a RSM and PM. All project-specific or task-specific JHAs are to be modified when new weather-related hazards are identified.

For more information on weather-related hazards, see Appendix C – Weather-Related Hazards.

7.5 BIOLOGICAL HAZARDS

Haley & Aldrich staff members have the potential to interact with a variety of biological hazards while working in the field. Biological hazards will be identified and addressed in either project-specific or task-specific JHAs. JHAs must be reviewed and approved by a RSM and PM. All project-specific or task-specific JHAs are to be modified when new biological hazards are identified.

For more information on biological hazards, see Appendix D – Biological Hazards.

8. PROTECTIVE MEASURES

8.1 IMPLEMENTING CONTROLS

The hierarchy of controls should always be used to evaluate how hazards can be mitigated. When possible, staff members should look to eliminate and substitute hazards or design engineering controls before implementing administrative controls and PPE. To effectively assess hazards and best select mitigations, field staff must be engaged in discussion, as they have the best understanding of the hazardous conditions and insights into how they can be controlled.

Staff members are to review these controls and use the JHAs to document hazards and their associated controls.

8.2 FIT FOR DUTY

It is important for those planning the work to support staff members to be fit for duty and complete their work in a safe manner. See OP1063 – Fit for Duty for more information. Below are guidelines to maintain a safe environment and encourage staff to be fit for duty:

- Scheduling enough staff on sites so they are able to rotate work.
- Allowing staff who have worked multiple shifts in a row to take time off.
- Giving staff members the weekend, when possible, to rest and prepare for the following work week.
- Ensuring staff members are physically capable of completing work tasks assigned to them.
- Being mindful of total worker health, ensuring that stress, emotional state, and conditions outside of work are considered.

Staff members are responsible to show up to work:

- Not under the influence of drugs or alcohol, including prescription medicines that may interfere with their ability to perform work safely.
- Symptom free for 24 hours from any contagious illnesses.
- Adhering to work restrictions prescribed by a medical professional.
- Fit for duty to perform job tasks assigned.

When there is a risk of fatigue, it is the responsibility of the PM and RSM to develop controls for staff to be fit for duty, and to build those mitigations into the project-specific JHA.

8.3 PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE is used to provide adequate personnel protection only after feasible engineering and administrative control options have been exhausted. See OP1024 – Personal Protective Equipment for more information. All PPE is provided by Haley & Aldrich to users and is selected to ensure that it is constructed and designed to protect staff members against known or anticipated hazards. Selected PPE should properly and appropriately fit the staff member. These provisions follow the requirements of all applicable regulations (29 CFR 1910.120(c)(5), 29 CFR 1910.132 to 1910.140, and 29 CFR 1926.28). It is the responsibility of the user to ensure that PPE is used and maintained in a sanitary and reliable condition.

All staff members at Haley & Aldrich are required to wear standard PPE listed below, unless a hazard assessment has determined the hazard related to some of the items listed below is not present. This includes but is not limited to:

- Hard hat;
- High visibility vest;
- Safety glasses;
- Cut-resistant gloves (A2);
- Hearing protection;
- Safety-toed boots; and
- Work clothing consisting of, at a minimum, long pants and a short-sleeve shirt.

The selection of additional PPE and other controls is based on an evaluation of the hazards present and job activities being performed. This selection is outlined in the PPE Hazard Assessment as part of the project-specific JHAs. PPE may vary from task to task, and all personnel engaged in the project work activities must use the appropriate level of protection as required by the activity to be performed. If an office does not have the necessary PPE for the work being conducted, contact the Local Health & Safety Coordinator.

If during the planned activities unique conditions are observed, an updated hazard assessment will be performed and reviewed by the PM and RSM. No changes in PPE will be conducted without a hazard assessment, review and approval by RSM and PM, and documentation of the proper training, if applicable.

8.4 LEVELS OF PERSONAL PROTECTIVE EQUIPMENT

8.4.1 Level D Protection

Level D protection should be used when:

- The atmosphere contains no known hazard; and
- Work functions preclude splashes, immersion, or the potential for unexpected inhalation of, or contact with, hazardous levels of any chemicals.

The following constitute Level D equipment which may be used when appropriate and selected by a RSM or PM:

- Coveralls.
- Gloves.
- Boots/shoes that meet ASTM International (ASTM) F2413.
- Boots, outer, chemical-resistant (disposable).
- Safety glasses or chemical splash goggles.
- Hard hat.
- Face shield.

8.4.2 Level C Protection

Level C protection should be used when:

- The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;
- The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator (APR) is available that can remove the contaminants; and
- All criteria for the use of an APR are met.

APRs can be used only when the contaminant(s) is known, cartridges/canisters exist, and concentrations are within the substance-specific standard guidelines or within the maximum use concentration (MUC) for the APR used. An appropriate cartridge/canister selection process and change schedule are outlined in our Respiratory Protection Program, according to the respiratory protection regulation (29 CFR 1910.134(d)(3)(iii)(B)(2)). See Respiratory Protection below for more information.

If warning properties (chemical odors, tastes, or physical irritation) are detected, staff members must immediately leave the work area and notify their PM and RSM.

The following constitute Level C equipment and may be used when appropriate and selected by a RSM:

- Full-face or half-mask, air purifying respirators (National Institute for Occupational Safety and Health [NIOSH] approved).
- Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls).
- Coveralls.
- Gloves, outer, chemical-resistant.
- Gloves, inner, chemical-resistant.
- Boots/shoes that meet ASTM F2413.
- Boot-covers, outer, chemical-resistant (disposable).
- Hard hat.
- Escape mask.
- Face shield.

8.4.3 Level B Protection

This level of protection is appropriate when the highest level of respiratory protection is necessary, but a lesser level of skin protection is needed. Level B protection should be used when:

- The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection;
- The atmosphere contains less than 19.5 percent oxygen; or

- The presence of incompletely identified vapors or gases is indicated by a direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the skin.

The following constitute Level B equipment and may be used when appropriate and selected by a RSM:

- Positive pressure, full-facepiece, self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved).
- Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one- or two-piece chemical splash suit; disposable chemical-resistant overalls).
- Coveralls.
- Gloves, outer, chemical-resistant.
- Gloves, inner, chemical-resistant.
- Boots/shoes that meet ASTM F2413.
- Boot-covers, outer, chemical-resistant (disposable).
- Hard hat.
- Face shield.

8.4.4 Level A Protection

This level of protection should be selected when the greatest level of skin, respiratory, and eye protection is required. Level A protection should be used when:

- The hazardous substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulates; or the site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the skin;
- Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible; or
- Operations are being conducted in confined, poorly ventilated areas, and the absence of conditions requiring Level A have not yet been determined.

The following constitute Level A equipment and may be used when appropriate and selected by an RSM:

- Positive pressure, full face-piece SCBA, or positive pressure supplied air respirator with escape SCBA, approved by NIOSH.
- Totally encapsulating chemical-protective suit.
- Coveralls.
- Long underwear.
- Gloves, outer, chemical-resistant.
- Gloves, inner, chemical-resistant.

- Boots/shoes that meet ASTM F2413.
- Hard hat (under suit).
- Disposable protective suit, gloves, and boots (depending on suit construction, may be worn over totally encapsulating suit).

8.5 INSPECTION, CLEANING, MAINTENANCE, AND STORAGE

PPE must be inspected prior to use and must be cleaned and maintained at regular intervals, as regulatory required, and as required by the manufacturer so that the PPE provides the requisite protection. PPE should be cleaned as needed, after each use, and before storage. PPE must be stored in a manner to avoid conditions that could result in damage, such as exposure to heat, light, moisture, or contamination (e.g., dirt, dust, or impacted media). PPE that is either defective or damaged must not be used and must be discarded or removed from service until repaired by a qualified person or the manufacturer. It is also important to ensure that contaminated PPE that cannot be decontaminated is not reused and is disposed of in a manner that protects staff members from exposure to hazards. For more information on decontamination, see Section 14 Decontamination.

PPE that is not grossly contaminated can be bagged and disposed in regular trash receptacles.

8.6 TRAINING AND PROPER FITTING

Staff members are trained on when PPE is necessary, what PPE is necessary for certain work, how to properly don, doff, adjust, and wear PPE, the limitations of the PPE, what to do if the PPE fails, the proper care, maintenance, useful life, and disposal of the PPE, and at the end of any training, should be able to demonstrate how to use PPE properly. Training is included as part of the Annual 8-Hour HAZWOPER Refresher for those that maintain a certificate. Refresher training must be performed annually for all staff members who use PPE, and more frequently, as necessary, in the event of any of the following:

- Changes in the workplace or types of PPE used which would make the previous training obsolete;
- Inadequacies in the staff's knowledge or use of PPE indicate that the staff has not retained the requisite understanding or skill; and
- Any other situation that arises in which retraining appears necessary to ensure safe use of PPE.

Staff members have the responsibility to communicate any issues with the fit or use of PPE to a member of the Health & Safety Team to ensure proper PPE is provided for hazards that are present.

8.7 DONNING AND DOFFING

Proper donning and doffing procedures are dependent on the type of PPE being worn by the staff member. Donning and doffing procedures are shown in Annual 8-Hour HAZWOPER Refresher courses and are to be demonstrated by local health and safety leads when PPE is given to a staff member for the first time.

8.8 EVALUATION OF EFFECTIVENESS

Staff members and RSMs are responsible for communicating the effectiveness of PPE with the Health & Safety Team. RSMs or their designees routinely visit projects sites to evaluate hazards present, and compare them to project documents developed, to ensure that the best mitigations are in place to protect staff members.

8.9 LIMITATIONS

Some PPE may create limitations when working in extreme environments, including extreme heat. Staff members are to review OP1015 – Heat Stress* as part of the hazard assessment with their project team ahead of work starting to identify appropriate PPE when there is concern for working conditions.

- *Note - OP1015 Heat Stress is currently in review to align with Federal OSHA's proposed heat stress ruling, while still meetings requirements of State OSHA heat safety plans. Staff must use the Heat Injury and Illness Prevention Plan (linked as OP1015 - Heat Stress) above to reduce risk when working in the heat.

8.10 RESPIRATORY PROTECTION

Before beginning any work that generates airborne contaminants, chemical, or dust, respiratory protection must be assessed. For more information on medical evaluation and clearance, fit testing, respirator maintenance and repair, storage, cartridge selection, and training, see OP1023 – Respiratory Protection.

Staff members that wish to wear respirators for voluntary use must complete a Voluntary Use Respirator Form. Contact the Health & Safety Team for more information.

8.11 HEARING CONSERVATION

Staff members exposed to, or with the potential to be exposed to, an 8-hour time-weighted average (TWA) sound level equal to or greater than 85 dBA must participate in a hearing conservation program. See OP1031 – Hearing Conservation for more information. All exposed personnel receive awareness training about the hazards of noise, the procedures to properly use and maintain hearing protection, and the importance of annual testing.

Hearing protection is made available when noise exposures equal or exceed an 8-hour TWA sound level of 85 dBA. Hearing protection is required when the 8-hour TWA sound level is greater than 90 dBA. Where noise exposure meets or exceeds this level, noise is listed as a physical hazard in the JHA for the tasks or operation, and hearing protection is included as one of the control measures.

Hearing protection is also required for any staff members who have not yet had a baseline audiogram or who have experienced a standard threshold shift and are exposed to an 8-hour TWA sound level greater than 85 dBA.

9. TRAINING REQUIREMENTS

9.1 HEALTH AND SAFETY TRAINING REQUIREMENTS

All Haley & Aldrich Staff members must be trained to a level required by their job function and responsibility prior to working on non-HAZWOPER and HAZWOPER sites. Haley & Aldrich staff members, contractors, subcontractors, and consultants who have the potential to be exposed to contaminated materials or physical hazards must complete the training described in the following sections.

Corporate Health & Safety maintains documentation of training records. PMs must review staff member training records to ensure they are trained and compliant with OSHA requirements for the tasks being performed. PMs may also access training records at the request of clients and/or OSHA through Corporate Health & Safety.

9.2 40-HOUR HAZWOPER

The 40-Hour HAZWOPER course provides instruction on the nature of hazardous waste work, protective measures, proper use of PPE, recognition of signs and symptoms which might indicate exposure to hazardous substances, and decontamination procedures. All staff members who are required to participate in work on hazardous waste sites- including equipment operators, general laborers, and supervisors- will be required to complete an initial 40 hours of training as specified by 29 CFR 1910.120 (e)(3).

9.3 8-HOUR ANNUAL REFRESHER

Personnel who complete the 40-hour health and safety training and are required to maintain its validity beyond one calendar year are required to attend an annual 8-hour refresher training course as per 29 CFR 1910.120 (e)(8). Haley & Aldrich maintains records of all staff members 40-hour HAZWOPER training status, and when required can provide proof of this status with a certificate of completion.

9.4 8-HOUR SUPERVISOR

The Haley & Aldrich SSO directly responsible for hazardous waste operations, or who supervise staff members engaged in these operations, must have eight additional hours of Supervisor training in accordance with 29 CFR 1910.120 (e)(4) Supervisor Training. This includes, but is not limited to, accident reporting/investigation, regulatory compliance, work practice observations, emergency response procedures, and maintenance of an internal Safety & Health program.

9.5 ADDITIONAL TRAINING FOR SPECIFIC PROJECTS

Haley & Aldrich PMs must ensure field staff are trained in any additional OSHA requirements for tasks they are required to perform, including information on specific instruments, equipment, and construction hazards, and can demonstrate competence. Specialized training will be provided at the awareness level, and competent person level where necessary, to staff members before engaging in the specific work activities. Examples of trainings offered include but are not limited to, Hearing Conservation, Respiratory Protection, Trenching & Excavations, Confined Space Entry (entrant, supervisor, attendant), Heavy Equipment (aerial lifts, forklifts, etc.), First Aid/CPR, Fall Protection, Nuclear Density Gauges, and Hazardous Substances specified in 1926 Subpart Z.

10. MEDICAL SURVEILLANCE

10.1 MEDICAL SURVEILLANCE

A medical surveillance program is present when staff members have the potential to be exposed to contaminants or hazards that cause adverse health effects. This program ensures that staff are protected from exposure to hazardous materials or health hazards that have been identified and when a potential exposure has occurred. This section follows the requirements as presented by OSHA in 29 CFR 1910.120(f), with additional guidelines for substance-specific requirements in 29 CFR 1910 1001-1052 if they are identified as present on-site. Additional information can be referenced in OP1009 – Workplace Medical, as listed below:

- Staff members covered
- Exam Frequency
- Exam Content
- Subpart Z Hazards and Additional Testing
- Physical Exam, Review, Written Opinion
- Recordkeeping Requirements
- Hearing Conservation
- Bloodborne Pathogens

11. AIR MONITORING PLANS AND EQUIPMENT

To determine the types and quantities of airborne contaminants that staff members may be exposed to on site, a project-specific evaluation of chemical hazards should be performed. Chemical hazards will be evaluated to develop a personal air monitoring plan with controls in accordance with applicable OSHA regulations. Personal air monitoring plans must be developed per project to incorporate project-specific details such as scope, chemical hazards, expected concentrations, site conditions, and available monitoring equipment, and must be documented in project-specific JHAs. All personal air monitoring plans must be reviewed and approved by the RSM and PM prior to starting work. Additional information about air monitoring equipment can be found in operating procedures:

- OP1004 – Operation and Calibration of PID
- OP1005 – Operation and Calibration of FID
- OP1006 – Operation of Draeger Gas Detector Pump
- OP1007 – Operation and Calibration of Combustible Gas Indicators

For information on chemical hazards and exposure limits from commonly encountered chemicals on site, see Appendix A – Chemical Hazards or appropriate Safety Data Sheets.

11.1 INITIAL ENTRY AND BACKGROUND MONITORING

Initial exposure monitoring and/or background monitoring should be conducted to measure staff member exposure to hazardous chemicals or atmospheres where the potential for the following conditions may exist:

- Possible Immediately Dangerous to Life or Health (IDLH) conditions;
- Potential for exposure near or over permissible exposure limits and/or action levels;
- Potential for exposure to any radioactive source;
- Oxygen rich or deficient environments;

- Flammable atmospheres;
- Or any other dangerous conditions on site.

Initial exposure monitoring should be conducted in accordance with applicable OSHA regulations for monitoring frequency, methodology, and notification procedures. Generally, an initial determination may include a representative sample of the staff member's exposure who is exposed to the greatest concentrations of the chemical hazard of concern. Contact your regional H&S representative to perform this process.

When conducting initial or background monitoring, staff must be protected from potential exposure by using appropriate engineering controls or PPE.

11.2 PERIODIC MONITORING

Periodic monitoring shall be established in accordance with applicable OSHA standards for each chemical hazard. The frequency of monitoring shall be further established by the results of initial exposure determinations, changes to work processes, controls, personnel changes which may result in new or additional exposure, or when there is any other reason to suspect a change in exposure.

The following examples are changes to site conditions that may impact and increase potential exposure to air contaminants or health Hazards:

- Work in a new area of a site.
- Work with new materials that may present a health hazard.
- The start of new tasks or work operations (i.e., soil vapor intrusion sampling vs. confined space entry).
- When staff are handling leaking drums or containers in working areas with liquid contamination.

11.3 AIR MONITORING EQUIPMENT

The air monitoring equipment below may be used in personal air monitoring plans for the associated contaminant or health hazard. See JHA for site-specific equipment and usage.

Equipment	Detectable Contaminants / Hazard
PID 10.2eV or 11.7eV	Volatile Organic Compounds (VOCs)
OV Monitor	Volatile Organic Compounds (VOCs)
Gas Chromatograph	Volatile Organic Compounds (VOCs)
Colorimetric Tubes	Volatile Organic Compounds (VOCs)
Combustible Gas Indicator	LEL
Multiple Gas Detector	LEL / O_2 / H_2S / CO
RAM (Real-time Air Monitor)	Particulates
Air Sampling Pump	Chemical specific

11.3.1 Calibration, Functionality Tests, and Use of Air Monitoring Equipment

The calibration of all monitoring equipment is required in accordance with manufacturers requirements and Haley & Aldrich Operating Procedures listed above in Section 10 and site-specific requirements (e.g., at the beginning and end of each workday). Calibration must be done by a qualified laboratory- at least annually- unless manufacturer recommendations differ, or you encounter problems. Rental companies will perform calibration services.

Daily functionality tests, also known as bump tests, of equipment shall be documented in the field notes or Daily Field Report. Documentation should include:

- Date/time,
- Equipment ID number,
- Zero reading, if applicable, and
- Reading obtained with calibration gas or gases.

The required equipment listed above must be in good working condition and be available on-site at all times during applicable work activities, as outlined in the JHA. Work shall not commence unless the equipment is present, calibrated, and operable.

12. SITE CONTROL

The goal of a site control plan is to establish procedures that minimize potential worker exposure to hazardous substances, protect the public from the site's hazards, and provide site security. Understanding the site control program is crucial in the event of an emergency. The degree of site control necessary depends on site characteristics, site size, and the surrounding community. Haley & Aldrich incorporates the elements required for a site control plan in the JHA. This includes information to access a site map that identifies work zones, site communications, applicable Haley & Aldrich SOPs, and the location of the nearest medical facility. Please reference the project-specific JHA for site control information.

All operating procedures, such as OP1025 - Signs, Signals, and Barricades, OP1043 - Site Traffic Control, and OP1046 - Site Control, are available to staff members at any time through our internal site. Operating procedures can be provided to any external party at any time upon request.

12.1 GENERAL SITE CONTROL INFORMATION

One of the main goals of a site control plan is to establish procedures that minimize potential exposure to hazardous substances that workers may encounter before the initiation of a project as described by 29 CFR 1910.120 (d)(1). Understanding the site control program is crucial in the event of an emergency. The degree of site control required depends on site characteristics, site size, and the surrounding community. The information provided below identifies all elements used to control the activities and movements of people and equipment at the project site.

12.2 SITE MAP WITH DESIGNATED WORK ZONES

See project-specific JHAs for site map with identified work zones and exit locations. Language to support JHA development related to site control can be found in Appendix B – Physical Hazards.

12.3 SITE COMMUNICATIONS

Haley & Aldrich encourages all staff members to communicate face to face with one another. If face-to-face communication is not feasible, conversation over cellular phones is acceptable. Haley & Aldrich does provide other forms of communication to staff members, such as satellite phones, radios, or walkie-talkies, when this is necessary. If staff are entering areas where hearing is of concern due to noise, PPE, or other reasons, staff will develop agreed upon hand signals to communicate.

12.4 LOCATION OF MEDICAL ASSISTANCE

See project-specific JHA for information about, and route to, the nearest medical facility. Additional emergency contact information can also be accessed on the same JHA.

13. EMERGENCY RESPONSE PLAN

13.1 EMERGENCY RESPONSE PLANS

Emergency Response Plans are developed prior to the beginning of work for all uncontrolled hazardous waste sites. Emergency response plans help facilitate anticipated emergencies on hazardous waste sites by providing clear direction for a course of action when each anticipated emergency occurs. Additionally, emergency response plans inform staff members of safe practices surrounding other hazards on the project, such as safe distances from machinery, and site security.

The major categories of emergencies that could occur during project work are:

- Fire(s)/Combustion
- Hazardous Materials Event
- Medical Emergency
- Natural Disaster

A detailed list of emergency types and response actions are summarized in Appendix E – Emergency Recognition And Prevention. Emergency response plans are included in the project-specific JHA.

13.2 HALEY & ALDRICH AS THE CONTROLLING EMPLOYER

Haley & Aldrich has developed the following Emergency Response plan to adhere to the requirements specified in 20 CFR 1910.120(l). This plan is applicable to all project sites where Haley & Aldrich is designated as the controlling employer of a project.

13.2.1 Pre-Emergency Planning

Before the start of field activities, the PM must prepare for emergencies to include the following:

- Meet with the controlling employer, subcontractor, or client to discuss emergency procedures in the event a person is injured.

- Develop, review, and communicate actions for specific scenarios, which will be incorporated into the project-specific JHA.
- The SSO will establish evacuation routes and assembly areas for the sites.
- All personnel entering the site, including subcontractors and visitors, will be informed of evacuation routes and assembly areas. Emergency response documents will be available for all to access on site. Additional copies can be provided upon request.
- Haley & Aldrich staff members should perform an emergency drill during the initial stages of the project. This can either be a physical drill performed by the field staff members while on the project site, or a step-by-step walkthrough of where to go and what to do with the entire project team on a call prior to beginning the work.

13.2.2 Personnel, Roles, Lines of Authority, and Communication

Site personnel must be trained on the use of the site emergency communication plan during site orientation. Emergency telephone numbers are accessible in the project-specific JHA. The SSO is responsible for establishing the communication network and discussing it with all staff prior to the start of work. This includes signals agreed upon to identify emergency situations which will be documented in the project-specific JHA. It is the responsibility of the SSO to regularly remind staff of the lines of communication, and ensure subcontractors are aware and understand the meaning of each form of communication.

In the event of an emergency, work must be stopped, and site personnel must be notified of the situation immediately. The scene should be surveyed to determine next steps. The Haley & Aldrich SSO will follow the procedure listed below:

- Evaluate the incident and assess the need for assistance and/or evacuation.
- Take appropriate measures to stabilize the incident scene.
- Assign roles and responsibilities for emergency response, as needed.
- Contact applicable Emergency Services if necessary.
- Notify other members of the project team (PM, RSM, Field Service Manager).

13.2.3 Safe Distances and Places of Refuge

Safe distances and places of refuge will be identified in the project-specific JHA.

13.2.4 Site Security and Control

Site security and control will be identified in the project-specific JHA.

13.2.5 Evacuation Routes and Procedures

Evacuation routes will be highlighted on the site map included in the project-specific JHA and discussed regularly during work kickoff meetings. Emergency procedures will be developed as part of the project documents.

13.2.6 Emergency Medical Treatment and First Aid

Haley & Aldrich field staff are trained in First Aid/CPR/AED use. Emergency services will be contacted immediately if an injury greater than first aid is required. Minor injuries to Haley & Aldrich staff that only require first aid should be addressed on site, reported to the SSO and other members of the project team, and then managed by Acuity. Minor injuries to contractors should be reported to the SSO, addressed on site, and then be managed by the contractor themselves.

13.2.7 Emergency Alerting and Response Procedures

In the event of an emergency, Haley & Aldrich will communicate with everyone on site. Emergency Response procedures will regularly be reviewed during morning tailgate meetings, and other scheduled & unscheduled project communication. In instances where emergency services are required, they will be contacted immediately and supported from the time they arrive on site until the emergency has been addressed.

13.2.8 PPE and Emergency Equipment

Haley & Aldrich provides all staff members with OSHA-approved first aid kits. Additional emergency response PPE and equipment is identified in project-specific or task-specific JHAs.

13.2.9 Critiques of Response and Follow-Up

Haley & Aldrich will exercise the use of reporting, incident investigation, and root cause analysis to identify learning opportunities related to emergency response. Any findings from the incident investigation or root cause analysis process will be used to improve emergency response plans for the project where the incident occurred, if still active, and for future emergency response plans on all other projects.

13.3 MULTI-EMPLOYER PROJECT SITES

Haley & Aldrich is often not the controlling employer on project sites. When a project requires a staff member to enter or work on a site where there are multiple employers, the project team must review the controlling employer's emergency response plan and incorporate the required information into our own emergency response plan.

The following information should be identified in the controlling employer's emergency response plan, and be incorporated into our own plan and procedures:

- Evacuation Alarm;
- Evacuation Routes;
- Evacuation Response Drills;
- Contractors written emergency and contingency plans;
- Discuss exit routes and fire extinguisher locations; and
- Confirm presence and access to emergency response supplies.

13.3.1 Procedures for Reporting a Fire or Other Emergency

- Haley & Aldrich requires staff members to discuss reporting procedures on the JHA Cover Page.
- In the event of a fire or other emergency, staff must immediately evacuate or remove themselves from the dangerous situation.
- Once in a safe location, staff should contact 911 if a life-threatening situation is present. If not:
- The staff member should immediately contact the safety coordinator of the controlling employer and follow their direction.

13.3.2 Procedures for Emergency Evacuation

Haley & Aldrich requires staff members to incorporate a site map into the project-specific JHA documents that designates work zones, and highlights emergency exit routes.

13.3.3 Procedures to Account for All Staff After an Evacuation

Staff members are responsible for knowing what other Haley & Aldrich staff are on the same project site at a time. The staff should first contact the other staff on site, and then contact the PM to confirm all staff are accounted for.

13.3.4 Procedures for Staff Performing Rescue or Medical Duties

If extensive rescue or medical duties are needed, staff are to call Acuity for non-emergency situations (1-888-397-8099), or 911 for emergency situations. Haley & Aldrich staff members are not to perform extensive rescue or medical duties.

13.3.5 Name or Title of Who is Responsible for the Plan

The PM is the responsible party for all aspects of the project. If a staff member does not think the project documents are sufficient, they can reach out to the PM or Health & Safety.

14. DECONTAMINATION AND DISPOSAL METHODS

14.1 GENERAL DECONTAMINATION AND DISPOSAL INFORMATION

All possible and necessary steps shall be taken to reduce or minimize contact with chemicals and contaminated/ impacted materials while performing field activities. Decontamination procedures are designed to achieve an orderly, controlled removal or neutralization of contaminants that may accumulate on personnel or equipment. These procedures minimize worker contact with contaminants, and protect against the transfer of contaminants outside designated work zones. Any procedures developed will be communicated to staff members and implemented before any staff members or equipment may enter areas on site where potential for exposure to hazardous substances exists.

All staff members leaving a contaminated area shall be appropriately decontaminated, and all contaminated clothing and equipment leaving a contaminated area shall be appropriately disposed of or decontaminated.

Decontamination areas and procedures will change from site to site, and it is the responsibility of the field staff, the PM, and Health & Safety to communicate with the Controlling Employer to understand appropriate procedures for each site. If procedures are changed as a result of inspection and monitoring, all affected staff are to be notified of these changes.

14.1.1 Required Information for Projects

Decontamination will be specific to each project. PMs and their teams are expected to incorporate the following information into the project-specific JHA.

- Location of decontamination areas
  - Geographical areas designated for decontamination that will minimize exposure of uncontaminated staff members and equipment.
- Equipment and solvents to be used for decontamination, such as, but not limited to:
  - Acetone
  - Alconox soap
  - Brushes
  - Disposal bags
  - 5-gallon buckets
  - Distilled water
  - Drums
  - Hexane
  - Methanol
  - Paper towels
  - Polyethylene sheeting
  - Pressure/steam cleaner
  - Tap water
  - Wash tubs
- Showers and change rooms
  - If temperature conditions prevent the effective use of water, then other effective means for cleansing shall be provided and used.
  - Establishing showers and changing rooms are the responsibility of the Controlling Employer.
- Disposal methods
  - Procedures for disposal of contaminated materials, decontamination waste, and single use PPE shall meet applicable client, local, state, and federal requirements.
  - PPE that is not grossly contaminated can be bagged and disposed in regular trash receptacles.
  - PPE that is grossly contaminated must be bagged and sealed, and field personnel should communicate with the PM to determine proper disposal.

14.1.1.1 Personal Hygiene Safeguards

PMs must also make staff members aware of the following minimum personal hygiene safeguards that shall be adhered to:

- No smoking or tobacco products in any project work areas.
- No eating or drinking in the exclusion zone.
- It is required that personnel present on site wash hands before eating, smoking, taking medication, chewing gum/tobacco, using the restroom, applying cosmetics, and before leaving the site for the day.

It is recommended that personnel present on site shower or bathe at home at the end of each day of working on the site.

14.1.1.2 Unauthorized Staff Members

PMs must make staff members aware of who is performing work that requires the staff member to follow decontamination processes. All other staff members are considered unauthorized staff and shall not perform HAZWOPER work. Unauthorized staff are not to remove protective clothing or equipment from change rooms or enter any decontamination areas.

14.1.2 Personal Protective Equipment and Clothing

Protective clothing and equipment shall be decontaminated, cleaned, laundered, maintained, or replaced as needed to maintain their effectiveness. Staff members whose non-impermeable clothing becomes wetted with hazardous substances shall immediately remove that clothing and proceed to shower. The clothing shall be disposed of or decontaminated before it is removed from the work zone. See Section 14.1.1 Equipment and solvents to be used for decontamination, and Standard Personal Decontamination Procedures below for more information on general decontamination processes. All information must be communicated to staff members before the start of the project, and as any changes are made to the decontamination process.

Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment shall be informed of the potentially harmful effects of exposures to hazardous substances.

14.2 STANDARD PERSONAL DECONTAMINATION PROCEDURES

Outer gloves and boots should be decontaminated periodically as necessary and at the end of the day. Brush off solids with a hard brush and clean with soap and water or another appropriate cleaner whenever possible. Remove inner gloves carefully by turning them inside out during removal. Wash hands and forearms frequently. It is good practice to wear work-designated clothing while on-site which can be removed as soon as possible. Non-disposable overalls and outer work clothing should be bagged onsite prior to laundering. If gross contamination is encountered on-site, contact the PM and RSM to discuss proper decontamination procedures.

The steps required for decontamination will depend upon the degree and type of contamination but will generally follow the sequence below.

1. Rinse boots and gloves of gross contamination.
2. Scrub boots and gloves clean.
3. Rinse boots and gloves.

4. Remove outer boots (if applicable).
5. Remove outer gloves (if applicable).
6. Remove and wipe clean hard hat.
7. Remove Tyvek coverall (if applicable).
8. Remove respirator, wipe clean and store (if applicable).
9. Remove inner gloves (if outer gloves were used).

PPE that is not grossly contaminated can be bagged and disposed in regular trash receptacles.

14.3 SMALL EQUIPMENT DECONTAMINATION

Pretreatment of heavily contaminated equipment may be conducted as necessary:

1. Remove gross contamination using a brush or wiping with a paper towel.
2. Soak in a solution of Alconox and water (if possible).
3. Wipe off excess contamination with a paper towel.

Standard decontamination procedure:

1. Wash using a solution of Alconox and water.
2. Rinse with potable water.
3. Rinse with methanol (or equivalent).
4. Rinse with distilled/deionized water.

Inspect the equipment for any remaining contamination and repeat as necessary.

14.4 MONITORING THE EFFECTIVENESS OF DECONTAMINATION PROCEDURES

Project teams and Health & Safety are responsible for routinely auditing the effectiveness of decontamination procedures through regular site visits and project audits. Visual examination is used to ensure that procedures are implemented as described, and that they appear to control the spread of contaminants under changing conditions.

Air samples can be taken in the clean zone to ensure that airborne contaminants have not spread to clean areas of the facility. Surface samples can be taken from the inside surfaces of PPE, from decontaminated equipment, and from surfaces within clean areas of the facility to ensure that decontamination and control procedures are performing as anticipated.

Results of the inspections of decontamination procedures and documentation of any action taken to correct deficiencies are recorded and stored in Health & Safety's reporting tool.

15. PERMIT-REQUIRED CONFINED SPACE ENTRY

15.1 GENERAL CONFINED SPACE INFORMATION

OSHA defines a confined space as a space that is large enough for an staff member to enter, limited means of entry and exit, and not designed for continuous staff member occupancy. Examples of these spaces include manholes, stacks, pipes, storage tanks, pits, sumps, hoppers, and bins. Before any staff are allowed to enter or even break the plane of a confined space, OSHA requires that a competent person is responsible for determining whether the confined space is a Permit-Required Confined Space (PRCS), using the OSHA decision flow chart found in 29 CFR 1910.46 Appendix A. An RSM must be contacted if you will be breaking the plane (putting any body part inside the entrance of a confined space) or entering a confined space.

15.2 PERMIT-REQUIRED CONFINED SPACE INFORMATION

PRCS are confined spaces where potential hazards like hazardous atmospheres, engulfment, or oxygen deficiency are present, requiring a formal permit to be issued before anyone can enter, ensuring proper safety procedures are followed and monitored by designated personnel. Haley & Aldrich maintains a PRCS program to identify and inform the involved staff members of the specific hazards of the PRCS. Before Haley & Aldrich staff are allowed to break the plane of a PRCS, the RSM must be engaged to oversee the permitting process. For more information on confined space entry, see OP1060 – Confined Space Entry.

15.2.1 Hazardous Atmosphere Permit-Required Confined Spaces

Haley & Aldrich develops and implements a monitoring and inspection plan for every confined space where Hazardous Atmosphere is a concern. If the confined space has an actual or potential hazardous atmosphere, including oxygen deficiency, it is a PRCS and staff must implement a monitoring and inspection plan, along with other requirements specified in OP1060 – Confined Space Entry. This includes the following steps.

- All conditions that make it unsafe to remove the entrance cover to the confined space will be eliminated before the cover is removed.
- After removal of the cover, the entrance to the confined space will be marked and guarded to prevent accidental fall through of individuals or other foreign objects.
- Before a staff member enters the space, the atmosphere will be tested for oxygen content, flammable gases and vapors, and potential toxic air contaminants, in that order.
- Any entrants will observe this testing process.
- Staff will not enter spaces that contain a hazardous atmosphere, nor remain in the space if a hazardous atmosphere is subsequently detected.
- Continuous forced air ventilation will be utilized according to the requirements specified in 29 CFR 1910.146 (c)(5)(ii)(E).
- The confined space will be tested for hazardous atmosphere continuously to ensure the forced air ventilation is functioning properly.
- Staff members will leave the confined space immediately if hazardous atmosphere is detected.
- An attendant must always be present when staff are in a confined space.

In the event of a change to the PRCS, whether it be reason for entry or presence of hazards, Haley & Aldrich staff members will immediately contact the RSM, who may reclassify the confined space, or stop work until it is safe to continue.

15.2.2 Permit-Required Confined Space Hazards Additional to Atmosphere

All PRCS entries with hazards other than or additional to hazardous atmosphere will also require the development of a PRCS entry permit. Other hazards include, but are not limited to engulfment, entrapment, drowning, and electrical hazards. Each PRCS entry is project-specific and is governed by a permit that must be complete prior to entry. All PRCS programs will adhere to the OSHA requirements provided in 29 CFR 1910.146 (d).

15.3 WHEN HALEY & ALDRICH IS NOT THE CONTROLLING EMPLOYER ON SITE

When Haley & Aldrich is not the controlling employer, and staff members are required to enter a confined space, the following protocol will be followed as detailed in 29 CFR 1910.146 (c)(8).

- Haley & Aldrich staff will be sure to complete the necessary permits required by the controlling employer and adhere to the requirements specified on the permit.
- Ensure that all of the hazards present in the confined space are clearly communicated with the Haley & Aldrich Staff Member.
- Communicate an entry, work, and exit plan with the contractor for the planned work inside the confined space.
- Debrief with the controlling employer following exit from the confined space.

15.4 CONFINED SPACE TRAINING

All Haley & Aldrich staff members will receive the proper training prior to being assigned the work that is specified in 29 CFR 1910.146 (g). All staff member training certificates can be provided upon request.

16. SPILL CONTAINMENT PROGRAM

16.1 POTENTIAL SOURCES

This section describes the potential for hazardous substance spills at this site, and procedures for controlling and containing such spills. Haley & Aldrich will ensure that spill containment planning is conducted, and appropriate control measures are established, consistent with regulatory requirements.

16.1.1 Handling Drums

Only employees who have completed U.S. Department of Transportation (DOT) certification training can handle drums. If you do not maintain the appropriate training, or you training has expired, please complete a training request ticket to H&S to be enrolled in a new DOT training course.

Hazardous substances and contaminated soils, liquids, and other residues shall be handled, transported, labeled, and disposed of in accordance with the following procedures:

- Drums and containers used during the clean-up shall meet the appropriate DOT, OSHA, and EPA regulations for the wastes that they contain.

- When practical, drums and containers shall be inspected, and their integrity shall be assured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions (i.e., buried beneath the earth, stacked behind other drums, stacked several tiers high in a pile, etc.) shall be moved to an accessible location and inspected prior to further handling.
- Unlabeled drums and containers shall be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.
- Site operations shall be organized to minimize the number of drums or containers moved.
- Prior to movement of drums or containers, all staff members exposed to the transfer operation shall be warned of the potential hazards associated with the contents of the drums or containers.
- U.S. Department of Transportation specified salvage drums or containers, and suitable quantities of proper absorbent shall be kept available and used in areas where spills, leaks, or ruptures may occur.
- Where major spills may occur, a spill containment program shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred.
- Drums and containers that cannot be moved without rupture, leakage, or spillage shall be emptied into a sound container using a device classified for the material being transferred.
- A ground-penetrating system or other type of detection system or device shall be used to estimate the location and depth of buried drums or containers.
- Soil or covering material shall be removed with caution to prevent drum or container rupture.
- Fire extinguishing equipment shall be on hand and ready for use to control incipient fires.

16.1.2 Opening Drums and Containers

The following procedures shall be followed in areas where drums or containers are being opened:

- Where an airline respirator system is used, connections to the source of air supply shall be protected from contamination and the entire system shall be protected from physical damage.
- Staff members not actually involved in opening drums or containers shall be kept a safe distance from the drums or containers being opened.
- If staff members must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation shall be placed between the staff member and the drums or containers being opened to protect the staff member in case of accidental explosion.
- Controls for drum or container opening equipment, monitoring equipment, and fire suppression equipment shall be located behind the explosion-resistant barrier.
- When there is a reasonable possibility of flammable atmospheres being present, material handling equipment and hand tools shall be of the type to prevent sources of ignition.
- Drums and containers shall be opened in such a manner that excess interior pressure will be safely relieved. If pressure cannot be relieved from a remote location, appropriate shielding shall be placed between the staff member and the drums or containers to reduce the risk of staff member injury.
- Staff members shall not stand upon or work from drums or containers.

16.1.2.1 Material Handling Equipment

Material handling equipment used to transfer drums and containers shall be selected, positioned, and operated to minimize sources of ignition related to the equipment from igniting vapors released from ruptured drums or containers. Any material handling equipment necessary must be selected and identified in project documents, communicated with staff members performing the work, and readily available for work.

16.1.3 Radioactive Wastes

- Drums and containers containing radioactive wastes shall not be handled until their hazard to staff members is properly assessed.
- If handling radioactive wastes is necessary, staff members must coordinate with Health & Safety to ensure that proper controls are in place to mitigate as much exposure as possible.

16.1.4 Shock-Sensitive Wastes

- Drums and containers containing shock sensitive wastes shall not be handled until their hazard to staff members is properly assessed.
- If handling shock sensitive wastes is necessary, staff members must coordinate with Health & Safety to ensure that proper controls are in place to mitigate as much exposure as possible.

16.1.5 Laboratory Waste Packs

The following precautions shall be taken, as a minimum, when handling laboratory waste packs (lab packs):

- Lab packs shall be opened only when necessary and then only by an individual knowledgeable in the inspection, classification, and segregation of the containers within the pack according to the hazards of the wastes.
- If crystalline material is noted on any container, the contents shall be handled as a shock-sensitive waste until the contents are identified.

16.1.6 Sampling of Drum and Container Contents

Sampling of containers and drums shall be done in accordance with a sampling procedure which is part of the project-specific JHA.

16.1.7 Shipping and Contents

Drums and containers shall be identified and classified prior to packaging for shipment. Identifying, classifying, and signing manifests for drums and containers requires training and an agency agreement to be in place. Before assigning staff members to perform this work, PMs must ensure staff have the proper training. Drum or container staging areas shall be kept to the minimum number necessary to identify and classify materials safely and prepare them for transport. Staging areas shall be provided with adequate access and egress routes. Bulking of hazardous wastes shall be permitted only after a thorough characterization of the materials has been completed.

16.1.8 Tank and Vault Procedures

Appropriate tank or vault entry procedures shall be identified and followed as outlined in project-specific JHAs, and must be developed in compliance with confined space entry requirements outlined in Section 15 Confined Space Entry.

16.2 SITE EVALUATION

All spills on the site are considered hazardous before they are evaluated. If an evaluation of the site and hazards present has been conducted, and the project team has determined that there is little if any potential for a hazardous substance spill of a sufficient quantity to require containment planning, equipment, and procedures, then no spill containment procedures will be required at the site. Spill containment kits should still be made available on site in the event an unforeseen incident occurs or there is a release from a piece of operation equipment. Staff members must always be trained on how to respond if there has been a potential spill, including any Controlling Employer requirements.

If following an evaluation it is determined there is the potential for a hazardous spill on site, then the spill containment procedures must be followed. The general outline below is to be followed and used to develop site-specific spill containment through JHAs. JHAs for spill containment should include but will not be limited to:

- Potential hazardous substances, their locations, and available controls
- Available spill containment equipment
- Initial notification and response
- Spill evaluation and response
- Post spill evaluation.

16.3 POTENTIAL SPILLS AND AVAILABLE CONTROLS

If there is potential for a hazardous spill on site, all site personnel are trained in the contents of their project-specific spill containment program and their roles and responsibilities during spill response operations. This information is to be outlined in the project-specific JHA and communicated with all staff at initial assignment and whenever there are changes in the process, hazards, or responsibilities. Project teams must identify the location and type of potential hazardous substance spills at this site. The project-specific JHA must also describe the activities or situations in which an accidental spill could occur and whether an emergency response is likely to be needed.

Where spills, leaks, or ruptures can occur, this site must have suitable quantities of proper absorbent and DOT-specified salvage drums and containers. In addition, all areas subject to potential spills are diked or a means to adequately dike these areas in the event of a spill is available so that the entire volume of the spilled hazardous substance can be contained and isolated. The type and location of spill containment equipment must also be outlined in the project-specific JHA.

16.4 INITIAL SPILL NOTIFICATION AND RESPONSE

Any staff member who discovers a hazardous substance spill must immediately notify the designated site contact, their PM, and RSM. The staff member, to their ability, shall report the following information:

- Hazardous substance involved.
- Location of the spill.
- Estimated quantity of substance spilled, the direction/flow of the spill material, related fire/explosion incidents, and any associated injuries.

16.5 SPILL EVALUATION AND RESPONSE

A member of the Health & Safety Team is responsible for working with project teams to evaluate hazardous substance spills and determine the appropriate response. When the hazardous substance spill evaluation is being made, the spill area is isolated to the greatest extent possible.

When an incidental release occurs, cleanup personnel receive instructions in a pre-cleanup meeting as to spill conditions, PPE, response activities, decontamination, and waste handling. The procedures of the Emergency Response section of this HASP are immediately implemented when the spill is determined to require emergency precautions and action. If necessary to protect those outside the cleanup area, notification of the appropriate authorities is made.

The following are general measures that must be considered for response/cleanup personnel to take when responding to a spill:

- To minimize the potential for a hazardous spill, hazardous substances, control/absorbent media, drums and containers, and other contaminated materials must be properly stored and labeled.
- When a spill occurs, only those persons involved in overseeing or performing spill containment operations will be allowed within the designated hazard areas. If necessary, the area will be roped or otherwise blocked off. Unauthorized personnel are kept clear of the spill area.
- Appropriate PPE is donned before entering the spill area.
- Appropriate spill control measures are applied during spill response.
- Whenever possible without endangerment to personnel, the spill is stopped at the source or as close to the source as possible.
- Ignition points are removed if fire or explosion hazards exist.
- Surrounding reactive materials are removed.
- Drains or drainage in the spill area is blocked or surrounded by berms to exclude the spilled waste and any materials applied to it.
- Provisions are made to contain and recover a neutralizing solution, if used.
- Small spills or leaks from a drum, tank, or pipe will result in the establishment of an evacuation zone to allow cleanup and to prevent staff member exposure. For small spills, sorbent materials are placed directly on the spill to prevent further spreading and aid in recovery.

- The spill area is sprayed with appropriate foam where the possibility of volatile emissions exists.
- If the spill results in the formation of a toxic vapor cloud from vaporization, reaction with surrounding materials, or the outbreak of fire, further evacuation may be required.
- To dispose of spill waste, all contaminated sorbents, liquid waste, or other spill cleanup will be placed in small quantities in approved drums for proper storage or disposal as hazardous waste.
- For more information on specific spill containment plans, please refer to project documents.

16.6 POST SPILL EVALUATION

At the conclusion of cleanup operations, documentation of spill response report must be prepared through our appropriate forms on our Forms, Audits, and Checklists page on the Health & Safety Intranet. The report includes, at a minimum, the following information:

- Date of spill incident.
- The hazardous substance(s) released.
- The quantity released.
- The location of the release.
- The effect of the release.
- Cause of incident.
- Spill response actions.
- Who responded.
- Spill equipment used.
- How the spill material was discarded or contained.
- Any outside agencies involved, including their incident reports.
- Lessons learned or suggested improvements.

The spill area is inspected for residual contaminants to determine whether safety and environmental requirements are met. The use of surface and air sampling is utilized in this determination as necessary. The root cause of the spill is examined, and corrective steps must be taken to ensure the engineering and control measures in place have performed as required. If alternative precautions or measures are needed, they are made available and implemented.

All durable equipment placed into use during cleanup activities must be decontaminated, as specified in this section, for future utilization. All spill response equipment and supplies are restocked as required.

APPENDIX A – CHEMICAL HAZARDS

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Metals			
Antimony	50 mg/m^3	0.5 mg/m^3 0.5 mg/m^3 0.5 mg/m^3	***Skin:*** Irritation ***Eye:*** Irritation ***Respiratory Tract:*** Nose and throat irritation, cough, loss of smell ***Gastrointestinal:*** Nausea, vomiting, diarrhea, stomach cramps
Arsenic	5 mg/m^3	0.01 mg/m^3 0.01 mg/m^3 0.002 mg/m^3 Known human carcinogen.	***Skin:*** Irritation, burning, itching and rash. Contact dermatitis is possible. ***Eye:*** Red, watery eyes and irritation. Conjunctivitis may occur in some people. ***Lung:*** Nose and throat irritation, and possible nasal perforation. ***CNS:*** Can cause nausea, poor appetite, vomiting, and muscle cramps, cognitive impairments and peripheral neuropathy.
Barium (and soluble compounds, as Ba, except barium sulfate)	50 mg/m^3 (as Ba)	0.5 mg/m^3 (as Ba) 0.5 mg/m^3 (as Ba) 0.5 mg/m^3 (as Ba).	***Skin:*** Irritation. Skin burns may be possible. ***Eye:*** Irritation, itching, and burning on contact ***Lung:*** Upper respiratory irritation. **Other:** Gastroenteritis; muscle spasms; slow pulse; extrasystoles; hypokalemia.
Beryllium	4.0 mg/m^3 (as Be)	0.002 mg/m^3 (as Be) 0.002 mg/m^3 (as Be) 0.0002mg/m^3 proposed TLV 0.0005 mg/m^3 (as Be, ceiling) Probable human carcinogen.	***Skin:*** Severe irritation. Skin ulcers may be possible. ***Eye:*** Severe irritation, itching, and burning on contact. Sometimes an allergic eye problem develops, breaking out again with future exposures. ***Lung:*** Over-exposure can severely irritate the airways and lungs, causing nasal discharge, tightness in the chest, cough, shortness of breath, and/or fever. Future exposures can cause further attacks. Death can occur in severe cases. High level acute exposures can lead to pneumonitis.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Cadmium	9.0 mg/m^3	0.005 mg/m^3 (Cd dust) 0.01 mg/m^3 (Cd dust) Reduce to lowest possible level. Known human carcinogen.	***Skin:*** Possible irritation may occur. ***Eye:*** Irritation and possible damage on contact. ***Lung:*** High exposures can cause rapid and severe lung damage, with shortness of breath, chest pain, cough, and a possible buildup of fluids in the lungs (pulmonary edema), which is a medical emergency. In serious cases, death or permanent lung damage can occur. Illness can be delayed for 48 hours, allowing over-exposures to occur without warning signs. ***Other:*** High exposure to cadmium may cause nausea, cramps, salivation, vomiting and diarrhea.
Chromium	250 mg/m^3 (as Cr)	1.0 mg/m^3 (as Cr) 0.5 mg/m^3 (as CrIII) 0.5 mg/m^3 (as CrIII) Hexavalent chromium is a known human carcinogen via inhalation.	***Skin:*** Irritation, rash and possible dermatitis. ***Eye:*** Chromium particles can irritate the eyes. ***Lung:*** Inhalation of chromium may cause a condition known as “metal fume fever” (flu-like symptoms).
Cobalt	20 mg/m^3 (as Co)	0.10 mg/m^3 0.02 mg/m^3 0.05 mg/m^3	***Skin***: Dermatitis. ***Lung***: Cough, shortness of breath, wheezing, respiratory hypersensitivity, asthma
Copper (dusts and mists, as Cu, except copper fumes)	100 mg/m^3 (as Cu)	1.0 mg/m^3 (as Cu) 1.0 mg/m^3 (as Cu) 1.0 mg/m^3 (as Cu)	***Skin:*** Irritation, rash and possible dermatitis. ***Eye:*** Red, watery eyes and irritation ***Lung:*** Irritation of nose, pharynx; possible perforation of the nasal septum
Lead	100 mg/m^3 (as Pb)	0.05 mg/m^3 (as Pb) 0.05 mg/m^3 (as Pb) 0.05 mg/m^3 (as Pb)	***Skin:*** Irritation/scratching on contact with particles. ***Eye:*** Irritation/scratching on contact with particles. ***Lung:*** Possible irritation of the nose, throat, and lungs following exposure to fibers and dusts.
Manganese	500 mg/m^3	5 mg/m^3 0.2 mg/m^3 1 mg/m^3	***Lung:*** Cough, dry throat, breathing difficulty, chest tightness, flu-like fever. ***Gastrointestinal (ingestion route):*** Abdominal pain, nausea, vomiting.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Mercury	10 mg/m^3 (as Hg)	0.1 mg/m^3 (skin) 0.025 mg/m^3 (skin) 0.1 mg/m^3 (skin)	***Skin:*** Irritation, rash, dermatitis, and possible redness and the appearance of small blisters. Dermal absorption will cause toxic systemic effects. ***Eye:*** Irritation, inflammation, watering, swelling, conjunctivitis. ***Lung:*** Inhalation of mercury vapors may cause irritation of the mucous membranes in the respiratory tract causing cough, phlegm, and lung tissue irritation leading to bronchitis, pneumonitis, and even delayed pulmonary edema.
Nickel	10 mg/ m^3	1.0 mg/m^3 1.5 mg/m^3 0.015 mg/m^3	***Skin:*** Irritation/scratching on contact with dusts. May cause “nickel itch” or nickel dermatitis. ***Eye:*** Irritation and scratching with possible progression to conjunctivitis. ***Lung:*** Irritation of the nose, throat and lungs on exposure to powders and dusts.
Selenium	1 mg/m^3	0.2 mg/m^3 0.2 mg/m^3 0.2 mg/m^3	***Skin:*** Irritation, burns, dermatitis ***Eye:*** Irritation and burns ***Respiratory Tract:*** Nose and throat irritation, shortness of breath, bronchitis ***Other:*** Metallic taste, garlic breath, GI disturbance
Silica	25-50 mg/m^3 (suspected human carcinogen)	$\frac{10 \text{ mg/m}^3}{\% \, SiO_2 + 2}$ (respirable dust) 0.05 mg/m^3 (respirable dust) 0.05 mg/m^3	***Eye:*** Irritation. ***Lung:*** Cough, dyspnea (breathing difficulty), wheezing.
Silicon	ND	15 mg/m^3 (total dust) 10 mg/m^3 (total dust) 10 mg/m^3 (total dust)	***Skin:*** Irritation and possible rash upon contact with skin (contact dermatitis). ***Eye:*** Severe irritation and possible inflammation. ***Lung:*** Irritation of the nose, throat, and lungs following exposure. Can cause coughing, dyspnea, nausea and headache.
Silver	10 mg/m^3 (as Ag)	0.01 mg/m^3 0.01 mg/m^3 0.01 mg/m^3	***Skin:*** Irritation and ulceration. ***Eye:*** Whites of eyes turn blue/gray eyes. ***Respiratory:*** Nose and throat irritation.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Thallium (soluble compounds as Tl)	15 mg/m^3 (as Tl)	0.01 mg/m^3 (as Tl) 0.01 mg/m^3 (as Tl) 0.01 mg/m^3 (as Tl)	***Eye:*** Irritation ***GI Tract***: Nausea, diarrhea, vomiting, metallic taste in mouth ***Respiratory***: Pulmonary edema ***CNS****:* Perineuritis, tremor, convulsions, psychosis. ***Other***: Ptosis, strabismus, chest tightness, chest pain, chorea, potential liver and kidney damage; alopecia
Zinc (as zinc oxide dust)	500 mg/m^3 (as ZnO dust)	15 mg/m^3 (total dust) 5 mg/m^3 (respirable dust) 5 mg/m^3 (TWA) 15 mg/m^3 (Ceiling) 2 mg/m^3 (TWA) 10 mg/m^3 (STEL)	***Respiratory***: Dry throat, cough, chest tightness, decreased pulmonary function. ***GI Tract*****:** Nausea, metallic taste in mouth, vomiting ***CNS****:* Blurred vision, malaise. ***Other***: Fever, chills, muscle aches, headaches, lower back pain, difficulty breathing,
BTEX			
Benzene	500 ppm	1.0 ppm 0.5 ppm ppm Known human carcinogen.	***Skin:*** Irritation with potential for redness, blistering and burning. ***Eye:*** Severe irritation; pain and permanent damage possible. ***Lung:*** Nose, throat and respiratory tract irritation causing difficulty in breathing, possible pulmonary edema (fluid in lungs) on high exposure that can be fatal. ***CNS:*** Confusion, dizziness, tightening of the leg muscles, cranial pressure (headaches), possible coma.
Chlorobenzene	1,000 ppm	75 ppm 10 ppm none	***Skin:*** Irritation with potential for redness and burning. ***Eye:*** Irritation and redness. ***Lung:*** Nose, throat and respiratory tract irritation ***CNS:*** CNS depressant, drowsiness

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Ethylbenzene	800 ppm	100 ppm 100 ppm 100 ppm	***Skin:*** Irritation with potential for redness, blistering, and serious burning. Chemical will pass through intact skin to cause toxic systemic effects, including narcosis. ***Eye:*** Severe irritation, burning, pain, and permanent damage possible. ***Lung:*** Nose, throat and respiratory tract irritation causing difficulty in breathing, possible pulmonary edema (fluid in lungs) on high exposure. ***CNS:*** Narcosis, headaches, light-headedness, dizziness, vertigo, coma, and death due to respiratory paralysis.
Toluene	500 ppm	200 ppm 50 ppm (skin) 100 ppm	***Skin:*** Severe irritation and possible burns. Will pass through unbroken skin to cause toxic systemic effects (weakness, nausea, collapse, and death). ***Eye:*** Severe irritation with damage and possible loss of vision likely. ***Lung:*** Severe irritation to the respiratory tract and associated mucosa. Can cause weakness, nausea, confusion, collapse, coma, and death (respiratory failure). ***CNS:*** A CNS depressant. Weakness, confusion, mood changes and other personality changes, nausea, collapse. ***Other:*** Ingestion will cause irritation to the gastrointestinal system with nausea, vomiting, convulsions, dyspnea, jaundice, tremor, confusion, and nervousness. Toluene is toxic to the liver and kidneys.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Xylene (mixed monomers)	900 ppm	100 ppm 100 ppm 100 ppm	***Skin:*** Irritation with potential for redness, blistering and serious burning. Chemical will pass through intact skin to cause systemic effects, including narcosis. ***Eye:*** Severe irritation, burning, pain, and permanent damage possible. ***Lung:*** Nose, throat, and respiratory tract irritation causing difficulty in breathing, possible pulmonary edema (fluid in lungs) on high exposure. ***CNS:*** Narcosis, headaches, light-headedness, dizziness, vertigo, drowsiness, loss of consciousness, coma, and death due to respiratory paralysis.
Diesel Fuel	ND	-- 100 mg/m^3 --	***Skin:*** Irritation, dermatitis ***Eye:*** Irritation ***Lung:*** Cough, difficulty breathing, nausea, chest tightness ***CNS:*** Lightheadedness, loss of consciousness. ***Other:*** Danger of cutaneous absorption, absorption through the skin may be significant contribution to overall exposure.
Gasoline	--	-- 300 ppm Reduce to lowest level	***Skin:*** Irritation with potential for redness, blistering, burning, and absorption. ***Eye:*** Severe irritation, conjunctivitis, redness, possible pain, and visual disturbance. ***Lung:*** Nose, throat, and respiratory tract irritation causing difficulty in breathing, possible pulmonary edema on high exposure (a medical emergency) that can be fatal. ***CNS:*** Inebriation, dizziness, stupor, hallucinations, slurred speech, mental confusion, loss of consciousness and possible convulsions. ***Other:*** Acute exposure can also lead to acute hemorrhage of the pancreas, fatty degeneration of the liver and kidneys, and congestion of the spleen.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Kerosene	ND	Not determined 200 mg/m^3 100 mg/m^3	***Skin:*** Irritation, dermatitis ***Eye:*** Irritation ***Lung:*** Burning sensation in chest, irritation of nose and throat ***CNS:*** Headache, nausea, lassitude, restlessness, incoherence, confusion, drowsiness.
Volatiles			
1,1-Dichloroethane	3,000 ppm	100 ppm 100 ppm 100 ppm	***Skin:*** Irritation. ***CNS:*** Depression. **Other**: Liver, kidney and lung damage.
1,2-Dichloroethane (Ethylene dichloride)	50 ppm (Ca)	50 ppm 10 ppm 1 ppm	***Skin:*** Irritation with potential for redness, pain, burns, and tissue damage. ***Eye:*** Irritation and smarting of the conjunctiva. Can cause clouding of the cornea (corneal opacity). ***Lung:*** Irritation of the mucous membranes of the nose, throat, and respiratory tract causing possible ulceration, coughing, chest pains, difficulty breathing, and pulmonary edema. ***CNS:*** Depression with headaches, light-headedness, dizziness, nausea, vomiting, diarrhea, narcotic and anesthetic effects.
1,1-Dichloroethene (vinylidene chloride)	ND	-- 5 ppm Not determined	***Skin:*** Irritation ***Eye:*** Irritation ***Respiratory system:*** Irritated throat ***CNS:*** Depressant, with dizziness, headache, nausea.
1,2-Dichloroethene	1,000 ppm	200 ppm 200 ppm 200 ppm	***Eye:*** Irritation ***Lung:*** Irritation ***CNS:*** Depressant
1,4 Dioxane	500 ppm (Ca)	100 ppm 20 ppm 1 ppm	***Skin:*** Irritation ***Eyes:*** Irritation ***Lung:*** Nose and throat irritation ***GI:*** Nausea, vomiting, liver failure ***CNS:*** Drowsiness, headache
2-butanone (MEK)	3,000 ppm	200 ppm 200 ppm 200 ppm	***Skin:*** Irritation, dermatitis ***Eye:*** Irritation ***Resp. System:*** Irritation of upper respiratory tract ***CNS:*** Headache, dizziness, vomiting

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Acetone	2,500 ppm	1,000 ppm 500 ppm 250 ppm	***Skin:*** Dermatitis ***Eye:*** Irritation ***Respiratory tract:*** Upper respiratory tract irritation ***CNS:*** Headache, dizziness CNS depression
Carbon Disulfide	500 ppm	20 ppm 1 ppm (skin) 1 ppm (skin)	***Skin***: Skin burns, dermatitis ***Eye***: Ocular changes, burns ***CNS***: Dizziness, headache, lassitude, anxiety, Parkinson-like syndrome ***Other***: Gastritis ***Target Organs:*** central nervous system, peripheral nervous system, cardiovascular system, kidneys, liver
Carbon Tetrachloride	200 ppm	10 ppm 5 ppm 2 ppm (60 minute STEL)	***Skin:*** Irritation with potential for redness, drying and cracking. ***Eye:*** Irritation with tearing and burning. ***Lung:*** Irritation of the mucous membranes of the nose, throat, and respiratory tract. ***CNS:*** Depression of the CNS with headache, dizziness, confusion. ***GI***: Gastric distress, nausea, vomiting, loss of appetite.
Chloroethane (ethyl chloride)	3,800 ppm	1,000 ppm 100 ppm Handle with caution	***CNS:*** Loss of coordination, inebriation, **GI:** Abdominal cramps **Other:** Cardiac arrhythmia, cardiac arrest, liver and kidney damage
Chloroform	500 ppm	50 ppm 10 ppm Reduce to lowest level	**Skin:** Irritation ***Eyes:*** Irritation ***Central Nervous System:*** Dizziness, nausea, confusion, headache, weakness, exhaustion and anesthetic effects.
Chloromethane (methyl chloride)	2,000 ppm	100 ppm (C: 200 ppm) 50 ppm As low as possible –Ca	***Skin:*** Frostbite ***CNS:*** Dizziness, stagger, slurred speech, convulsions, coma **GI:** Nausea, vomiting
Cyclohexane	2,000 ppm	300 ppm 100 ppm 300 ppm	***Skin:*** Redness, dryness, irritation, dermatitis ***Eye:*** Redness, irritation ***Lung:*** Nose and throat irritation, cough, ***CNS:*** Headache, dizziness, weakness, drowsiness, narcosis, coma ***Gastrointestinal:*** Abdominal pain, nausea, vomiting

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Methyl Isobutyl Ketone (MIBK or Hexone)	500 ppm	100 ppm 50 ppm 50 ppm	***Skin:*** Irritation and dermatitis with possible localized rash and redness. Absorption is likely. ***Eye:*** Irritation with pain and inflammation that can lead to corneal damage and possible visual disturbances. ***Lung:*** Irritation causing coughing and/or shortness of breath. Higher exposures can cause dizziness, headache and, possibly, coma and death. ***CNS:*** A mild to moderate narcotic compound producing neurotoxicity as it is partially metabolized to methanol.
Methyl Tertiary Butyl Ether (MTBE)	ND	TLV- 50 ppm	***Lung:*** Nose and throat irritation. ***CNS:*** Headache, nausea, dizziness, mental confusion.
Methylcyclohexane	1,200 ppm	500 ppm 400 ppm 400 ppm	***Skin:*** Irritation, drying and cracking of exposed areas upon prolonged contact ***Eye:*** Irritation ***Lung:*** Upper respiratory tract irritation ***CNS:*** Dizziness, lightheadedness, drowsiness
Methylene chloride (Dichloromethane)	2,300 ppm	25 ppm 50 ppm Reduce to lowest level	***Skin:*** Irritation with potential for redness, pain, burns and tissue damage. ***Eye:*** Irritation and smarting of the conjunctiva. Can cause tearing, redness and pain. ***Lung:*** Irritation of the mucous membranes of the nose, throat, and respiratory tract causing possible ulceration, coughing, chest pains, difficulty breathing and pulmonary edema. ***CNS:*** Depression with headaches, light-headedness, dizziness, nausea, vomiting, diarrhea, narcotic and anesthetic effects.
Pentachlorophenol	2.5 mg/m^3	0.5 mg/m^3(skin) 0.5 mg/m^3 0.5 mg/m^3	***Skin:*** Dermatitis ***Eye:*** Irritation ***Respiratory Tract:*** Irritation of nose and throat, coughing, sneezing ***CNS:*** Headache, dizziness, lassitude ***GI:*** Nausea, vomiting ***Cardiac:*** chest pain

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Stoddard Solvent (Mineral Spirits)	20,000 mg/m^3	500 mg/m^3 100 ppm 350 mg/m^3	***Skin:*** Irritation, dermatitis ***Eye***: Irritation ***Lung:*** Nose and throat irritation. May cause chemical pneumonia if liquid is aspirated. ***CNS:*** Depressive effects. Dizziness. ***Other:*** Kidney damage
Tert-Butyl Alcohol (TBA, 2-Methyl-2-propanol)	1,600 ppm	100 ppm --- 100 ppm	***Skin:*** Irritation ***Eye:*** Irritation ***Respiratory:*** Nose and throat irritation ***CNS:*** Drowsiness, narcosis
Tetrachloroethylene (Perchloroethylene)	150 ppm	100 ppm 25 ppm Lowest possible level	***Skin:*** Moderate irritation with redness and possibly painful inflammation. It will pass through unbroken skin easily to cause toxic systemic effects. ***Eye:*** Severe irritation and burning but rarely causes permanent damage. ***Lung:*** Nose and throat irritation. Produces intoxicating effects and may cause lung effects as well. ***CNS:*** Unconfirmed effects by all routes of exposure. There may be numbness around the lips and mouth, dizziness, loss of coordination, headache, somnolence, slurred speech, flushed face, irregular heartbeat, and other unspecified effects on nervous system functions.
1,1,2,2-Tetrachloroethane	100 ppm	5 ppm 1 ppm 1 ppm	***Skin:*** Moderate irritation with redness and possibly painful inflammation. It will pass through unbroken skin easily to cause toxic systemic effects. Dermatitis is also possible. ***Eye:*** Severe irritation and burning, but rarely causes permanent damage. ***Lung:*** Nose and throat irritation. Produces intoxicating effects and may cause lung effects as well. ***CNS:*** Adverse effects (depression) by all routes of exposure. There may be numbness around the lips and mouth, dizziness, loss of coordination, headache, somnolence, slurred speech, flushed face, irregular heartbeat, and other unspecified effects on nervous system functions.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
1,1,1-Trichloroethane (Methyl chloroform)	700 ppm	350 ppm 350 ppm 350 ppm	***Skin:*** Irritation with potential for redness, pain, dryness, scaling, cracking, and infection. Dermatitis may occur in some individuals. ***Eye:*** Severe irritation, burning, pain and smarting of the conjunctiva. Permanent damage to visual acuity is possible. ***Lung:*** Nose, throat, and respiratory tract irritation. High concentrations can cause severe irritation. ***CNS:*** Headaches, light-headedness, dizziness, hallucinations, loss of coordination, aggressive behavior, motor changes. Death can occur due to cardiac arrhythmia and possible cardiac arrest.
1,1,2-Trichloroethane	100 ppm	10 ppm 10 ppm 10 ppm	***Skin:*** Irritation ***Eye:*** Irritation ***Respiratory:*** Nose irritation ***CNS:*** Depressant
Trichloroethylene	1,000 ppm	100 ppm 10 ppm 25 ppm	***Skin:*** Moderate irritation with redness and possibly painful inflammation with blisters and burns. It will pass through unbroken skin easily to cause toxic systemic effects. ***Eye:*** Severe irritation and burning with a possibility for injury to the corneal epithelium. ***Lung:*** Nose and throat irritation. Produces intoxicating effects and may cause lung effects such as pulmonary edema (may be fatal). ***CNS:*** Depressive effects by all routes of exposure. There may be numbness around the lips and mouth, dizziness, loss of coordination, headache, somnolence, slurred speech, blurred vision, flushed face, irregular heartbeat, and other effects on nervous system functions. Death can result from cardiac arrest.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Vinyl Chloride	--	1 ppm 1 ppm Reduce to lowest level Known human carcinogen.	***Skin:*** Irritation with potential for redness, pain, inflammation and tissue damage (frostbite). ***Eye:*** Severe irritation, burning, pain, and permanent damage possible. ***Lung:*** Nose, throat, and respiratory tract irritation. Symptoms can include dyspnea, asthma, and pneumoconiosis. ***CNS:*** Narcosis, headaches, light-headedness, dizziness, drowsiness, nausea, vomiting, confusion, decreased mental status, possible loss of consciousness, and death (respiratory arrest).
Pesticides			
2,4 Dichlorophenoxy-cetic acid	100 mg/m^3	10 mg/m^3 10 mg/m^3 10 mg/m^3	***Skin***: Dermatitis ***Inhalation***: Irritation of nose and throat; irritation of lungs causing coughing and/or shortness of breath; fluid buildup in lungs; headache; fatigue; muscle weakness and twitching; poor coordination in arms and legs. ***Ingestion***: Nausea, vomiting, sweating, fever, diarrhea, stomach pain, and loss of appetite and weight.
Carbaryl (Sevin)	100 mg/m^3	5 mg/m^3 5 mg/m^3 5 mg/m^3	***Skin***: May cause severe irritation, rash or a burning feeling. Will pass through unbroken skin and enter the bloodstream. ***Eyes***: May cause severe irritation. ***Inhalation***: Can cause blurred vision, sweating, nausea, vomiting and abdominal pain. Higher exposures can cause pulmonary edema and death. ***Ingestion***: Symptoms include nausea, vomiting, diarrhea, abdominal cramps, miosis, lachrymation, and excessive salivation.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Chlordane	100 mg/m^3	0.5 mg/m^3 (skin) 0.5 mg/m^3 (skin) 0.5 mg/m^3 (skin)	***Skin:*** Liquid can pass through unbroken skin. Contact may cause irritation and rash. Symptoms of exposure include headache, nausea, abdominal pain, and vomiting. ***Eye:*** Severe irritation and possible damage on contact. ***Lung:*** Irritation of the nose and throat. Breathing vapors can cause cough, convulsions, unconsciousness, and death. ***CNS:*** A central nervous system stimulant. Symptoms include ataxia, excitement, tremors, convulsions, blurred vision, confusion, delirium, and irritability.
Copper sulfate	100 mg/m^3 as Cu	Dust/mist – 1 mg (Cu)/m^3 1 mg (Cu)/m^3 1 mg (Cu)/m^3	**Skin**: Contact may cause smarting and first degree burns, second degree burns on prolonged contact. Can pass through skin and cause toxic systemic effects. **Inhalation**: Irritation of the upper respiratory system, nose and throat. May cause nosebleeds and “metal fume fever” (flu-like illness with chills, aches and cough.) **Ingestion**: Will cause intense pain and local corrosion with hemorrhages, prostration, anuria, hematuria, anemia, coma, and death.
DDT (Dichlorodiphenyl-trichloroethane)	500 mg/m^3	1.0 mg/m^3 (skin) 1.0 mg/m^3 0.5 mg/m^3 (skin)	***Skin:*** Dermatitis associated with DDT is unusual. Most effects from skin contact are internal due to adsorption of liquid solutions containing DDT. Symptoms include vomiting, nausea, malaise, and muscular twitching at high doses (above the PEL). ***Eye:*** Possible irritation. ***Lung:*** Irritation causing coughing and/or shortness of breath. Higher exposures can lead to respiratory problems. ***CNS:*** Dizziness, headaches, nausea, vomiting, muscle jerks, severe seizures, and death.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Dieldrin	50 mg/m^3	0.25 mg/m^3 (skin) 0.25 mg/m^3 (skin) 0.25 mg/m^3 (skin)	***Skin:*** Liquid can pass through unbroken skin. Contact may cause irritation and rash. Symptoms of exposure include headache, nausea, abdominal pain, vomiting and CNS stimulation. ***Eye:*** Mild to severe irritation. Absorption through direct eye contact is possible. ***Lung:*** Irritation of the nose and throat. Breathing vapors can cause cough, convulsions, and adverse effects on the liver. ***CNS:*** A central nervous system stimulant. Symptoms include: irritability, blurred vision, tremors, convulsions, and metal confusion.
Endrin	2 mg/m^3	0.1 mg/m^3 (skin) 0.1 mg/m^3 (skin) 0.1 mg/m^3 (skin)	***Skin:*** Liquid can pass through unbroken skin. Contact may cause irritation and rash. Symptoms of exposure include headache, nausea, abdominal pain, vomiting, and CNS stimulation. ***Eye:*** Severe irritation. ***Lung:*** Irritation of the nose and throat. Breathing vapors can cause cough, convulsions, and adverse effects on the liver. ***CNS:*** A powerful central nervous system stimulant. Symptoms of exposure may include agitation, aggressiveness, excitement, tremors, convulsions, blurred vision, mental confusion, delirium, and irritability.
Heptachlor	35 mg/m^3	0.5 mg/m^3 (skin) 0.05 mg/m^3 (skin) 0.5 mg/m^3 (skin)	***Skin:*** Liquid can pass through unbroken skin. Contact may cause irritation and rash. Symptoms of exposure of exposure include headache, nausea, abdominal pain, and vomiting. ***Eye:*** Severe irritation and possible damage on contact. ***Lung:*** Irritation of the nose and throat. Breathing vapors can cause cough, convulsions, unconsciousness, and death. ***CNS:*** A central nervous system stimulant. Symptoms include ataxia, excitement, tremors, convulsions, confusion, delirium and irritability.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Lindane	50 mg/m^3	0.5 mg/m^3 (skin) 0.5 mg/m^3 (skin) 0.5 mg/m^3 (skin)	***Skin:*** Liquid can pass through unbroken skin. Contact may cause irritation and rash. Symptoms of exposure include headache, nausea, abdominal pain, vomiting and CNS stimulation. ***Eye:*** Mild to severe irritation. Absorption through direct eye contact is possible. ***Lung:*** Irritation of the nose and throat. Breathing dusts or solution vapors can cause cough, convulsions, and adverse effects on the liver. ***CNS:*** A central nervous system stimulant. Symptoms include irritability, blurred vision, tremors, convulsions, and mental confusion.
Semivolatiles			
1,2-Dichlorobenzene	200 ppm	50 (Ceiling) 25 ppm 50 (Ceiling)	***Eye:*** Irritation ***Respiratory:*** URT irritation ***Target organs:*** Liver, kidneys
1,4-Dichlorobenzene	150 ppm Carcinogen	75 ppm 10 ppm Carcinogen	***Eye***: Irritation, periorbital swelling ***Inhalation/Ingestion:*** Rhinitis, headache, anorexia, nausea ***Target organs***: Kidneys, liver, respiratory system
3,3’-Dichlorobenzidine	Ca (ND) *OSHA Regulated Carcinogen	NE* ALAP** NE ** As low as possible	**Skin:** Skin sensitization, dermatitis, burns ***Eye:*** Irritation Inhalation/Ingestion: Headache, dizziness, frequent urination, blood in urine, GI upset, upper respiratory infection **Target organs:** Bladder, liver, lung, skin, GI Tract
1,2,4-Trichlorobenzene	ND	none 5 ppm (ceiling) 5 ppm (ceiling)	***Skin:*** Irritation with burning, itching, redness. ***Eye:*** Irritation with burning, itching and watering. ***Respiratory:*** Irritation of mucosa of respiratory tract. ***Other:*** Potential Teratogen

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Aniline	100 ppm (Ca)	5 ppm (skin) 2 ppm (skin) Lowest possible level	***Aniline is rapidly absorbed through all routes and induces methemoglobinemia. Symptoms include:*** *Cyanosis, headache, dizziness, weakness, lethargy, loss of coordination, shortness of breath.* ***Skin:*** Aniline causes skin irritation and mild skin sensitization. The skin is a major route of exposure. **Eye**: Severe irritation ***CNS****:* Severe headache, tremor, confusion. CNS depression may be a result of methemoglobinemia. ***Systemic****:* Chronic exposure may cause injury to kidney, bladder, liver and spleen.
Bis(2-ethylhexyl) phthalate	5000 mg/m^3	PEL: 5 mg/m^3 TLV: 5 mg/m^3	***Skin***: Irritation ***Eye****:* Irritation ***Other****:* Nausea, diarrhea ***Suspected human carcinogen***
Hexachlorobenzene	NE	NE 0.002 mg/m^3 NE	***Skin:*** UV sensitivity and skin damage, hyperpigmentation ***Inhalation/ingestion:*** CNS impairment, skin effects noted above
Naphthalene	250 ppm	10 ppm 10 ppm (skin) 10 ppm	***Skin:*** Irritation with burning, itching, and edema (buildup of fluid) redness and swelling. ***Eye:*** Severe irritation of the conjunctiva with burning, itching, and watering. Direct contact with heated fumes can irritate the eyes. ***Lung:*** Irritation of the bronchial tubes and other members of the respiratory tract. May cause headache, loss of appetite, nausea, vomiting, slowed reactions, and a loss of strength. ***CNS:*** Depression of the nervous system causing excitement, convulsions, and possibly coma.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
No. 6 Fuel Oil	100 ppm (H_2S)	20 pm (H_2S) 1 ppm (H_2S) 10 ppm (H_2S-ceiling)	***Skin:*** Skin irritation with prolonged contact ***Eye:*** Mild to moderate irritation ***Lung:*** Minimal inhalation hazard at ambient temperature, upon heating, vapors may result in respiratory tract irritation and CNS effects- see below ***CNS:*** Headache, dizziness, loss of balance and coordination, unconsciousness ***Other:*** Irritating and toxic hydrogen sulfide gas may be found in confined spaces. H_2S causes olfactory fatigue, so the characteristic rotten egg odor may not be detected, especially at higher concentrations. Thus, the odor is not a reliable warning indicator for exposure.
Phenol	250 ppm	5 ppm (skin) 5 ppm (skin) 5 ppm (skin)	***Skin:*** Severe irritation and possible burns. Will pass through unbroken skin to cause toxic systemic effects, including weakness, nausea, collapse, and death. ***Eye:*** Severe irritation with damage and possible loss of vision likely. ***Lung:*** Severe irritation to the respiratory tract and associated mucosa. Can cause weakness, nausea, confusion, collapse, coma and death (respiratory failure). ***CNS:*** A central nervous system depressant. Weakness, confusion, mood changes and other personality changes, nausea, collapse and death.
Polyaromatic hydrocarbons (PAHs) (coal tar pitch volatiles)	80 mg/m^3	0.2 mg/m^3 0.2 mg/m^3 0.1 mg/m^3	***Skin:*** Irritation with burning, itching, edema, redness and swelling. ***Eye:*** Severe irritation of the conjunctiva with burning, itching and watering. ***Lung:*** Irritation of respiratory tract, especially bronchial tubes. ***CNS:*** Slowed reactions, headache and loss of strength. ***Other:*** Loss of appetite, nausea, vomiting.

Contaminant	IDLH Level	PEL/TLV/REL	Acute Toxicological Symptoms
Polychlorinated Biphenyls (PCBs)	5 mg/m^3-	PEL:1 mg/m^3-1242 PEL:0.5 mg/m^3-1254 TLV:1 mg/m^3-1242 TLV:0.5 mg/m^3-1254 REL: 0.001 mg/m^3 – 1242 and 1254	***PCBs have low acute toxicity, but because they accumulate in the environment and in animal and human tissues, the potential for chronic toxicity is significant.*** ***Skin:*** Burning sensation and edema of the face and hands, skin thickening, hyper pigmentation, chloracne. ***Eye:*** Eye discharge, swelling of the eyelids. ***Ingestion:*** Severe abdominal pain, nausea, vomiting, diarrhea have been reported following acute and chronic exposures. ***Central and peripheral Nervous System:*** Headache, dizziness, depression and nervousness, weakness and numbness of the extremities.
Trimethyl benzene (mixed isomers)	ND	No PEL 25 ppm 25 ppm	***Skin***: Irritation ***Eye***: Irritation ***Lung***: Irritation of the throat, respiratory system, bronchitis ***CNS***: Headache, lassitude, drowsiness, dizziness, ***Gastrointestinal***: Nausea, vomiting
Other			
Methane	NA	NA	***-Simple asphyxiant-displaces oxygen in air and may cause rapid suffocation.*** ***-Odorless and does not provide adequate warning.*** ***-Highly flammable gas that may form explosive mixtures with air.***

Notes:
IDLH – Immediately Dangerous to Life or Health
mg/m3 – milligrams per cubic meter
NA – not applicable (no specific IDLH value has been determined)
ND – not determined (no IDLH value has been formally derived)
NE – not established
ppm – parts per million
STEL – Short-Term Exposure Limit

APPENDIX B – PHYSICAL HAZARDS

Asbestos Removal

- For asbestos removal, a Regulated Area will be constructed in accordance with Occupational Safety and Health Administration (OSHA)1926.1101.
- A digital vacuum pressure gauge must be maintained on-site during the removal activities, and the containment area must maintain a -0.020 inches of water column pressure.
- Warning signs and danger signs will be posted outside the containment area and all personnel performing the asbestos removal must wear safety toed shoes, hard hat, Tyvek (with booties and hoodie), nitrile gloves with polyvinyl chloride (PVC) over gloves, and full-face air purifying respirator.
- During the removal of asbestos containing materials, all asbestos materials must be sprayed with amended water and must be kept adequately wet during the removal process. Perform required personal air monitoring and provide results to staff members. Avoid over watering to control potential runoff. Capture any runoff on poly film and use towels or rags to soak up excessive water.
- Ensure best management practices are in place prior to work, and drains are protected.
- Ground-fault circuit interrupters must be utilized on all powered equipment.
- No cutting tools to be used for non-friable asbestos removal.
- Do not overload, throw, drop, or puncture bags.
- Good housekeeping must be maintained, and work area should be kept free of debris.
- If caulking needs to be cut, ensure to use cut resistant gloves and a self-retracting safety knife.
- A personal decontamination area must be on-site.
- All waste will be double bagged and must be properly marked with required U.S. Department of Transportation (DOT) hazard label, and all waste must be maintained on-site until the required manifest(s) are available and signed for transport and disposal.
- Personal air sampling is required for workers performing asbestos removal work.

Batteries

- Battery inspection: Determine the functionality and potential damage of each battery cell.
- Voltage checks: Implement procedures to check battery voltage before and after charging.
- Discharge prevention: Shut down the battery's ability to discharge below 20 volts.
- Alarm fixes: Improve the specificity of "battery abnormality" alarms and raise the threshold for maximum charge alarms.
- Standard work: Develop a Standard Operating Procedure (SOP), Job Hazard Analysis (JHA), or other standard work guidance for infrequent activities.
- Workplace exams: Conduct regular workplace examinations and eliminate hazardous conditions.
- Proper training: Train staff in the correct use and care of lithium battery-powered equipment, including appropriate personal protective equipment (PPE) usage.

- Follow instructions: Adhere to the manufacturer's guidelines for the storage, use, charging, and maintenance of lithium batteries.
- Fire safety: Keep fire extinguishing equipment readily available and ensure a smoke or heat alarm is installed in areas where devices are charged or stored.

Caught-In Or Between

Below are best practices to mitigate caught in between hazards:

- Ensure operating paths are clear of personnel or objects subject to hazard.
- Operate equipment safely and according to manufacturer's instructions.
- While heavy equipment is operating, all personnel on ground will wear reflective, high-visibility vests and hard hats.
- No one will approach equipment in operation unless the operator gives them positive indication that it is acceptable to do so.
- Put up barriers to avoid unnecessary contact with hazards.
- Ensure egress paths are clear and unobstructed.

Combustible Dusts

For a combustible dust explosion to occur, the following must be present:

- Combustible dust (fuel);
- Ignition source (heat);
- Oxygen in air (oxidizer);
- Dispersion of dust particles in sufficient quantity and concentration; and
- Confinement of the dust cloud.

Dust control:

- Minimize the escape of dust from process equipment or ventilation systems;
- Use dust collection systems and filters;
- Utilize surfaces that minimize dust accumulation and facilitate cleaning;
- Provide access to all hidden areas to permit inspection;
- Inspect for dust residues in open and hidden areas, at regular intervals;
- Clean dust residues at regular intervals;
- Use cleaning methods that do not generate dust clouds, if ignition sources are present;
- Only use vacuum cleaners approved for dust collection;
- Locate relief valves away from dust hazard areas; and
- Develop and implement a hazardous dust inspection, testing, housekeeping, and control program (preferably in writing with established frequency and methods).

Ignition control:

- Use appropriate electrical equipment and wiring methods;
- Control static electricity, including bonding of equipment to ground;
- Control smoking, open flames, and sparks;
- Control mechanical sparks and friction;
- Use separator devices to remove foreign materials capable of igniting combustibles from process materials;
- Separate heated surfaces from dusts;
- Separate heating systems from dusts;
- Proper use and type of industrial trucks;
- Proper use of cartridge activated tools; and
- Adequately maintain all the above equipment.

Damage control:

- Separation of the hazard (isolate with distance);
- Segregation of the hazard (isolate with a barrier);
- Deflagration venting of a building, room, or area;
- Pressure relief venting for equipment;
- Provision of spark/ember detection and extinguishing systems;
- Explosion protection systems;
- Sprinkler systems; and
- The use of other specialized suppression systems.

Compressed Air

Hazards of compressed air use include:

- Flying objects cutting or bruising the body.
- Foreign bodies getting lodged under skin.
- Air or foreign particles causing eye injury that can cause loss of sight.
- Injection of an air bubble into the blood stream that can lead to a fatal embolism.
- Air blown into the mouth that can rupture the esophagus or the lungs (can happen even at a low pressure of 5 psi).
- Noise from an air hose that can lead to hearing loss (sounds can reach 120-130 dB).

Safely working with and around compressed air involves the following:

- Stand clear of areas where compressed air is being used, whenever possible.
- Do not use compressed air to clean clothing or hair.
- Do not point a compressed air hose at yourself or another person.
- Check condition of hoses and lines before use.
- Wear PPE-safety glasses with side shields, full face shields, and hearing protection.
- Do not use compressed air for cleaning workspaces.
- Safety chains or other locking devices should be used at couplings of high-pressure hose lines where a connection failure would create a hazard.

Compressed Gases

- Compressed gases pose both physical and chemical hazards, depending on the type of gas. These gases can range from inert and non-reactive to highly toxic, flammable, or explosive. Due to the high pressure inside cylinders, any physical damage or exposure to high temperatures can result in serious incidents.
- All compressed gas cylinders must be:
  - Clearly labeled with the name of their contents in accordance with OSHA and other applicable regulations.
  - Accompanied by a Safety Data Sheet (SDS), which must be obtained and maintained for each type of gas.
- Always store, transport, and use cylinders upright with the valve facing up. Secure them using appropriate supports such as racks, straps, chains, or stands to prevent tipping or falling.
- Protect cylinder valves with standard caps when not in use—this applies to both full and empty cylinders.
- Never force a cap or regulator; caps should be hand-tightened only.
- Avoid exposing cylinders to excessive moisture, corrosive chemicals, or fumes.
- Do not store cylinders near combustible materials or in areas subject to extreme temperatures.
- Never transfer gases from one cylinder to another (except for dry ice or cryogenic materials). Do not attempt to refill compressed gas cylinders.
- Before use, slowly “crack” the valve to clear dust or debris—ensure the opening is pointed away from people. Take extra precautions with toxic or flammable gases.
- Do not stand in front of the regulator gauge when opening the valve.
- Always use the correct pressure regulator for specific gas. Never operate a cylinder without a regulator.
- Before opening the cylinder, ensure the regulator’s adjusting screw is released. Never allow gas to enter the regulator suddenly.
- If a leak occurs between the cylinder and regulator, close the valve before attempting to tighten the union nut.
- Never strike an electric arc on a cylinder.

Confined Space

A confined space is an area that has limited or restricted means for entry or exit, and it is not designed for continuous staff member occupancy. Confined spaces include, but are not limited to, underground vaults, tanks, storage bins, manholes, pits, silos, process vessels, and pipelines. OSHA uses the term "permit-required confined space" (permit space) to describe a confined space that has one or more of the following characteristics:

- contains or has the potential to contain a hazardous atmosphere;
- contains a material that has the potential to engulf an entrant;
- has walls that converge inward or floors that slope downward and taper into a smaller area which could trap or asphyxiate an entrant; or
- contains any other recognized safety or health hazard, such as unguarded machinery, exposed live wires, or heat stress.

Haley & Aldrich staff members should avoid entering confined spaces whenever possible. Confined spaces can only be investigated by opening the entryway, allowing adequate venting time, and viewing the interior using a flashlight without entering the space or breaking the plane of the opening of the space.

Work in confined spaces requires additional planning, training, permits, control of energy through lockout/tagout, and safety documentation. Confined space work cannot be performed without approval from Regional Safety Managers (RSMs). Contact an RSM for more information on safely completing confined space work.

Congested Areas

- Project sites may present congested working areas with other subcontractors and moving equipment.
- Be mindful of the work happening around you, pay attention to the hazards beyond those of just the task you are performing.
- Stay clear of vehicle pathways.
- Remain visible to operators and receive confirmation before moving across the pathway of any heavy equipment.

Construction Materials

- To prevent fires and hazards, separate incompatible materials during storage. Keep solvent waste, flammable liquids, and oily rags in fire-resistant containers until they are removed from the site.
- All materials stored in tiers must be securely stacked, racked, blocked, or interlocked. Cylindrical materials like steel, poles, and pipes need proper stacking and blocking to prevent shifting and potential injuries.
- Be aware of the maximum safe load limits for floors used as storage areas and never exceed these limits.
- Keep walkways and passageways clear and well-maintained to allow the safe movement of staff members and vehicles.
- When working on different levels, provide ramps or graded surfaces to prevent vehicle accidents and material spillage.

Control of Hazardous Energy

- A system for effective de-energization will be implemented, communicated to personnel, and verified prior to conducting operations in an area affected by energized equipment.
- Personnel will remain alert for energized equipment and will notify their supervisor immediately should they suspect anything around them is still energized or unsafe to approach.
- The steps of lockout/tagout are a primary method of isolating energy and include the following,
  - Lockout/tagout events to be discussed in tailgate safety meetings prior to implementation.
  - Notify all staff members within the immediate affected area that a lockout or tagout is going to be utilized and the reason why.
  - If the equipment is operating, shut it down in an orderly fashion using the normal stopping procedure.
  - Operate the switch, valve, or other energy isolating device(s) so that the equipment is isolated from its energy source(s).
  - Lockout and/or tagout the energy isolating devices with assigned individual lock(s) or tag(s).
  - Lockout devices and tagout devices are to indicate the identity of the employee applying the device(s).
  - Use the TAG Template available on the Haley & Aldrich Intranet Forms/Health & Safety/ Hazardous Energy Control page to generate staff member and equipment-specific tags.
  - Following the application of lockout or tagout devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, or otherwise rendered safe. For example:
    - Prior to work on hydraulic or pneumatic systems, the energy source shall be turned off and existing pressure drained.
    - Release the tension on springs or block the movement of spring-driven parts.
    - Block parts that could move form loss of hydraulic and pneumatic pressure.
    - Drain process piping systems and close valves to prevent the flow of hazardous materials.
    - Verify a zero-energy state with applicable test equipment, gauges, etc.
    - Verify that timing devices and delayed starts have been isolated.
    - Attempt to energize the equipment.
    - Return the controls to its energy isolation position (i.e. “OFF”).
  - At this point the equipment is considered to be locked or tagged out.
  - If lockout is the energy control method utilized, the authorized staff member is to keep the key in their possession for the duration of the lockout period.

Dehydration

There may be instances where staff members become dehydrated while performing work. To reduce potential for dehydration, staff members should:

- Drink plenty of fluids, including drinks with electrolytes, at regular intervals. OSHA recommends at least one quart of water per hour on days that exceed 80 degrees F;
- Eat foods that are high in water, such as fruits and vegetables;

- Drink additional water in hot or humid weather to help lower your body temperature and to replace what you lose through sweating;
- Drink extra water in cold weather to combat moisture loss from dry air, particularly at higher altitudes; and,
- Ensure that project teams prepare for staff members to have access to adequate hydration.

If at any point staff members are experiencing extreme symptoms of dehydration, contact emergency medical services.

Drilling Hazards

There are several hazards associated with drilling. The primary hazards are the exposed moving parts where the soil borings are advanced. The size of the drill rig may present blind spots for the operator as well as workers moving around the drill rig. Noise is also a significant hazard, particularly when using air rotary equipment.

Use of a drill rig will require all personnel in the vicinity of the operating rig to wear steel-toed boots, hard hats, reflective safety vests, hearing protection, and safety eyewear. Personnel should not remain in the vicinity of operating equipment unless it is required for their work responsibilities.

Oversight personnel should follow these safety procedures:

- Do not stand near cables under tension, such as those lifting drill pipe
- Do not stand directly underneath a load suspended by a cable
- Stand clear as drill pipe is lowered into pipe rack by cable
- Keep away from drill rig unless required by task
- Do not approach equipment without first establishing eye contact with the operator
- Ensure that all machinery have operating back-up alarms
- Keep hands away from moving parts

Additionally, the following safety requirements must be followed:

- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists must be aware of this device. This device must be tested before the job starts and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency stop when necessary.
- The driller must never leave the controls of the rig while the tools are rotating unless all workers are kept clear of rotating equipment.
- A long-handled shovel must be used to clear drill cuttings away from the hole and from rotating tools. Hands and/or feet are not to be used for this purpose.
- A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools that could rotate, the driller must shut down the rig prior to initiating work.
- Drillers, helpers, and geologists must secure all loose clothing when in the vicinity of drilling operations.

- Only equipment that has been approved by the manufacturer may be used in conjunction with drilling equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be permitted.
- No person may climb the drill mast while tools are rotating.
- No person may climb the drill mast without the use of American National Standards Institute (ANSI)-approved fall protection or portable ladder that meets the requirements of OSHA standards.
- The drill rig must not be moved with the mast in a raised position.
- Elevated parts of the drill rig shall remain at least 20 feet from overhead power lines or follow the procedures outlined in Overhead Utilities below.

Drum Handling

- Use proper lifting and moving techniques to prevent back injuries.
- Make sure the vehicle selected has sufficient rated load capacity to handle the anticipated loads, and make sure the vehicle can operate smoothly on the available road surface.
- Have overpacks ready before any attempt is made to move drums.
- Before moving anything, determine the most appropriate sequence in which the various drums and other containers should be moved.
- Exercise extreme caution in handling drums that are not intact and tightly sealed.
- Ensure that operators have a clear view of the roadway when carrying drums.
- Pressurized drums are extremely hazardous. Wherever possible, do not move drums that may be under internal pressure, as evidenced by bulging or swelling.
- Make sure that all waste drums are managed according to state, federal, and PG&E regulations and requirements.

Economically Depressed Areas

- Economically depressed areas may have high crime rates.
- Staff could be subjected to crime that includes but may not be limited to thievery, vandalism, and violence.
- Prior to the start of work, staff need to understand the work locations and the potential for exposure to low level crime.
- Staff members should never work alone in these areas.
- A buddy system is required.
- Conduct work during daylight hours.
- Secure equipment and vehicles.
- If warranted, contact the local police department for a security detail.
- Leave the work area immediately and contact the local authorities if staff members feel threatened, or are threatened.

Electrical Hazards

- Electrical work of 120 volts or less can be completed by a qualified person, who has received training and has demonstrated skills and knowledge in the construction and operation of electric equipment and installations and the hazards involved.
- Electrical work of over 120 volts but under 600 volts can be completed by a qualified electrical worker as defined as a person with who by reason of a minimum of 2 years of training and experience with high-voltage circuits and equipment and who has demonstrated by performance familiarity with the work to be performed and the hazards involved.

Energized Equipment and Electrical Shock

- Document process to de-energize or isolate energy sources.
- Ensure staff are appropriately trained to conduct work requiring lockout/tagout.
- Affix lock and/or tag to equipment to ensure improper start-up or release of energy.
- Execute an Energy Isolation Permit.
- Electrical equipment and power tools must be operated and maintained in accordance with manufacturers' requirements.
- Electrical equipment, tools, switches, and outlets must be protected from environmental elements.
- Check manufacturers' requirements.

Equipment and Moving Vehicle Safety

The following procedures can be used to minimize the risk of traffic-related hazards and working near heavy equipment:

- Always wear seat belts when operating vehicles or heavy equipment, unless the equipment is designed for stand-up operation or lacks a rollover protective structure.
- Check vehicles and equipment before each shift to ensure all parts and accessories are in safe working condition.
- Obey all traffic laws and any additional on-site vehicle rules.
- Do not use cell phones or other distractions while driving.
- Allow adequate travel time to avoid speeding.
- Only drive on roadways or grades that are safely constructed and maintained.
- Do not exceed a vehicle's rated load or lift capacity.
- Do not carry passengers unless the vehicle is equipped with a designated and safe seating area.
- Operators must meet all requirements (e.g., licenses, certifications, training) for the specific equipment they are using.
- Do not drive in reverse with an obstructed rear view unless the vehicle has an audible reverse alarm, or a spotter signals it is safe.
- Use a dedicated spotter when operating or maneuvering heavy equipment.

- Set parking brakes when vehicles are parked, and chock wheels if on an incline.
- Lower or block buckets and place all controls in neutral when equipment is not in use.
- Ensure all vehicles have adequate braking systems and safety devices.
- Use traffic signs, barricades, or flaggers when working near public roadways.
- Clearly define work zones using reflective tape, traffic cones, or similar markers.
- Use orange flashing lights to alert drivers to hazards or changes in traffic patterns.
- Workers must wear high-visibility clothing.

Excavation and Trenching Safety

- Contact the proper utilities to obtain clearance. Prior to work, review the utilities in the area and be sure they have been staked properly. Before work begins, staff obtain multiple lines of evidence, using guidance found in OP1020 Working Near Utilities.
- Be aware that trenches and excavations deeper than 4 feet are considered confined spaces and require additional safety precautions, such as shoring. If an excavation exceeds 4 feet in depth, contact the Client or Site Safety Officer (SSO) to review the original Safe Work Permit and ensure that it is adequate. A 4-gas meter monitoring will be required in addition to the existing air monitoring plan.
- The walls and faces of all excavations and trenches more than 5 feet deep, in which a staff member is exposed to danger from moving ground, will be guarded by a shoring system, sloping of the ground, or some other equivalent means. The design of shoring systems in excavation greater than 20 feet must be done by a registered Professional Engineer as per 29 Code of Federal Regulations 1926 Part P.
- Excavated or other material will be effectively stored and retained at least 2 feet or more from the edge of any excavation or trench.
- Make daily inspections of excavations. If evidence of possible cave-ins or slides is apparent, all work in the excavation will cease until the necessary precautions have been taken to safeguard staff members.
- Trenches more than 4 feet deep will have ladders or steps available so no more than 25 feet of lateral travel is required.
- Determine soil composition (through soil sampling and/or soil maps) and other relevant site conditions, with special emphasis on conditions conducive to cave-ins.
- Monitor the atmosphere in and around excavation on a regular basis to check for explosive, toxic, or otherwise dangerous gases and vapors. Be sure sources of nuisance and harmful gas are not near the trenches; for example, do not park vehicles or equipment next to the excavation where the fumes can enter it.
- Water will not be allowed to accumulate in any excavation. Utilize ditches, dikes, pumps, or other means to keep surface water out of trenches.
- All open excavations must be well marked and barricaded.

- Staff members involved in the excavation activity have appropriate training in safe excavation practices, with emphasis on factors such as:
  - Utility line identification.
  - Cave-in prevention measures.
  - Recognition of conditions which may cause cave-ins.
  - Means of egress from trench.
- Excavations greater than 5 feet in depth are not to be entered unless properly sloped, shored, or benched.
- No project staff member is to enter the excavation unless they have determined that there is no potential for injury such as cave-ins and/or atmospheric hazards.
- It is the CM and project staff’s responsibility to safeguard all affected workers from falling into any excavation by the use of barriers and warning signs.
- No excavation is to be left open or unattended when there is a possibility for anyone to fall into the excavation. Barricades will be placed around excavation where there is a fall hazard by workers and/or equipment; and if needed will be lighted at night. This is the responsibility of the subcontractor.
- Keep all equipment at a minimum of 10 feet away from energized electrical lines

Extended Shift

- Extended work hours may disrupt the body's regular schedule, leading to increased fatigue, stress, and lack of concentration.
- The degree to which an individual is exposed to fatigue risk factors depends upon the work schedule. As both the duration of the workday and the number of days worked increase, so do the fatigue risk factors.
- Staff Managers need to be aware of the fatigue risk factors and ensure projects are structured to mitigate these factors.
- Staff Members also have a responsibility to manage the personal fatigue risk factors that they can control outside of work (e.g., duration and quality of sleep, diet, drugs, and alcohol).
- Fatigue symptoms, both mental and physical, vary and depend on the person and degree of overexertion. Examples include:
  - Weariness
  - Sleepiness
  - Irritability
  - Reduced alertness
  - Lack of memory
  - Concentration and motivation
  - Increased susceptibility to illness
  - Depression
  - Headaches

  - Loss of appetite
  - Digestive problems
- When possible, managers should limit use of extended shifts and increase the number of days worked.
- Additional breaks and meals should be provided when working extended shift periods.
- Tasks requiring heavy physical labor or intense concentration should be performed at the beginning of the shift, if possible.
- Make efforts, when feasible, to ensure that unavoidable extended work shifts and shift changes allow affected staff members time for adequate rest and recovery.
- PMs need to plan to have an adequate number of personnel available to enable workers to take breaks, eat meals, relax, and sleep.
- Plan for regular and frequent breaks throughout the work shift.
- If at remote sites, ensure if possible, that there is a quiet, secluded area designated for rest and recuperation.
- Encourage use of micro breaks to change positions, move about, and shift concentration.
- Personnel should look to obtain an adequate quantity and quality of sleep.

Fuel Operations

Below are best practices to prevent spills or releases during fueling activities:

- Conduct fueling operations from a leak-proof nozzle or safety fuel can with a fitted gooseneck nozzle or funnel.
- Use screens to prevent debris and particles (from debris or ice in cold weather) from entering fuel tanks.
- Secondary containment shall be placed under the equipment during fueling to prevent any loss of containment to the ground surface.
- Store sorbent pads near fueling areas during all fueling operations to prevent fuel leaks or spills from travelling.
- Use flashlights in low light areas or in other than daylight hours to prevent over filling fuel tanks.
- Fuels will be stored in approved containers that are placed in a secondary containment capable of storing 100 percent of the spilled material.
- Equipment must be shut down before fueling, and drips will be wiped clean, and the fuel cap must be securely fastened before restarting the equipment.
- Store the fuel away from combustible materials and oxidizers.
- Fuel storage areas will be located away from common walkways and work areas.

Geoprobe® or Other Direct Push Rig Use

Use of a Geoprobe® or other direct push rig will require all personnel in the vicinity of the operating rig to wear steel-toed boots, hard hats, hearing protection and safety eyewear. Personnel should not remain in the vicinity of operating equipment unless it is required for their work responsibilities.

The following general guidelines apply to the operation and transport of any direct push rig.

Hazards

- Pinch points - Geoprobe® rod ends, auger joints, stacked rods, or augers
- Rotating augers - loose clothing
- Low head clearance when working directly over hole beneath mast
- Overhead and underground utilities
- Back strain - auger or Geoprobe® rod handling
- Use of cutting tools to open acetate core sleeves
- Accidentally engaging operating controls
- Noise

General Operating Procedures

- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists must be aware of this device. This device must be tested before the job starts and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency stop when necessary.
- Only equipment that has been approved by the manufacturer may be used in conjunction with drilling equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be permitted.
- Elevated parts of the drill rig shall remain at least 20 feet from overhead power lines or follow the procedures outlined in "Overhead Utilities" below.
- One person will be assigned the responsibility of lead operator. The lead operator will be responsible for operating the rig and performing the daily checklist. One additional personnel will assist with handling Geoprobe® rods. When augering, an additional person is recommended for assisting with auger flights. In either case, a separate person will be required for collection of soil samples or logging cores.
- A safe zone will be established using banner guard or physical barriers to prevent unnecessary personnel from entering the work area.
- Operations and crew will be familiar with the operator's manual and will review the practical training on rig use.
- The driller must never leave the controls of the rig while it is running.
- Keep hands away from moving parts.
- Drillers, helpers, and geologists must secure all loose clothing when in the vicinity of drilling operations.
- Wear heavy gloves when handling Geoprobe® rods or augers.
- Hearing protection must be worn.
- Lifting tasks should be accomplished by using the legs to lift instead of the back (bending at the knees instead of at the waist). A second person should help lift the item if it is too large or heavy for one person.

- For protection of staff members from cut injuries during sampling activities or other activities where knives may be used, first evaluate whether hand knives are the correct tool for the task. Where possible, use a safer cutting tool such as scissors or snips. Cut resistant gloves such as Kevlar must be worn. If using a knife/ box cutter, it should have a self-retracting blade. When using a knife, cut away from oneself and end the knife stroke away from the body. Hold the item firmly and do not cut downwards and towards the body. Personal knives (e.g., pocket knives) are not to be considered as a tool for any type of work-related cutting.
- The rig and inspection logs will be maintained.
- During auger flight connection, pinch potential will be controlled by keeping hands away from the joint (heavy gloves must be worn). Constant communication between lead operator and helper must be maintained.

Oversight Personnel Should Follow these Safety Procedures:

- Do not stand near cables under tension such as those lifting drill pipe
- Do not stand directly underneath a load suspended by a cable
- Stand clear as drill pipe is lowered into pipe rack by cable
- Keep away from drill rig unless required by task
- Do not approach equipment without first establishing eye contact with the operator
- Ensure that all machinery have operating back-up alarms
- Keep hands away from moving parts

Daily Maintenance Checklist (for subcontractors):

- Check all fluids.
- Test kill switch.
- Ensure that back-up alarm is operating.
- Confirm mandatory underground utility clearances, double check for indications of utilities not reported by appropriate state clearing centers.
- Before raising mast, look up for overhead obstructions.
- Review location of kill switch and fire extinguisher with entire crew.
- Maintain safe distance from all electrical power lines.
- Decontaminate entire rig prior to leaving site.
- Check that fire extinguisher is charged.

Maintenance of Rig (for subcontractors):

- Regular inspection and maintenance will be performed by qualified personnel. A full check-out will be performed on a monthly basis and immediately following extensive use.
- The daily inspection will be completed by the rig operator.

Hand Tools

- Use tools that are in good condition.
- Ensure handles are not split, mushroomed, or otherwise damaged.
- Defective tools shall be removed from service.
- Use the proper tool for the job.
- Wear eye protection and hand protection depending on the potential hazard
- Maintain secure footing when using any hand tool
- Do not use fixed blade open knives, unless approval is obtained by Health & Safety. Examples include pocketknives, multi-tools, hunting knives, machetes, standard utility knives, and box cutters.
  - There are safer alternatives, such as self-retracting utility knives and guarded utility knives, that can effectively accomplish tasks while providing additional protection to staff members.
- For any tasks that involve cutting, staff must:
  - Wear cut score A2 cut resistant gloves.
  - Cut away from oneself and end the knife stroke away from the body. Hold the item firmly and do not cut downwards and towards the body. Cut into the air or onto something hard.

Heavy Equipment and Traffic – Working Around

- Before approaching a piece of heavy equipment or heavy equipment work zone, establish eye contact with the equipment operator. The equipment operator must put the equipment in a neutral energy state (e.g., coring equipment stopped from pushing or rotating) and then remove their hands from the controls.
- Once this is done, it is acceptable to approach the piece of equipment or heavy equipment work zone.
- The equipment operator must keep their hands off the equipment controls for the duration of time someone is in the work zone.
- Maintain visual contact with operators at all times and keep out of the strike zone whenever possible.
- Always approach heavy equipment with an awareness of the swing radius and traffic routes of each piece of equipment and never go beneath a hoisted load.
- Never position yourself between fixed objects and running equipment and/or between two running pieces of equipment.
- When possible, use a spotter or backer while equipment is being moved.
- Workers must be highly visible in all levels of light. Warning clothing, such as red or orange vests, are required while working near vehicles or any heavy mobile equipment. If worn for night work, clothing must be of reflective material.
- Be aware of traffic patterns and make sure to stay well away from these areas as a pedestrian.
- Be aware that debris may be kicked up or fly out of passing vehicles.
- Be especially careful and alert when working near heavy equipment since equipment failure or breakage can lead to accidents and worker injury.
- Avoid breathing fumes created by heavy equipment exhaust.

Heavy Equipment and Traffic – Operating

- Create a traffic control plan.
- Check vehicles before each shift to assure that all parts and accessories are in safe operating condition.
- Obey all traffic rules as well as an additional vehicle rules on-site.
- Do not speed. Make sure to leave adequate time to arrive at your destination on time.
- Do not drive a vehicle in reverse gear with an obstructed rear view, unless it has an audible reverse alarm, or another worker signals that it is safe.
- Drive vehicles or equipment only on roadways or grades that are safely constructed and maintained.
- Make sure that you and all other personnel are in the clear before using dumping or lifting devices.
- Lower or block buckets and leave all controls in neutral position when not in use (e.g., end-loader buckets, dump bodies).
- Set parking brakes when vehicles and equipment are parked and chock the wheels if they are on an incline.
- All vehicles must have adequate braking systems and other safety devices.
- Do not exceed a vehicle’s rated load or lift capacity.
- Do not carry personnel unless there is a designed and safe place to ride.
- Use a dedicated spotter while heavy equipment is in operation.
- Use traffic signs, barricades, or flaggers when construction takes place near public roadways.
- Ensure work zones are defined (e.g., reflective tape, traffic cones).
- Use orange flashing lights to make drivers better aware of potential hazards and traffic pattern changes.
- If operating heavy equipment, personnel must meet all the requirements to operate that specific heavy equipment (e.g., licenses, certifications, training).

Hot Surfaces

- Cover hot surfaces with materials that can withstand high temperatures and prevent direct contact.
- Implement measures like ventilation, reflective shields, and air conditioning to reduce heat exposure.
- Provide appropriate gloves, heat-resistant clothing, and other gear to protect workers from burns.
- Identify potential hazards associated with hot surfaces and assess the risk of burns.
- Educate workers on the risks of hot surfaces, how to identify hazards, and how to use PPE effectively.
- Conduct routine inspections to ensure controls are effective and PPE is in good condition.
- Use clear warning signs, labels, and physical barriers to alert workers to hot surfaces.

Hot Work

Hot work activities include burning, welding, grinding, braising, soldering, and using fire or spark-producing tools. The main hazards associated with hot work are getting burned directly by the hot work activity or by fires or explosions that result from an accumulation of combustible materials.

Performing hot work in classified and non-classified areas may be considered a hazardous activity, and a Permit to Work may be required. In general, the Hot Work Permit has five purposes:

- To serve as written permission to do the work.
- To provide a minimum checklist prior to the commencement of hot work.
- To outline the steps necessary for making the work site safe for conducting hot work.
- To alert operating personnel to the hot work in progress.
- To provide a record of safe work practices performed during the permitted activity.

All work shall be conducted in accordance with OP1034 - Hot Work.

Combustible and flammable materials must be kept at least 35 feet from ignition sources. A trained person must act as a fire watch during hot work and 30 minutes after hot work is completed. A properly inspected and tagged fire extinguisher must be readily available to the fire watch.

Housekeeping

Haley & Aldrich strives to provide a clean, hazard-free and safe environment for staff members. Each staff member is expected to take an active role in maintaining a safe environment. Workplaces must be kept neat, clean and organized. Staff members are expected to observe good housekeeping practices at offices and project sites. Such practices must:

- Keep work areas clean and free of debris that might cause safety hazards.
- Maintain order on project sites to avoid tripping hazards. Equipment, tools, extension cords, coolers and supplies must be kept away from areas with foot traffic. These items must be put away and stored in a safe manner at the end of the workday.
- Prevent slip and fall hazards by keeping project sites clean and free from oil, grease, mud, and other slippery materials. Clear away snow and ice.
- Unsafe conditions at offices (e.g., ice on the sidewalk) shall be reported to the office manager to resolve with the property owner.
- Ensure that aisles, walkways, entrances, exits, and access to first aid and spill materials are kept free of obstructions.
- Collect and properly dispose of waste.
- All spills should be reported or cleaned up promptly.
- Avoid placing materials where they may become contaminated.
- Do not place tools or materials on elevated surfaces where they may fall and strike another worker.

- Remove sharp objects and debris including scrap metal, broken glass, nails, etc. from the work area.
- Ensure subcontractors keep the work area and the rest of the site in a neat and orderly fashion.

Periodic inspections of office areas and project sites are conducted by the Corporate Health & Safety Team. To protect against slips, trips, and falls, Haley & Aldrich requires its staff members to wear appropriate footwear (skid resistant soles) and watch for hazards such as uneven terrain, holes, ditches, wires, ropes, hoses, or any other materials or equipment in the path of travel. Tripping caused by wearing disposable footwear can be reduced by selecting properly sized disposable boots. Workers will also change work speed in muddy, snowy, or icy conditions.

Hunting Season

The PM will be responsible for identifying and informing the field crew of the potential for hunting activities in the general area of field activities.

- The field crew will be required to wear appropriate safety clothing such as, but not limited to, orange vests and/or hats when conducting field work during the hunting season in areas where it is likely to occur.

Inadequate Lighting

Some work may need to occur in areas that are not well lit. To reduce hazards of working in low light:

- temporary lighting can be used to brighten the site, such as flashlights or headlamps, if possible.
- Clear safety glasses should be worn under these conditions.
- If conditions are dark and visibility is poor, staff members should pause work and work with project teams to implement mitigations or postpone work until lighting is better.

Ladders

- Always maintain three points of contact when using a ladder.
- Only use ladders on a smooth and level surface.
- Do not exceed the maximum load rating of the ladder.
- Ladders shall always be maintained and kept in good condition.
- Lubricate metal bearings frequently (e.g., locks, wheels, pulleys).
- Safety feet and other auxiliary equipment shall be kept in good condition to ensure proper performance.
- Ladders shall be inspected prior to use, and those which have developed defects shall be withdrawn from service for repair or destruction and tagged or marked as "Dangerous, Do Not Use."
- Ladder rungs should be kept free of grease and oil.
- Fixed ladders that equal or exceed 24 feet must be equipped with ladder safety devices. If using multiple ladder sections, each ladder section is not to exceed 50 feet in length and must use a cage or well. Alternatively, self-retracting lifelines and rest platforms at intervals of 150 feet or less can be used.

- Side rails of through or side-step fixed ladders must extend 42 inches above the top level or landing platform served by the ladder.
- All on-site personnel shall review and be familiar with the requirements of OP1027 - Ladder Safety.

Lasers

- Restrict access and designate laser-controlled areas to restrict access to only authorized personnel who have completed laser safety training.
- Post appropriate warning signs at the entrance(s) of laser-controlled areas to warn about potential hazards.
- Ensure the area is set up and restricted to prevent laser beam transmission outside the controlled area.
- Never enter a laser-controlled area unless authorized and equipped with proper PPE.

Line of Fire - Lifting Equipment and Overhead Hazards

- Install barriers, shields, or screens around unsafe areas.
- Identify and maintain safe walking areas.
- Address overhead work concerns and avoid unsafe zones.
- Keep a safe distance between you and any suspended loads, heavy equipment, or other line of fire hazards.
- Never stand under a suspended load.
- Avoid areas where there is potential for dropped objects.
- Remain aware of stored energy, and where equipment or objects may fall when energy is released.

Line of fire - Lines Under Pressure

Injection hoses operating under pressure may release stored energy if connections fail or hoses otherwise become dislodged. Oversight personnel may be sprayed with injection chemicals and/or be injured by violent hose movements. Staff members shall maintain a safe distance from connection points during injection activities and wear safety glasses. Should the need arise to stand closer to connection points, a face shield should be worn over safety glasses. Contractors should be using whip checks to secure hoses that may become loose or dislodged.

Manual Lifting

Wherever possible, material handling will be done mechanically. Where manual handling is absolutely necessary, personnel will be instructed in safe handling techniques and will be instructed to use the appropriate protective gear to prevent abrasions, cuts, and struck-by accidents. Personnel will also be encouraged to request assistance from other site personnel when lifting large, heavy, or awkward objects (greater than 50 pounds).

The following steps describe the proper method for lifting:

- Get a good footing.
- Place your feet about shoulder-width apart.
- Bend your knees to pick up the load. Never bend from the waist.
- Keep your back straight.

- Get a firm hold. Grasp opposite corners of the load, if possible.
- Keep your back as upright as possible.
- Lift gradually by straightening your legs. Do not jerk the load.
- Keep the weight as close to your body as possible.
- When changing directions, turn your entire body, including your feet.
- Do not twist your body or make awkward moves forcing you to be off balance.

Mechanical Equipment

- Use physical guarding and barriers whenever possible to reduce potential for injury around mechanical equipment.
- Personnel should exercise caution when working with mechanical equipment to prevent entanglement with clothing, placing body parts near pinch points on equipment or using equipment on slopes or unstable surfaces.
- Site personnel and visitors who are not performing necessary work shall remain a distance of at least 15 feet away from moving parts on such equipment.

Material and Equipment Handling

The movement and handling of equipment and materials on site pose a risk to workers in the form of muscle strains and minor injuries. These injuries can be avoided by using safe handling practices; proper lifting techniques and use of safety equipment including steel-toed boots, hard hats and work gloves; and testing the weight of an object before attempting to lift or carry it. Where necessary, mechanical devices will be used to assist in moving equipment and materials.

Proper Lifting Procedure:

- Get a good footing.
- Place feet shoulder width apart.
- Bend knees to pick up load. Do not bend from waist.
- Keep back straight.
- Get a firm hold on load. Grasp opposite corners of the load if possible.
- Keep the back as upright as possible.
- Lift gradually by straightening the load-do not jerk the load.
- Keep the weight as close to the body as possible.
- When changing direction, turn the entire body, including the feet.
- Do not twist the body.

General Requirements for Powered Industrial Trucks are:

- They must be inspected daily before being placed into service, to detect safety problems.
- High-lift rider trucks must be fitted with an overhead guard to protect the operator from falling objects.

- If the load being carried obstructs forward view, the load must travel with the load trailing.
- When a unit is left unattended, the load must be fully lowered, the control Level positioned in neutral, the power shut off, and the brakes set.
- Trucks, trailers or railroad cars being unloaded or loaded with lift trucks must be secured by setting their brakes and placing wheel chocks under the rear wheels.
- Any driver-operated equipment (truck, tractor) used on a site with uneven terrain must have some form of rollover protection.

Naturally Occurring Radioactive Materials (NORM)

- Practice As Low As Reasonably Achievable (ALARA) principles by minimizing the time spent near, increasing your distance from, and using appropriate shielding materials, such as lead or concrete, to block radiation.
- Be aware that NORM can be present in various materials, like rocks, soil, and building materials, as well as in specific industrial equipment.
- Do not eat, drink, or smoke in areas where NORM may be present.
- Contamination Control:
  - Avoid activities that generate dust, such as cutting or grinding, which can contain NORM/ Technologically Enhanced Naturally Occurring Radioactive Material (TENORM).
  - Protect any wounds or cuts to prevent potential contamination.
  - Practice good hygiene, including hand washing after working with or around NORM/TENORM.
- Monitoring and Decontamination:
  - Use appropriate radiation monitoring equipment, like alarming dosimeters, to track exposure.
  - Ensure workers are checked for contamination before leaving a NORM/TENORM work area.
  - Decontaminate equipment and work areas appropriately.
- PPE: Utilize PPE like respirators, coveralls, boots, and gloves, as needed.

Needles

- If you find a discarded needle, stop and do not approach or attempt to pick up the needle.
- Notify the client, controlling employer, or other designated safety personnel immediately.
- Clearly describe the location of the needle to ensure it can be safely addressed.
- Treat all needles, blood, and other potentially infectious materials as if they are infectious.
- When discarded, needles must be placed in SHARPS containers and not in traditional trash.

Night Work

- Minimize or redesign routine administrative tasks to ensure staff members can focus on core duties during their night work.
- Limit consecutive night shifts worked.
- A project requiring staff to work beyond four nights requires a fatigue management plan.

- Ensure that rosters allow for at least two full night's sleep after the last night shift before returning to day shift.
- Regular and frequent breaks are needed.
- Comprehensive training on fatigue risk factors for the staff members assigned to the project.
- Identify optimal sleeping conditions during the day (e.g., dark/quiet rooms, minimize distractions, light meal prior to sleep).

Noise Exposure (e.g., loud equipment, impact noise, noise from tools)

- Wear appropriate hearing protection such as earplugs or earmuffs in high-noise areas.
- Check the Noise Reduction Rating (NRR) of your hearing protection to ensure it provides adequate protection for the noise levels you're exposed to.
- Maintain distance from loud equipment whenever possible to reduce noise exposure.
- Take regular breaks in quiet areas to give your ears time to recover from prolonged noise exposure.
- Use tools like the NIOSH Sound Level Meter app to monitor and understand noise levels on-site and assess the need for hearing protection.
- Be aware of the potential for sudden loud noises. While it’s best to wear hearing protection at all times in noisy environments, always follow posted signage indicating when hearing protection is required.

Operations On, Over, or Near Water

Staff are not permitted to perform work on, over, or near water without first informing their RSM and developing additional safety plans. Coast Guard approved flotation devices will be worn to protect staff members from the risk of drowning.

General hazards of walking around water bodies:

- Enhanced potential for slips, trips, and falls.
- Engulfment/entrapment.
- Rising water conditions.
- Enhanced physical exertion from wearing waders, hauling equipment to areas inaccessible to vehicles; this will increase the likelihood of fatigue leading to muscle strains, heat stress, or cold stress.
- Increased chance of encounters with biological hazards.

Protective measures for working around water:

- Ensure team has proper PPE, such as Coast Guard approved floatation devices, lifeline, life buoy, or audible alarms.
- Use the buddy system.
- Conduct daily inspections of work areas, equipment, and safety devices.
- Install guardrails or other barriers to reduce potential for falling into water.
- Ensure team is aware of emergency procedures and prepared to respond in the event of an emergency.

- Be vigilant about weather changes.
- Dress appropriately for weather and other conditions of the site.
- Remain hydrated and maintain electrolyte balance.
- Make sure all walking areas and work surfaces are clean, dry, clear of debris, etc.
- Keep all gear secure when not in use.
- Keep stairs, ladders, doorways, ramps, walkways, and gangways clear.
- Safely secure ramps or gangways when loading and offloading.
- Check for items such as loose boards or nails that stick out on docks and repair as necessary.
- Wear footwear with slip-resistant soles.
- Use a non-skid deck compound where possible.
- Do not allow any part of your body to be between the dock and the boat.

Overhead Utilities

Before beginning equipment operations, the contractor will identify the work zone and determine if any part of the equipment, load line, or load could get closer than 20 vertical or horizontal feet to a power line. If so, the contractor will:

- Determine the line's voltage and maintain clearance distances both vertical and horizontal in accordance with the table below, or
- Arrange with the utility to de-energize and ground the power line, or
- Modify the work to maintain a 20 foot clearance distance by implementing the measures specified in 29 CFR 1926.1408(b) including conducting a planning meeting, erecting, and maintaining an elevated warning line, barricade, or line of signs in view of the operator equipped with high visibility markings at the minimum clearance distance, using a proximity alarm, dedicated spotter, or range limiting device.

Table B. Equipment Travel Clearance Distances for Uninsulated Power Lines

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1000	As established by the utility owner operator or registered PE who is a qualified person with respect to electrical power transmission and distribution

Pinch Points

A pinch point is a place where a body part can get caught between moving parts of a machine, between moving and stationary machine parts and between moving parts and other materials. Other situations where pinch point injuries can occur include:

- Catching fingers, hands, toes, or feet under or between heavy crates or equipment or drums while moving them
- Slamming fingers or hands in a door
- Nipping fingers or hands with hand tools
- Nipping fingers or hands with equipment that has sliding parts or hinges
- Nipping fingers or hands while closing a container
- Getting clothing, hair, or jewelry tangled in a pinch point

Pinch point injuries can be prevented by:

- Using machine guards
- Never reaching around, under, or through a guard
- Reporting guards that are missing, damaged, or not working properly
- Lockout/tagout of equipment before repairing or servicing
- Looking for pinch points before starting any task
- Lifting the edge of a heavy item slightly before picking it up to assess its weight and if you are able to lift the weight unassisted-an awkward or heavy load can slip and pinch or crush hands or feet. Get help or use material handling aids to move heavy or awkward items.
- When placing a heavy item on a shelf, pallet, floor etc. or closing a heavy door, make sure there is enough room so the item will not land on your feet
- Sliding the item into place while moving feet and hands out of the way
- Concentrating on the task at all times

Power Tools

Potential Hazards:

- Electrical
- Eye injuries
- Hand injuries
- Musculoskeletal Injuries
- Dust inhalation

Safe Work Practices and Control Measures:

- Personnel will be trained in the use operation and proper handling of portable power tools before they use them.
- Ensure the right tool is used to perform the job.
- Before use, the tool must be inspected for loose power cord connections and frays, and damage to the casing, cord, and plug. The grounding prong must be in good condition, if present.
- Electric tools must be grounded (i.e., have three pronged plugs) and be plugged into a properly grounded outlet or be double insulated. Always hold the tool by the insulated gripping surface instead of the cord.
- Extension cords with three-pronged grounding plugs must be plugged into a three-pronged outlet when using grounded tools.
- When using power tools, grounded surfaces such as pipes or radiators shall not be touched, as there is a greater risk of electric shock if your body is grounded.
- When working with electric tools in damp or wet locations, ground fault circuit interrupter (GFCI) protection must be used.
- Do not abuse the cord, carry the tool by its cord, or pull the cord to unplug it. Keep cord from heat, oil, sharp edges, or moving parts. Replace damaged cords immediately.
- Unplug the tool immediately after use, before removing or changing bits, and before performing any service or maintenance on the tool.
- During inspection, ensure that the trigger turns the tool when “on” and stops the tool in the “off” position. Make sure the chuck is tightly secured to the spindle.
- Loose clothes, gloves, jewelry, or hair can be caught in moving parts, so they must not be worn or be controlled (tie back hair).
- Always wear safety glasses or goggles and, if needed, a face shield.
- Wear hearing protection and a particulate respirator, if dust is generated.
- Hold or brace the tool securely. Brace against stationary things for maximum control.
- Avoid bending the wrists and other awkward body postures, such as twisting the torso.
- Take frequent breaks from tool use to avoid musculoskeletal injuries from repetitive motion.
- Use proper lifting techniques for handling tools. Do not lift more than 55 pounds alone, and use proper body mechanics - lift with your legs, not your back. Do not twist the body when picking up a load.

Projectiles

- Be aware that many tasks, such as cutting, grinding, or prying, can create flying debris or projectiles.
- Implement controls to prevent tools and materials from falling, such as securing tools, using toe boards, guardrails, debris nets, or canopies.
- Secure materials that could become airborne or projectiles.
- Use tool tethers to prevent tools from falling from heights and becoming projectiles.

- Barricade areas where work creating projectiles is taking place and prevent unauthorized personnel.
- Wear proper PPE, including hard hats, eye protection, and safety-toed boots.

Public Right Of Way

- Haley & Aldrich staff and their subcontractors conducting work on public roads and/or rights of way can be exposed to vehicular traffic and expose the public to the hazards of the job site.
- Where a hazard exists to site workers because of traffic or haulage conditions at work sites that encroach public streets or highways, a system of traffic controls in conformance with the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), or state program, is required.
- A Temporary Traffic Control Plan (TCP) describes traffic controls to be used for facilitating vehicle and pedestrian traffic through a temporary traffic control zone. TCPs are required to provide for worker protection and safe passage of traffic through and around job sites with as little inconvenience and delay as possible.
- The plan may range in scope from being very detailed, to merely referencing typical drawings contained in the MUTCD.
- The degree of detail in the TCP depends entirely on the complexity of the situation, and TCP's should be prepared by persons knowledgeable about the fundamental principles of temporary traffic control and the work activities to be performed.
- Haley & Aldrich PMs or their subcontractors need to establish appropriate control measures and obtain any permits when project work is on or encroaches public roadways.
- You may need flaggers or police details.
- Cease work and notify the field supervisor immediately if any conditions are such that safety is jeopardized.
- Utilize protective vehicles whenever appropriate, or position equipment so it is in between the work and oncoming traffic.

Railroad Right Of Way

- Typically, the presence of anyone, equipment, and/or material is "in the railroad area" (closer than 15 feet of the nearest railroad rail, centenary, electrical wire, signal wire, or other signal facility) must have permission of the railroad company prior to initiating work. All work must avoid causing damage to trains, tracks, or other facilities of the railroad company, and not to interfere with movement of trains or railroad track ballast.
- Railroad companies may require a flagger when construction operations encroach "the railroad area."
  - The flagger is assigned to a construction project to ensure safe passage of trains or on-track equipment by communicating with trains regarding the movement of construction equipment on/near active tracks.
  - Notify the flagger whenever necessary to be "in the railroad area” and proceed only after the flagger has indicated it is safe to do so.
  - The tracks must be cleared promptly anytime the flagger indicates to do so.
- Trains may need 1.5 miles to come to a complete stop.

- New trains are quiet and can cover a mile in less than 30 seconds producing enormous amounts of wind turbulence.
- The slipstream is powerful enough to drag you under the wheels of the train if standing next to the track.
- Communication protocols need to be established prior to being "in the railroad area."
- Tracks are clearly defined and known by all parties involved.
- If a flagger is required, they must inform all workers how they will be warned of approaching trains.
- Complete safety and security awareness training through e-railsafe or designated vendor.

Remote Work Area

- Establish frequent check-ins and meetings to maintain clear communication among team members.
  - Project team members must regularly touch base with staff members performing remote work to ensure they are safe.
  - When working in remote areas, cell phone reception may be limited.
  - Ensure you have designed communication systems that are adequate for the working environment.
- Encourage the use of instant messaging and email for quick updates.
- Establish adequate emergency response processes, including who to call, how to call, and directions to your location.

Repetitive Motion

- Trade-off job duties to minimize repetitive stress of joints or muscles.
- Encourage job rotation for repetitive or monotonous work in the field.
- Take breaks at the intervals defined during the task risk assessment to prevent fatigue and repetitive motion injuries.
- Use proper lifting and hand positioning to avoid sprains and repetitive motion injury.
- Prior to work, stretch legs, arms, and back.

Rotating Equipment

- Personnel should exercise caution when working near rotating equipment to prevent entanglement with clothing, placing body parts near pinch points on equipment, or using equipment on slopes or unstable surfaces.
- Site personnel and visitors who are not performing necessary work shall remain a distance of at least 15 feet away from moving parts on such equipment.

Rough Terrain

- Wear proper footwear with tread patterns designed for rough terrain.
- Before stepping, lightly tap the ground with your foot to assess its stability.
- Reduce your walking speed to allow for better balance and reaction time.
- Keep your feet slightly apart to increase your base of support.

- Actively scan the path ahead for obstacles, loose rocks, or uneven surfaces.
- Carry lightly: Avoid carrying heavy loads that could affect your balance.
- Take extra caution in wet, icy, or snowy conditions.

Sharp Objects

- Staff members are required to wear ANSI cut score A2 gloves whenever there is potential for cutting hazards on site.

Silica Dust

- Use of wet methods must be utilized to minimize dust production.
- Ensure that enough water is supplied.
- A water-integrated delivery system that supplies water to cutting surface will be a requirement for stationary mason saws, hand-held power saws, walk behind saws, drivable saws, rig mounted core saw/drills, jackhammers, and hand-held grinders.
- All water must be collected for sampling and disposal off-site.
- All drain inlets will need to be identified and secured with plastic sheeting and absorbent snakes or sandbags, and will need to be identified by the use of a cone or delineator.
- Personnel must ensure drain valves are safely secured, and washed soils will be shoveled from the unit and will be transported into appropriate labeled drums.
- Evaluation must be completed to determine whether a dusk mask/respirator is required to prevent inhalation of particles (based on equipment used – see below).
- The slurry from utilizing the wet methods must be removed before it dries to prevent the dried material from generating dust that can spread to other areas of the site.

Simultaneous Operations (SIMOPS)

- SIMOPS are described as the potential class of activities which could bring about an undesired event or set of circumstances (e.g., safety, environment, damage to assets, schedule, commercial, financial, etc.).
- SIMOPS are defined as performing two or more operations concurrently.
- SIMOPS should be identified at an early stage before operations commence to understand issues such as schedule and physical clashes, maintenance activities, failure impacts, interferences between vessels, contracts and third part interfaces and environmental impacts.
- Coordinate project with site activities.
- Identify and understand the hazards associated with the host and client's activities.
- Integrate site emergency response protocols, where appropriate, and communicate to all project staff.
- Integrate site communication protocols and communicate to all project staff.

Site Control

- Work Zones
  - To prevent both exposure of unprotected personnel and migration of contaminated materials due to tracking by personnel or equipment, work areas along with PPE requirements will be clearly identified.
  - Haley & Aldrich designates work areas or zones in accordance with the "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" (NIOSH/OSHA/USCG/EPA).
  - They recommend the areas surrounding each of the work areas to be divided into three zones:
    - Exclusion zone
    - Contamination Reduction Zone (CRZ)
    - Support Zone
- Exclusion Zone
  - The areas of site activities discussed in the mobilization section of this HASP which contain or are suspected to contain hazardous material will be considered the exclusion zone.
  - The exclusion zone for soil excavation will be a radius of 20 feet around each area to be excavated whenever possible and where applicable.
  - The exclusion zone for drilling activities will be at least a radius equal to the height of the drill rig mast.
  - This radius may be increased if air monitoring reveals that Level C respiratory protection is required during these activities.
  - Personnel in the exclusion zone must have the required OSHA training, medical authorization, and have the appropriate PPE.
  - The locations of the exclusion zones will be determined in the field by the SSO and will be marked using caution tape, snow fence, and/or signs, where appropriate.
- Contamination Reduction Zone (CRZ)
  - The CRZ will be established upwind of the exclusion zone and will provide for personnel and equipment decontamination where necessary. The decontamination area will be determined in the field by the SSO.
- Support Zone
  - The support zone is located in an area that is not contaminated.
  - This area is established to provide areas for breaks, administration of first aid, personnel monitoring, administrative functions, and equipment storage.

Slips, Trips, and Falls

- Keep site and walking pathways clear of obstacles and debris.
- Keep work surfaces dry where possible.
- Wear appropriate footwear for the conditions. Add traction devices (ice cleats, 'Yaktrax', etc.) to footwear as needed.

- Take your time, stay alert, and be aware of the conditions.
- In mixed vegetation, rubble or debris, or walking over snow/ice use a walking stick/staff to 'investigate the ground' of your path.

Steep Slopes

- All machines have limits for the slopes on which they can safely operate.
- Machines must not be operated on slopes outside of the manufacturer's recommendations.
- If excavations are on a steep slope, evaluate operations to ensure compliance with excavation/ trenching regulations.
- Work should be evaluated for fall protection, and any heavy equipment should be evaluated to see if appropriate for the work.
- When planning how the work should be done on a specific site, consider:
  - Soil/ground conditions,
  - Ground roughness,
  - Underlying material,
  - Machine design/limits,
  - Terrain-slope measurements,
  - Visibility,
  - Weather conditions,
  - Water on site/sinking/floods.
- When working on a steep slope, additional care should be taken to prevent slips, trips, or falls.

Struck-By

- Ensure operating paths are clear of personnel or objects subject to hazard.
- Operate equipment safely and according to manufacturer's instructions.
- No one will approach equipment in operation unless the operator gives them positive indication that it is acceptable to do so.
- Put up barriers to avoid unnecessary contact with hazards.
- Ensure egress paths are clear and unobstructed.
- Vessel operator will clearly notify anyone boarding the vessel of any pinch point hazards associated with the operation of the vessel and sample equipment.

Underground Utilities

Pre-planning is required for understanding the limitations of the site and identifying whether subsurface intrusive work can be completed safely. The following items, which are provided in OP1020 - Underground Utilities may need to be completed or reviewed prior to intrusive work based on the type of work as well as local, state, federal, and client requirements:

- Dig-In Prevention Policy;
- A health and safety plan and related health and safety documents/considerations;
- OP1020 Attachment C - Subsurface Clearance Field Checklist;
- Utilities marked with ANSI Z 535.1 Color Matrix;
- Confirm utilities with a private utility locator;
- Establish Tolerance Zones;
- A site walkthrough with staff members, subcontractors, and others who know utility locations, as applicable;
- State One Call – 811, three days prior to starting ground disturbance activities; and/or
- State One Call Ticket/Permit kept at site or readily accessible.

Welding

- Stay at least 35 feet away from the welding area, when possible, especially if not involved in the welding operation.
- If you must be in the vicinity, ensure you are shielded from the direct line of the welding arc, do not look at the welding arc, or wear appropriate eye protection.
- Flammable materials should be removed from the area or protected with fire-resistant shields or blankets.
- Unauthorized people should not enter the welding area.
- If staff will be performing welding activities, they must complete a task-specific JHA, hot work permit, and contact H&S.

Working at Heights

- Any project teams performing work that requires fall protection must work with their RSM for proper planning and training.
- Fall protection such as guardrail systems, safety net systems, or personal fall arrest systems can be used to protect staff while working at height.
- Staff required to wear fall arrest systems shall have received appropriate training and will inspect their gear prior to use to ensure it is in good working order.

Working in Phragmites Marshes

Special precautions should be taken when working in and around Phragmites marshes. These precautions include:

- Phragmites marshes pose significant slip, trip, and fall hazards. These marshes have soft and wet soil which can cause slip hazards. Terrain may be uneven, and changes in terrain may be hidden by ground cover. Additionally, features including muskrat burrows and ditches may create hazardous walking conditions. Use caution when walking through these areas.

- Dense Phragmites growth limits visibility, making slip, trip, and fall hazards such as ditches or waterway banks difficult to negotiate.
- The limited visibility can affect orientation. Site personnel entering areas of dense Phragmites growth should travel in pairs and maintain constant awareness of the way to exit the area.
- Phragmites leaves are sharp edged and cut skin. Additionally, Phragmites pose significant threat to eyes. Site personnel should wear work gloves and eye protection (spoggles) if the activity involves walking through Phragmites.
- When working in marshes and other limited visibility areas, field staff should ensure that they make another team member aware of their location. Radios or cell phones should be used to maintain communication. Have readily available telephone numbers for emergency services such as fire and police departments.
- Dry Phragmites stalks and leaves can catch fire. See section on Brush Fires in Appendix C for more information.

Workplace Harassment

- Staff members that encounter any sort of harassment during work should first try to deescalate the situation, if possible, and remove themselves from any threat as soon as possible;
- Do not attempt to engage or antagonize a person threatening violence;
- Report any threats, physical or verbal, and/or any disruptive behavior of any individual to HP and H&S as soon as possible either through phone call, email, or the use of the Sensitive Information Reporting Form; and
- Following an incident, staff may be asked to participate in any subsequent investigation of the workplace harassment incident.

Safety in everything we do

HALEY ALDRICH

APPENDIX C – WEATHER-RELATED HAZARDS

Brush Fires

Fires are a concern due to the large amount of vegetative material. Dry weather and strong winds contribute to the threat of fires. The following precautions should be taken during these periods:

- Prior to field activity, personnel should review all available weather information for warnings of increased fire potential.
- For extended work activities in the wetlands, a minimum of two evacuation routes should be established and cleared. The evacuation routes must be identified to field personnel working in the wetlands.
- A fire extinguisher will be carried into the wetlands.
- One field team member must return to the entry point to check the surroundings for signs of brushfire (smoke, etc.) and changing wind conditions on intervals not exceeding twenty minutes.
- Navigation tools, such as a map and compass, and two separate means of communication (cell phones, two-way radios, etc.) will be required safety equipment and must be immediately accessible to all members of each field team during all activities.
- Work involving the use of a potential ignition source (e.g. generators, halogen lighting) will not be performed.
- No smoking is allowed in wetland areas.
- In the event that warning signs of a brush fire are noticed by any field team member (fire sighting, smoke smell or sight, warning from elsewhere on site), all work will be suspended, and field teams will evacuate the site immediately. After evacuation, the priority will be achieving confirmation of evacuation from all field personnel. Emergency services will be contacted as per the HASP.
- All activities will be suspended until positive confirmation can be obtained that the fire has been completely controlled and extinguished.

Cold Stress

- Make sure workers are aware of cold stress symptoms, consequences, and prevention methods.
- Dress appropriately for wet/cold weather.
- Dress in layers and wear waterproof clothing as needed and proper cold weather PPE.
- Stay inside, as practicable, and use a buddy system to monitor cold stress effects.
- Have a warm area or vehicle available for breaks from the cold.
- Schedule work at warmer times of day or during milder weather times, if possible.
- If staff members feel the effect of weather stress, seek a warm location and drink warm non-caffeinated beverages.

Earthquakes

- Remember to Drop, Cover, and Hold on.
  - Drop: Wherever you are, drop down to your hands and knees and hold onto something sturdy. If you're using a wheelchair or walker with a seat, make sure your wheels are locked and remain seated until the shaking stops.
  - Cover: Cover your head and neck with your arms. If a sturdy table or desk is nearby, crawl underneath it for shelter. If no shelter is nearby, crawl next to an interior wall (away from windows). Crawl only if you can reach better cover without going through an area with more debris. Stay on your knees or bent over to protect vital organs.
  - Hold on: If you are under a table or desk, hold on with one hand and be ready to move with it if it moves. If seated and unable to drop to the floor, bend forward, cover your head with your arms, and hold on to your neck with both hands.
- If an earthquake happens, protect yourself right away:
  - If you are in a car, pull over and stop. Set your parking brake.
  - If you are in bed, turn face down and cover your head and neck with a pillow.
  - If you are outdoors, stay outdoors away from buildings.
  - If you are inside, stay and do not run outside and avoid doorways.
- There can be serious hazards after an earthquake, such as damage to the building, leaking gas and water lines, or downed power lines.
  - Expect aftershocks to follow the main shock of an earthquake. Be ready to Drop, Cover, and Hold On if you feel an aftershock.
  - If you are in a damaged building, go outside and quickly move away from the building. Do not enter damaged buildings.
  - **If you are trapped, send a text or bang on a pipe or wall.** Cover your mouth with your shirt for protection and instead of shouting, use a whistle.
  - If you are in an area that may experience tsunamis, go inland or to higher ground immediately after the shaking stops. Avoid contact with floodwaters as they can contain chemicals, sewage, and debris.

Fires

- Small
  - Use fire extinguisher if safe and qualified to do so.
  - Notify PM, Site Safety Officer, contact 911.
- Large
  - Evacuate immediately.
  - Notify PM, Site Safety Officer, contact 911.

Flooding

- Move to higher ground.
- Avoid floodwater, don't walk, drive, or swim in flooded areas.

- Don’t touch any electrical equipment.
- If heavy rains are expected and there is potential for flooding, consider rescheduling work to avoid unsafe areas.
- Evacuate when instructed to do so.

Heat Stress

- Make sure workers are aware of heat stress symptoms, consequences, and prevention methods.
- Drink plenty of hydrating fluids (i.e., water), provide enough water for each staff member to drink one quart per hour for days when heat exceeds 80 degrees F using the Heat Index.
- Use cooling devices, as needed.
- Acclimatize workers before performing work in extreme heat.
- Have a shaded area or vehicle available for breaks from the heat.
- Use a buddy system to monitor heat stress effects.
- Schedule work at cooler times of day or during milder weather times, if possible.
- Monitor the Heat Index using the OSHA NIOSH Heat Safety Tool mobile app, complete the Heat Injury and Illness Prevention Plan when heat exceeds 80 degrees F using the Heat Index, and consult Health and Safety.

High Winds

- The table below summarizes the stop work action levels for general site work and various high-risk project activities with respect to wind speed.

Work Activity	Wind Speed Stop Work Action Levels	
	Sustained[1]	Instantaneous
General Site Work	25 mph	40 mph or greater
High Risk Activities		
Working at Heights	15 mph	25 mph or greater
Critical Lifting Operations	15 mph	25 mph or greater
Lifting Operations	25 mph	35 mph or greater
Over Water Work	25 mph	35 mph or greater
Heavy Equipment with Elevated Masts	25 mph	35 mph or greater

- It should be noted that when using specific heavy equipment, that the manufacturer’s recommended wind speed for cease of operations (if defined) supersedes the wind speed action levels stated above, if the manufacturer’s guidelines are more restrictive.
- Task specific JHAs must reflect manufacturer’s specific guidelines, or if exact make and model of equipment is not known during initial JHA development, they will be updated in the field to reflect requirements.

Hurricanes

- Pay attention to emergency information and alerts.
- If you live in a mandatory evacuation zone and local officials tell you to evacuate, do so immediately.

- Determine how best to protect yourself from high winds and flooding.
- Take refuge in a designated storm shelter or an interior room for high winds.
- Go to the highest level of the building if you are trapped by flooding. Do not climb into a closed attic. You may become trapped by rising flood water.
- Do not walk, swim, or drive through flood waters. Turn Around. Don't Drown! Just 6 inches of fast-moving water can knock you down, and 1 foot of moving water can sweep your vehicle away.

Lightning Storms

- If lightning is observed to be within 6 miles of the project, suspend operations, depending on the speed of storm approach.
- You can use "Spark" by WeatherBug, or another recognized lightning warning app to track lightning.
- National Severe Storms Laboratory (NSSL) recommends the "Flash to Bang" method. Simply count the seconds from the time the lightning is sighted to when the clap of thunder is heard.
- Divide the number by five to obtain how far away in miles the lightning is occurring.
  - For example, if the lightning flash is seen and then 15 seconds later the bang of thunder is heard, the lightning is 3 miles away. It is important site personnel monitor not only how far away the lightning is, but also how fast it is approaching.
- The NSSL recommends by the time the Flash to Bang count reaches 30 seconds, all individuals should have left the site and reached a safe structure, such as a building or job trailer.
- If caught in the open by an electrical storm, immediately seek shelter in a vehicle on land.
- If a vehicle is inaccessible: move to a topographically low area away from tall objects and conductors (e.g., trees, transformers, fences, pipelines, power lines, metal sheds) and wait for the storm to leave the area.
- If you feel your hair stand on end (an indicator lightning is about to strike), drop to your knees and bend forward, putting your hands on your knees. Do not lie flat on the ground (be wary of seeking shelter in washes, ravines, or gullies during heavy downpours because of the risk of flash floods).
- In the event of extreme weather conditions which may pose a health and/or safety risk to workers, field activities will cease until the SSO determines conditions are safe to resume operations.
- Wait at least 30 minutes after the last lightning strike within 6 miles before resuming work.

Snowstorms

- Assess the weather before traveling and ensure emergency supplies are packed in the vehicle.
- Provide sufficient time for travel delays due to snow/ice covered roads or accidents.
- Inform someone of your travel plans and expected time of arrival.
- Wear layered clothing, including jackets, hats, and mittens, or keep these items in the vehicle.
- If you get stuck inside your vehicle:
  - Stay inside the vehicle.
  - Run the heater periodically but be cautious of carbon monoxide poisoning.

Sun Exposure

- Exposure to ultraviolet light from working outdoors can cause sunburn and can lead to skin cancer. Staff members are encouraged to liberally apply sunscreen, with a minimum sun protection factor of SPF 30 when working outdoors. Sunscreen selected should protect against both UVA and UVB rays. Staff members should work in the shade whenever practical.
- Prevention of over-exposure and sunburn will be completed by wearing appropriate clothing and using sunscreen. Long-sleeve breathable shirts are recommended to avoid sun exposure to the arms. All staff members are required to wear long pants and boots as part of their PPE and will eliminate sun exposure to legs and feet.
- Additionally, staff wear safety glasses offering protection from ultraviolet A/ultraviolet B rays.

Tornadoes

- Watch areas where tornadoes could become present.
- Review and discuss your emergency plans, communication/sirens in case of emergency and review shelter locations.
- If site is prone to tornadoes, monitor weather reports during work shifts.
- Act quickly if a warning is issued or you suspect a tornado is approaching.
- If a tornado has been sighted or indicated by weather radar, imminent danger to life and property exists.
- Go to shelter locations listed in Safety Plan. Go immediately under ground to a basement, storm cellar or an interior room (closet, hallway, or bathroom).
- If caught outdoors when a tornado is threatening, seek shelter in a basement or a sturdy building. If one is not within walking distance, try to drive to the nearest shelter.
- If flying debris is encountered while in a vehicle, there are two options:
  - Stay in the vehicle with the seat belt on, keep your head below the windows, and cover it with your hands or a blanket, or
  - If there is an area that is noticeably lower than the roadway, lie in that area and cover your head with your hands.

Tsunami

- If you are under a tsunami warning:
  - Know evacuation routes (often are marked by a wave with an arrow in the direction of higher ground) and follow them to higher ground.
  - Contact your project manager when it is safe to do so to inform them that you have evacuated.
  - Leave immediately if you are told to do so. Evacuation routes often are marked by a wave with an arrow in the direction of higher ground.
  - If you are in the water, grab onto something that floats, such as a raft or tree trunk.
  - If you are in a boat, face the direction of the waves and head out to sea. If you are in a harbor, go inland.

Wildfires and Air Quality Concerns

- Monitor and assess the air quality index (AQI) for particulate matter at 2.5 microns (PM 2.5) utilizing AirNow.
- Utilize engineering or administrative controls to limit staff member exposure to an AQI level of 150 or lower if possible.
- Review our Wildfire Smoke and Air Quality program materials.
- Ensure all staff members have completed Air Quality Training.

AQI for PM 2.5	Response Action
0 to 50	Normal working conditions. Monitor PM 2.5 conditions and forecasts.
51 to 100	Normal working conditions. Sensitive groups should begin to monitor physical condition. Notify staff of air quality conditions. Ensure only trained staff members are working in the field.
101 to 150	NIOSH approved N95 respirators will be available in all offices for staff members that have completed the voluntary use form. Engineering controls and administrative controls will be implemented. Sensitive groups should continue to monitor conditions.
151 to 200	NIOSH approved N95 respirators will remain available in all offices for staff members that have completed the voluntary use form. Monitor physical conditions throughout the day and remain aware of immediate health impacts of smoke inhalation. PMs should begin discussions about rescheduling work. Recommended that outdoor staff take frequent breaks in areas where filtered AQI is less than 101.
201 to 250	Respirators will remain available for all staff if voluntary use form is completed. All outdoor staff are required to take frequent breaks in areas where filtered AQI is less than 101. Sensitive persons are not to work outdoors in these conditions.
251+	All outdoor projects will be stopped in the impacted areas until the AQI has dropped below 251. Outdoor project work will be rescheduled.

APPENDIX D – BIOLOGICAL HAZARDS

Bacteria

- Wear appropriate personal protective equipment (PPE), such as gloves, eye protection (goggles or face shields), and disposable clothing, when working with potentially contaminated materials or in areas where bacterial exposure is possible.
- Wash your hands and any exposed skin with soap and water immediately, or as soon as feasible, after contact with potentially infectious materials or contaminated surfaces.
- Disinfect potentially contaminated surfaces to reduce potential for bacteria to spread.

Bees, Wasps, and Hornets

- Bees generally fly in straight lines between flower and hive, hence collision with unsuspecting individuals occurs.
- If a single bee approaches, STAY STILL, do not try to swat the insect as this may cause it to react.
- If it lands, gently try to blow it off the skin.
- If a swarm of bees approach, run for shelter. Bees release a chemical when they sting, which may attract other bees to sting.
- If stung, try to look for the stinger and carefully remove it by flicking it or scratching it out of the skin from the stinger sack.
- Stings to the head and neck are more dangerous.
- Life threatening reactions are more likely to occur in people who are already known to be very allergic to bee venom, older people with pre-existing heart and chest complaints, or with multiple stings.
- When stung immediately apply ice or cold compresses to the sting site.
- Wasps and bees are drawn to flower fragrances and clothing with bright colors (white is safest), perfumes, fruit juices and eating fruit outdoors, hair tonics, suntan lotions, and floral odors.
- Hornets are drawn to food and sources of moisture.
- Carefully shake out any clothing left on the ground.
- Cover open containers and any food outdoors.
- Individuals who are prone to severe reactions to bee stings should notify the SSO and carry their prescribed medication(s) with them for self-administration.
- Emergency medical treatment should be sought immediately for individuals who are allergic to bee stings or other individuals who exhibit severe reactions described above.

Bird and/or Bat Droppings

- Avoid situations where bird or bat droppings may exist.
- Use dust suppression methods to reduce airborne particulate levels.
- Wear respiratory protection and PPE to curtail particulate adhesion to clothing.

Bloodborne Pathogens (BBPs)

- While Haley & Aldrich staff members should not anticipate occupational exposure to bloodborne pathogens in their normal daily activities, there is always potential for an incident that could lead to exposure.
- Bloodborne pathogens are bacteria, viruses, and other pathogenic microorganisms that can only be detected by medical tests.
- Any time you come in contact with another individual's blood or other potentially infectious material (OPIM), you are at risk of becoming infected.
- Therefore, staff members must treat all blood and OPIM as if they could get infected.
- Offices are equipped with BBP response kits, and field staff members have the option to collect the same BBP kits to have on hand as a resource.
- Proper PPE, disposal, and handwashing are critical to limit exposure to BBP.
- For more information, see OP1058 - Bloodborne Pathogens.

Contaminated water

- Don PPE to reduce exposure, such as gloves, safety glasses, and protective clothing.
- Implement work practices to limit contact with contaminated water, such as avoiding walking through contaminated areas and using remote handling techniques, where feasible.
- Use signage that clearly indicates the presence of contaminated water and warns against contact or use.
- Identify handwashing facilities or areas where staff members can thoroughly wash hands following any potential exposure.

Disease

- The primary routes of infectious disease transmission are contact, droplet, and airborne.
- General practices, such as the following, can help reduce the risk of disease:
  - Regular handwashing
  - Covering coughs and sneezes
  - Proper cleaning and disinfection of surfaces
  - Staying home when sick
  - Wearing face coverings
  - Wearing gloves

Mammals - Large

- Avoid contact with animals whenever possible.
- If an animal displays aggressive behavior and charges, do not run or turn your back.
- When confronted by a large mammal, it is important not to run or exhibit any behavior that may be construed as a challenge (e.g., looking the animal in the eyes, showing your teeth, etc.).

- Stand still and place your work bag between you and the animal and then begin to move slowly away from the animal, while not turning your back.

Mammals - Small

- Avoid contact with rodents, if possible.
- Avoid contact with rodent excrement.
- Do not eat food or water that may have encountered rodent excrement.
- If exposed, wash hands and avoid touching your face with your hands.

Mosquitoes

- Take appropriate precautions to minimize the potential transmission of viruses carried by mosquitoes.
- Use of PPE techniques is essential to prevent mosquito bites, especially when working at sites where mosquitoes may be active and biting.
- Use repellents containing DEET, picaridin, IR3535, and some oil of lemon eucalyptus and para-menthane-diol products provide longer-lasting protection. To optimize safety and effectiveness, repellents should be used according to the label instructions.
- Cover as much of your skin as possible by wearing shirts with long sleeves, long pants, and socks whenever possible.
- Avoid use of perfumes and colognes when working outdoors during peak times when mosquitoes may be active; mosquitoes may be more attracted to individuals wearing perfumes and colognes.
- Treat bites by cleaning the affected area with warm soapy water.
- Place an ice pack on the affected area to reduce swelling.
- Take or apply an antihistamine to reduce itchiness.
- Avoid scratching the bite to reduce risk of infection.

Marine Animals

- Maintain a minimum 50-yard distance from marine mammals.
- Marine mammals can be aggressive if bothered, and many have environmental protections.
- Do not approach marine mammals and should maintain their distance.
- If marine mammals are in the work area and impede work, the team should contact the harbormaster and project management.

Poisonous Plants

Poisonous plants that can cause skin irritation include poison ivy, poison oak, and poison sumac. Poisonous plants are found throughout the United States (except Alaska and Hawaii).

<u>Poison Ivy</u>

Eastern poison ivy is typically a hairy, ropelike vine with three shiny green leaves budding from one small stem. The leaves may be red in the fall.

Western poison ivy is typically a low shrub with three leaves that does not form a climbing vine. It may have yellow or green flowers and white to green-yellow or amber berries.

Poison Oak

Poison oak is typically a shrub with three leaves, like poison ivy. Pacific poison oak may be vine-like. It may have yellow or green flowers and clusters of green-yellow or white berries.

Poison Sumac

Poison sumac is a woody shrub that has stems with 7 to 13 leaves arranged in pairs. It may have glossy, pale yellow, or cream-colored berries

Types of Exposure

Poison ivy, poison oak, and poison sumac release an oil (urushiol) when part of the plant is damaged or burned. When the oil gets on the skin, most exposed people have an allergic reaction (contact dermatitis). Workers can become exposed to urushiol through:

- Direct contact with the plant.
- Indirect contact, such as touching tools, livestock, or clothing that have urushiol on them.
- Inhaling particles containing urushiol from burning plants.

Prevention

- Wear long sleeves, long pants, boots, and gloves. Wash exposed clothing separately in hot water with detergent.
- Use barrier skin creams, such as Ivy X pre contact towelettes.
- Clean tools with rubbing alcohol (isopropanol or isopropyl alcohol) or soap and lots of water. Urushiol can remain active on the surface of objects for up to five years. Wear disposable gloves while cleaning.

Symptoms of contact with poisonous plants include:

- Red rash within a few days of skin contact
- Bumps, red patches or streaking, or weeping blisters
- Note: fluids in blisters will not cause blisters to spread on you or others
- Swelling
- Itching

First Aid

- Rinse skin immediately.
- Use rubbing alcohol, poison plant washes (Ivy X Contact wipes), or dishwashing soap, and lots of water.
- Rinse often to prevent wash solutions from drying on the skin and further spreading the urushiol.
- Apply cold compresses, follow directions on treatment wipes, do not apply to broken skin
- Emergency medical treatment should be sought immediately for individuals who are allergic to poisonous plants or other individuals who exhibit severe reactions described above.

Snakes

The degree of toxicity resulting from snakebites depends on the potency of the venom, the amount of venom injected, and the size of the person bitten. Poisoning may occur from injection or absorption of venom through cuts or scratches.

The most effective way to prevent snakebites is to avoid snakes in the first place. Personnel should avoid walking at night or in high grass and underbrush. Visual inspection of work areas should be performed prior to activities taking place.

The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg. No attempts at killing snakes should be made; many people are bitten in such an attempt.

If someone is bitten by a potentially poisonous snake, the following treatment should be initiated:

- Keep patient calm.
- Notify emergency medical services.
- Wash the wound and keep the affected body part still.
- Apply direct pressure to site of bite if bleeding is extreme.
- Keep the affected area lower than the heart.
- Carry a victim who must be transported or have them walk slowly.
- Transport to the closest medical facility.

Ticks

- Wear light-colored clothing so ticks stand out, and long-sleeved shirts and long pants to reduce skin exposure.
- Tuck your shirt into your pants and tuck your pants into your socks to close gaps.
- Use repellent containing 20-30% DEET (N, N-diethyl-m-toluamide) on exposed skin and clothing.
- Avoid hands, eyes, and mouth and wash off repellent when back indoors.
- Treat clothing with or purchase clothing with products containing 0.5% permethrin.
- Conduct frequent tick checks on clothing and skin. Have others check your back, scalp, and behind your ears and check gear for "hitchhikers."
- As soon as you return indoors, take a bath or shower. and do a full-body inspection using a mirror.
- Wash field clothes and tumble dry on high to kill any ticks that may be hidden.
- If working in an area of significant tick habitat, PPE may need to be upgraded to a Tyvek suit.
- Implementation of controls is crucial to minimize or eliminate the possibility of a tick bite.
- If a staff member has been bitten contact Corporate H&S and Work Care at 888-449-7787 to initiate the Tick Management Protocol. Once bitten, it takes approximately 48 hours to transmit Lyme Disease,
- For removal, a fine-tipped tweezer is recommended as a tick removal tool and should be in the first-aid kit. Follow these steps:
  - Pull upward with steady, even pressure.
  - Do not twist or jerk the tick; this can cause mouth parts to break off and remain in the skin.
  - If this happens, remove the parts with tweezers.
  - If unable to remove easily with tweezers, leave them alone and let the skin heal.
  - After removing the tick, thoroughly clean the bite area and hands with rubbing alcohol, iodine scrub, or soap & water.
  - Dispose of live ticks by submersal in alcohol, placing it in a sealed bag/container, wrap it tightly in tape, or flush it down the toilet.

  - Never crush ticks with your fingers.
  - Do not attempt to use nail polish remover, petroleum jelly, lotion, or heat to try to get the tick to exit skin.
  - Swift removal is key.

Venomous Spiders

- Inspect or shake out any clothing, shoes, towels, or equipment before use.
- Wear protective clothing, such as a long-sleeved shirt and long pants, hat, gloves, and boots when handling stacked or undisturbed piles of materials.
- Minimize the empty spaces between stacked materials.
- Remove and reduce debris and rubble from around the outdoor work areas.
- Trim or eliminate tall grasses from outdoor work areas.
- Store apparel and outdoor equipment in tightly closed bags.
- Keep tetanus boosters up to date (every 10 years).
- Spider bites can become infected with tetanus spores.
- Additional information in the case of bites can be obtained from the Poison Center (1-800-222-1222).

Wildlife Droppings

- Do not touch droppings with unprotected hands.
- Avoid disturbing the droppings and generating dust.
- Staff member work practices and dust control measures that eliminate or reduce dust generation during removal of manure from a building will also reduce risks of infection and development of disease.
- Use an industrial vacuum cleaner with a high-efficiency (HEPA) filter to bag contaminated material.

APPENDIX E – EMERGENCY RECOGNITION AND PREVENTION

Emergency Type	Notification	Response Action
Chemical Exposure	Report event to PM immediately	Refer to Safety Data Sheet for required actions
Fire- Small	Contact 911 and notify PM when safe to do so	Use fire extinguisher if safe and qualified to do so
Fire - Large/Explosion	Contact 911 and notify PM when safe to do so	Evacuate Immediately
Medical - Bloodborne Pathogen	Report using H&A's reporting tool	If qualified and trained dispose in container or call client/responsible party for further instruction
Medical - First Aid	Call Acuity (1-888-397-8099) and notify PM when safe to do so	If qualified, perform first aid duties. Contact Acuity for future management.
Medical - Trauma	Call 911 immediately, and notify PM when safe to do so	Wait at site entrance for ambulance.
Security Threat	Notify PM, who will call 911 as warranted	Hide all valuables and delineate all work zones. Double check and secure access points to site.
Weather - Earthquake/ Tsunami's	Stop Work, evacuate the site if necessary, and notify PM	Turn off all equipment and evacuate as soon as it is safe to do so.
Weather - Lightning Storm	Stop Work and seek shelter, and notify PM	Work may resume 30 minutes after the last observed lightning.
Weather - Tornadoes/ Hurricanes	Monitor weather conditions, Stop Work, seek appropriate shelter, and notify PM when safe to do so	Evacuate to shelter location or shelter in place immediately.
Weather - Fog	Monitor Weather conditions	Pause work until fog dissipates and site lines can be re-established.
Weather - Wind	Notify PM and all equipment operators	Monitor conditions and be prepared to Stop Work.
Weather - Floods	Notify PM and monitor weather conditions	Immediately Stop Work and evacuate.
Hazardous Materials Spill - Small	Contain and clean the spill if it is safe to do so, and notify the PM	Properly trained staff can clean up the spill.
Hazardous Material Spill - Large	Stop Work, secure the area, and notify the PM when safe to do so	Spill will be reported to the correct agency, and cleanup will be at their discretion

APPENDIX G
NYSDOH CAMP Guidance Document

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "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.

<u>VOC Monitoring, Response Levels, and Actions</u>

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

<u>Particulate Monitoring, Response Levels, and Actions</u>

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/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.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

<u>December 2009</u>

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.