www.haleyaldrich.com

REMEDIAL INVESTIGATION WORK PLAN
PROPOSED 98-114 BERRIMAN STREET DEVELOPMENT
98-114 BERRIMAN STREET
BROOKLYN, NEW YORK

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

for
Berriman Residents LLC
130 Lee Avenue, #174
Brooklyn, New York 11206

File No. 0214078
December 2025

REMEDIAL INVESTIGATION WORK PLAN
PROPOSED 98-114 BERRIMAN STREET DEVELOPMENT
98-114 BERRIMAN STREET, BROOKLYN, NEW YORK

PREPARED ON BEHALF OF
BERRIMAN RESIDENTS LLC
BROOKLYN, NEW YORK

PREPARED BY:

____
Kassidy O'Connor
Staff Geologist
H & A of New York Engineering and Geology, LLP

REVIEWED AND APPROVED BY:

____
Elizabeth R. Fitzgerald
Project Manager
H & A of New York Engineering and Geology, LLP

____
Mari C. Conlon, P.G.
Senior Associate
H & A of New York Engineering and Geology, LLP

Certification

I, Mari C. Conlon, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that that this Remedial Investigation Work Plan was prepared in accordance with the applicable statues and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Mari C. Conlon Date

Table of Contents **Page**

Certification ii

List of Tables v
List of Figures v
List of Appendices v

1. Introduction 1

1.1 PURPOSE 1

2. Background 2

2.1 CURRENT LAND USE 2
2.2 SITE HISTORY 2
2.3 SURROUNDING LAND USE 2
2.4 SURROUNDING LAND USE HISTORY 2
2.5 PREVIOUS INVESTIGATIONS 3
2.5.1 September 2025 Phase I ESA Prepared by Haley & Aldrich of New York 3
2.5.2 October 2025 Limited Phase II ESI Summary Letter Prepared by Haley & Aldrich of New York 4

3. Remedial Investigation 5

3.1 UTILITY MARKOUT 5
3.2 SELECTIVE PARTIAL DEMOLITION 5
3.3 SOIL SAMPLING 5
3.4 GROUNDWATER SAMPLING 6
3.5 INVESTIGATION-DERIVED WASTE 8
3.6 SOIL VAPOR SAMPLING 8
3.7 PROPOSED SAMPLING RATIONALE 9

4. Green and Sustainable Remediation and Climate Resiliency 10

4.1 BEST PRACTICES AND TECHNIQUES 10
4.2 REPORTING 11
4.3 CLIMATE RESILIENCY EVALUATION 11

5. Quality Assurance and Quality Control 12

6. Data Use 13

6.1 DATA SUBMITTAL 13
6.2 DATA VALIDATION 13

Table of Contents **Page**

7. **Project Organization** 14

8. **Health and Safety** 15

    8.1 HEALTH AND SAFETY PLAN 15
    8.2 COMMUNITY AIR MONITORING PLAN 15
    8.3 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT (QHHEA) 16

9. **Reporting** 17

10. **Schedule** 18

References 19

List of Tables

Table No.	Title
1	Sample and Analysis Plan
2	Minimum Reporting Limits

List of Figures

Figure No.	Title
1	Project Locus
2	Surrounding Land Use-Sensitive Receptor Map
3	Map of Soil Chemistry
4	Map of Soil Vapor Chemistry
5	Proposed Sample Location Plan

List of Appendices

Appendix	Title
A	Previous Reports
B	September 2025 GPR Findings Report
C	Field Sampling Plan
D	Quality Assurance Project Plan
E	NYSDEC Emerging Contaminant Field Sampling Guidance
F	Climate Screening Checklist
G	Health and Safety Plan and Job Hazard Analysis
H	NYSDOH CAMP Guidance Document

1. Introduction

On behalf of the Applicant, Berriman Residents 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 98-114 Berriman Street Development located at 98-114 Berriman Street in Brooklyn, New York (Site; see Figure 1). This RIWP was prepared in accordance with the regulations and guidance applicable to the Brownfield Cleanup Program (BCP).

The approximately 0.402-acre Site is located in Kings County, New York and identified as Block 3989, Lots 20, 24, and 25 (pending lot merger). An Application for Apportionment or Merger to merge the three lots into a single tax lot (Lot 20) was preliminarily approved by the NYC Department of Finance on November 9, 2025.

The Site is partially developed with an industrial building on Lot 20 and a parking lot on Lots 24 and 25. The Site is currently owned by Accurate Organization 98 Corp (Lot 20) and Accurate Organization 112-114-148-152 Corp. (Lots 24 and 25). The Applicant is in contract negotiations to purchase the Site. The Site is bounded by Silk Auto Repair to the north, a two-story family apartment building to the south, Berriman Street, followed by Public School 345, a three-story elementary school, to the east, and walk-up family apartment buildings and an undeveloped lot used for parking to the west. The Site is located within a residential area along the edge of a C2-4 commercial overlay district in a medium-density neighborhood.

According to the New York City Planning Commission Zoning Map 17c, the Site is located within a residential R6A zone. The proposed use is consistent with existing zoning for the property. The Site is located in an urban area surrounded by commercial and residential properties served by municipal water.

While the development plans are conceptual at this time, the planned project will consist of the demolition of existing structures and development of a new multi-story residential use building with an affordable housing component. The new development is anticipated to have a cellar that will extend to approximately 14 feet below ground surface (bgs).

1.1 PURPOSE

Based on the findings of the September 2025 Limited Phase II Environmental Site Investigation (ESI) Report (H & A of New York Engineering and Geology, LLP, 2025b), primary contaminants of concern at the Site include semi-volatile organic compounds (SVOCs), specifically polycyclic aromatic hydrocarbons (PAHs) and heavy metals in shallow soils up to 4 feet bgs and volatile organic compounds (VOCs), specifically chlorinated volatile organic compounds (CVOCs), including tetrachloroethene (PCE) and petroleum-related compounds (benzene, toluene, ethylbenzene, and xylenes [BTEX]) in sub-slab soil vapor. Previous investigations did not comprehensively delineate the extent of soil, groundwater, and soil vapor contamination at the Site. Results of the additional sample analyses proposed in this RIWP will be used to confirm the results of the previous Site characterization activities, address data gaps, delineate any on-Site source(s), and determine a course for remedial action.

2. Background

2.1 CURRENT LAND USE

The Site is partially developed with a one-story industrial building and parking lot and is currently occupied and operated by Accurate Metal Slitting on Lot 20 and an auto towing/ parking lot on Lots 24 and 25. The Site is located within a mixed-use area characterized by multi-story commercial and residential buildings.

2.2 SITE HISTORY

Based on a Phase I Environmental Site Assessment (ESA), completed by Haley & Aldrich of New York for the Site in September 2025, the Site was partially developed by 1887 with a single dwelling on the eastern side of Lot 25 and a shoe factory on the western side. The shoe factory was replaced with a sweater factory, as depicted in the 1908 Sanborn map. Lots 20 and 24 were depicted as vacant and undeveloped through the 1920s. By 1928, Lot 20 had been developed as a garage with two gas tanks depicted on the southeast corner of the lot, and Lot 24 was developed with a dwelling on the eastern side of the lot. The sweater factory on Lot 25 remained unchanged into the late 1920s; however, the dwelling on the eastern side of this lot was razed, and a small auto shop was developed in its place. By 1951, the Site remained mostly unchanged, with the exception that Lot 20 became a razor blade manufacturing facility. By 1965, the razor blade manufacturing operation was relabeled as non-descript manufacturing. City Directories listed the operator of Lot 20 as Kellerman Manufacturing Co. Inc. in 1965 and 1970, and the operators of Lot 25 as various knitting operations from the mid-1930s through 1976. Lot 24 was listed as operated by several individuals during this time period. The Site remained largely unchanged through 1987, with the exception of the buildings on Lots 24 and 25 being razed at some point during the 1980s.

2.3 SURROUNDING LAND USE

The Site is located on Berriman Street between Liberty Avenue and Glenmore Avenue in an urban area identified as the East New York neighborhood within the Borough of Brooklyn. The area surrounding the Site consists of residential and commercial-use properties. There are four sensitive receptors (each associated with Patrolman Robert Bolden Public School 345) within a 500 feet radius of the Site listed below and shown on Figure 2:

- Patrolman Robert Bolden Public School 345 (school), two playgrounds and Cypress Hills Local Development (childcare facility) located at 111 Berriman Street, Brooklyn New York

2.4 SURROUNDING LAND USE HISTORY

The area surrounding the Site was used for residential, industrial, and commercial-related uses from the late 1800s through present day.

2.5 PREVIOUS INVESTIGATIONS

To date the following investigations have been completed for the Site and the following reports have been prepared detailing those investigations:

1. September 2025 Phase I ESA Prepared by Haley & Aldrich of New York; and
2. October 2025 Limited Phase II ESI Summary Letter, prepared by Haley & Aldrich of New York.

Previous reports are included in Appendix A. A summary of the environmental findings is provided below.

2.5.1 September 2025 Phase I ESA Prepared by Haley & Aldrich of New York

Haley & Aldrich of New York prepared a Phase I ESA for the Site to identify Recognized Environmental Conditions (RECs) in connection with the Site.

The Phase I identified the following RECs at the Site:

REC #1: Current Uses and Condition of Site

At the time of inspection, the Site was operating as a metal slitting and auto towing/parking facility. The building was used for metal slitting and for the storage of machinery and automotive supplies. The exterior lot is used for auto towing and storage of cars and trailers. Two active 275-gallon aboveground storage tanks (ASTs) containing No. 2 fuel oil were observed. One AST, located in the storm cellar on the eastern side of the building, is used to power a boiler, and the second AST, located on the first floor in the southwestern corner of the building, is suspected to be used for heating. Site conditions, such as evidence of staining, improper storage of hazardous materials, and observations of kitty litter/Speedy Dry and stained cardboard located beneath equipment and vehicles, indicated previous and potentially ongoing releases. The current use of the property, in conjunction with the Site conditions, is considered a REC.

REC #2: Historical Uses of the Site

Historic Sanborn maps indicate that the Site formerly operated as a shoe factory and sweater factory in the late 1800s and early 1900s, as well as a razor blade manufacturing facility from as early as 1951 through the 1970s. Non-descript manufacturing continues through the present on Lot 20, with the most recent operator being a metal slitting facility. Two gas tanks were also depicted on the southeastern corner of Lot 20 on the 1928 Sanborn map. Potential environmental concerns associated with this historical use include the potential for release of hazardous substances commonly found in industrial practices, particularly if spills, leaks, or improper manufacturing practices occurred. The historical uses of the Site are considered a REC.

REC #3: Historical and Current Uses of Surrounding Properties

Historic Sanborn maps indicate that by 1908, the eastern-adjacent property was used as the John C. Creveling Coal & Lumber Yard with a rail spur extending northward across Liberty Avenue in apparent association with the Standard Oil Co. of New York. By 1951, the property was operated by the Harvey

Lumber Co., and from 1965 to 1968, the property was utilized for metal parts storage. Additionally, by 1908, the northern-adjacent property was partially developed with an auto shop, and by 1965, the property was fully developed with an auto repair shop, which is currently still in use. Sanborn maps also indicate that there were multiple historical small auto sheds and garages to the west and south of the Site. Potential environmental concerns associated with auto repair and manufacturing operations include the potential for release of hazardous substances, such as spent solvents, waste oils, heavy metals, and chlorinated compounds. These surrounding historical and current uses are considered a REC.

2.5.2 October 2025 Limited Phase II ESI Summary Letter Prepared by Haley & Aldrich of New York

On behalf of the Applicant, Haley & Aldrich of New York mobilized to the Site on September 16, 2025 to perform the Limited Phase II ESI to investigate soil, groundwater, and soil vapor quality beneath the Site. The investigation included eight soil borings (to depths ranging from 4 to 28 feet bgs), five temporary monitoring wells (installed to 30 or 32 feet bgs), three temporary sub-slab vapor points (immediately below the concrete building slab at approximately 0.5 to 2.5 feet bgs), and two temporary soil vapor points (to 10 feet bgs). A total of 12 soil samples, five groundwater samples, and five soil vapor samples were collected and submitted to the laboratory for analysis.

Urban fill, generally consisting of brown sand with varying amounts of silt, brick, cinders, glass, and ceramic, was observed from surface grade to approximately 1.7 to 8 feet bgs throughout the Site and was underlain by a potential native layer consisting of orange-brown to tan sand with varying amounts of silt and gravel. Soil samples were collected continuously, characterized, and screened for visual and olfactory evidence of contamination, such as staining and odors. Instrumental screening for the presence of organic vapors was performed using a photoionization detector (PID). No significant subsurface impacts were observed; PID readings did not exceed 0.7 parts per million (ppm) and no staining was noted. However, a faint petroleum-like odor was detected in borings SB-01, SB-02, and SB-05 from 0 to 4 feet bgs. Groundwater was encountered at depths ranging from approximately 25 and 27 feet bgs and is interpreted to flow toward the southwest across the Site.

Field observations and analytical results identified urban fill contaminated with heavy metals and SVOCs (specifically PAHs) at concentrations consistent with the characteristics of urban fill found throughout the New York City area. Elevated total lead and mercury were identified in one soil location in the northern portion of the Site from 0 to 2 feet bgs above Restricted Residential Use Soil Cleanup Objectives (RRSCOs). Additionally, VOCs, including CVOCs and BTEX, were identified in all sub-slab/soil vapor samples throughout the Site with maximum elevated CVOCs observed in sub-slab samples from Lot 20. No exceedances were encountered in the groundwater analytical results, which included only VOCs during this investigation, compared to the Ambient Water Quality Standards (AWQS).

Based on the findings of the September 2025 Limited Phase II ESI, primary contaminants of concern at the Site include SVOCs, specifically PAHs, and heavy metals in shallow soils up to 4 feet bgs (below grade surface) and VOCs, specifically CVOCs, including PCE and BTEX in sub-slab soil vapor.

The October 2025 Limited Phase II ESI Summary Letter is provided in Appendix A. Summaries of the soil and soil vapor analytical data obtained from previous investigations conducted at the Site are displayed on Figures 3 and 4, respectively.

3. Remedial Investigation

This section describes the field activities to be conducted during the remedial investigation and provides the sampling scope, objectives, methods, anticipated number of samples, and sample locations. As mentioned above, previous limited environmental investigations were conducted at the Site that have identified, but not delineated, contamination at the Site. A summary of the sampling and analysis plan is provided in Table 1 and Figure 5. 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 geophysical survey was performed by Ground Penetrating Radar Systems, LLC to clear drilling locations on September 16, 2025. The geophysical findings report is provided as Appendix B.

A ground-penetrating radar (GPR) scan 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, in preparation for the proposed sampling work. It is noted that the borings may be adjusted based on the results of the GPR scan, and any adjustments to the locations presented below will be communicated to the New York State Department of Environmental Conservation (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 the marking out of utilities. Once the utilities are marked, field equipment and personnel will be mobilized to the Site.

3.2 SELECTIVE PARTIAL DEMOLITION

Prior to commencing the remedial investigation, partial demolition of above-grade structures will be completed as needed to facilitate the implementation of the remedial investigation.

3.3 SOIL SAMPLING

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

The sampling and analysis plan is summarized in Table 1. A total of ten soil borings will be advanced to the observed groundwater interface (anticipated approximately 25 to 27 feet bgs) using a track-mounted direct-push drill rig (Geoprobe®) operated by a licensed operator. Soil samples will be collected from acetate liners using a stainless-steel trowel or sampling spoon. 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 a modified Burmister system. The presence of staining, odors, and PID response will be noted. VOC grab samples will be collected using encores or terra cores. Sampling methods are described in the Field Sampling Plan (FSP) provided as

Appendix C. A Quality Assurance Project Plan (QAPP) is provided as Appendix D. Laboratory data will be reported in Analytical Services Protocol (ASP) Category B deliverable format.

Soil samples representative of Site conditions will be collected at ten locations widely distributed across the Site, as shown in Figure 5. Soil samples will be collected from shallow soil below the cover (0 to 0.5 feet bgs); the 2-foot interval at the groundwater interface (to be determined in the field but anticipated to range from approximately 25 and 27 feet bgs; the deepest interval of urban fill observed (to be determined in the field but anticipated to be approximately 2 feet bgs in the southern region of the Site [existing parking lots] and approximately 8 feet bgs in the northern region of the Site [existing building]) or the greatest degree of impacts observed; and the proposed development depth (approximately 12 to 14 feet bgs). Additional samples will be collected from any interval exhibiting elevated PID readings or visual and olfactory impacts. Soil exploration and sampling would continue beyond the depth of the observed groundwater table if necessary to achieve vertical delineation. Soil samples will be analyzed for:

- Target Compound List (TCL) VOCs using U.S. Environmental Protection Agency (EPA) Method 8260D/5035;
- TCL SVOCs using EPA Method 8270E;
- Total Analyte List (TAL) Metals using EPA Method 6010D;
- Polychlorinated biphenyls (PCBs) using EPA Method 8082A;
- TCL Pesticides using EPA Method 8081B;
- Per- and polyfluoroalkyl substances (PFAS) using EPA Method 1633; and
- 1,4-dioxane by EPA Method 8270E.

The sampling and analysis plan is summarized in Table 1. Proposed soil boring locations are displayed on Figure 5.

Soil analytical results will be compared to NYSDEC 6NYCRR Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs) and RRSCOs.

Samples to be analyzed for PFAS and 1,4-dioxane 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” and the June 2019 Sampling for “1,4-dioxane and PFAS Under DECs Part 375 Remedial Programs,” respectively.

3.4 GROUNDWATER SAMPLING

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

Groundwater at the Site was encountered between approximately 25 and 27 feet bgs during the September 2025 Limited Phase II ESI. Groundwater is anticipated to flow toward the southwest across the Site.

Seven 2-inch permanent monitoring wells will be installed using a direct-push drill rig (e.g., Geoprobe®) operated by a licensed operator. If necessary, another appropriate and industry-standard drilling method may be used based on the subsurface conditions. Wells will be advanced to approximately 30 to 32 feet bgs or to at least 5 feet below the groundwater interface (if encountered at a shallower depth).

Each monitoring well will be constructed using a 2-inch-diameter polyvinyl chloride (PVC) riser pipe with 5- or 10-foot-long, 0.010-inch (10-slot) slotted PVC screen installed to straddle the groundwater interface. The annular space will be backfilled with clean No. 2 silica sand to approximately 2 feet above the top of the screen. A bentonite seal (minimum 2 feet thick) will be placed above the sand pack, and the remaining borehole will be grouted to the surface using bentonite, cement, or non-impacted soil cuttings. Each well will be completed at grade with steel flush-mount protective covers or stick-up covers equipped with protective bollards and secure locking mechanisms.

Monitoring wells will be developed in accordance with ASTM D5521 after the grout seal has sufficiently cured to remove water which may have been introduced during the drilling process. Development will be performed using a surge pump to mobilize fine-grained material from the well. Development will continue until turbidity is at or below 50 nephelometric turbidity units, or until 10 well volumes have been removed, if possible.

Groundwater sampling will occur at a minimum of one week after monitoring well installation and 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.

The sampling and analysis plan is summarized in Table 1. The minimum reporting limits are provided in Table 2. Proposed groundwater monitoring well locations are displayed in Figure 5.

A total of five monitoring wells will be sampled and analyzed for:

- TCL VOCs + tentative identified compounds (TICs) (10 VOCs with the highest concentrations of TICs) using EPA Method 8260C;
- TCL SVOCs + TICs (20 SVOCs with the highest concentrations of TICs) using EPA Method 8270D;
- TAL metals (filtered and unfiltered) using EPA Method 6010;
- Total cyanide (filtered and unfiltered) using EPA Method 9012;
- PCBs using EPA Method 8082;
- TCL pesticides using EPA Method 8081B;
- PFAS using EPA Method 1633A; and
- 1,4-dioxane using EPA Method 8270D SIM isotope dilution.

PFAS and 1,4-dioxane samples will be collected and analyzed in accordance with the NYSDEC April 2023 "Sampling, Analysis and Assessment of Per- and Polyfluoroalkyl Substances (PFAS)" and the June 2019 Sampling for "1,4-dioxane and PFAS Under NYSDEC's Part 375 Remedial Programs," respectively. All PFAS samples collected after July 15, 2025 will be analyzed using EPA Method 1633A.

Groundwater wells will be sampled using low-flow sampling methods 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 C details field procedures and protocols that will be followed during the field activities. The QAPP presented in Appendix D details the analytical methods and procedures that will be used to analyze samples collected during the field activities. PFAS sampling at each monitoring well will be conducted following the purge and sampling method detailed in the NYSDEC guidance documents (see Appendix E).

Groundwater analytical results will be compared to 6 NYCRR Part 703.5 NYSDEC Technical and Operational Guidance Series 1.1.1 AWQS and Guidance Values.

3.5 INVESTIGATION-DERIVED WASTE

All investigation-derived waste (IDW) will be managed in accordance with Section 3.3(e) of DER-10. Drill cuttings and/or spoils generated during the remedial investigation that appear to be clean (i.e., no visual contamination or presence of contamination-related odors) may be used to backfill the borehole from which they were removed. All excess drill cuttings and drill cuttings/spoils that appear to be contaminated will be containerized for off-Site disposal at a properly permitted treatment, storage, or disposal facility. Boreholes will be restored to grade with the surrounding area.

Groundwater purged from the monitoring wells during development and sample collection will be placed into a New York State Department of Transportation-approved 55-gallon drums pending off-Site disposal. All IDW, including soil, groundwater, and decontamination fluids, will be stored in labeled drums or other appropriate containers and staged in a secure, impervious area on the Site in a manner to prevent leakage, deterioration, or the release of waste. All IDW will be transported off Site for disposal in a timely manner by a hauler licensed in accordance with 6 NYCRR Part 364. If the waste is determined to be hazardous, it will be shipped with a manifest in accordance with 6 NYCRR Part 372.

3.6 SOIL VAPOR SAMPLING

Samples will be collected in accordance with the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, October 2006). Seven vapor implants will be installed using a direct-push drill rig (e.g., Geoprobe®) or another appropriate drill rig, depending on subsurface conditions, to advance a stainless-steel probe to the desired sampling depth. Soil vapor probes will be installed in the 2-foot interval immediately above the groundwater interface, whichever occurs at a shallower depth. Sampling will occur over a two-hour duration.

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. Sampling methods are described in the FSP provided as Appendix C.

3.7 PROPOSED SAMPLING RATIONALE

Haley & Aldrich of New York has proposed the sample plan described herein and as shown on Figure 5, in consideration of the data generated during the previous investigations conducted at the Site. Previous investigations left data gaps throughout the Site, including a lack of analytical data for potentially high-risk areas that may have been impacted during historical Site operations. Proposed sampling in this RI will also include full suite analysis for soil and groundwater samples. In addition, adequate soil vapor samples are proposed for the eastern Site boundary nearest to the adjoining school across Berriman Street. To properly characterize the Site and identify and delineate potential source areas, all phases of media will be comprehensively investigated as part of this remedial investigation and data gaps will be evaluated.

The Proposed Sample Location Map (included as Figure 5) is designed to generate sufficient data to identify the source of contamination and 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.

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 F.

5. Quality Assurance and Quality Control

Quality assurance/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 D.

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 Deliverables 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 a Remedial Investigation Report (RIR), further discussed in Section 8.

7. Project Organization

A project team for the Site has been created based on qualifications and experience with personnel suited for successfully completing the project.

Mari Cate Conlon, P.G., will be the Principal in Charge and Qualified Environmental Professional (QEP) for this work. As the Principal in Charge, Ms. Conlon will be responsible for the overall completion of each task as per requirements outlined in this work plan and in accordance with the DER-10 guidance. As the QEP, Ms. Conlon will manage the day-to-day tasks, including coordination and supervision of field engineers and scientists, adherence to the work plan, and oversight of the project schedule.

Elizabeth Fitzgerald will be the Project Manager for this work. Ms. Fitzgerald will be responsible for communications with the NYSDEC Case Manager regarding project status, schedule, issues, and updates for the project work.

Michael Boland will be the Assistant Project Manager for this work and will also function as the Quality Assurance Officer (QAO). The QAO will assure the application and effectiveness of the QAPP by the analytical laboratory and the project staff, provide input to 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.

Delia Freliech will be the field geologist responsible for implementing the field effort for this work. The field geologist’s responsibilities will include implementing the work plan activities and directing the subcontractors to ensure successful completion of all field activities.

The drilling subcontractor will be Lakewood Environmental Services Corporation (Lakewood). Lakewood will provide a Geoprobe® operator to implement the scope of work in this RIWP.

The analytical laboratory will be Alpha Analytical of Westborough, Massachusetts, a New York Environmental Laboratory Accreditation Program-certified laboratory. Alpha Analytical will be responsible for analyzing samples 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 as Appendix G of this work plan. 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 remedy, 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) 40 CFR 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 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 ppm. Community air monitoring 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 mobile devices that notifies 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 it 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 8. 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 per this CAMP.

When work areas are within 20 feet of potentially exposed populations or occupied structures, a special requirements CAMP will be considered The NYSDOH CAMP guidance document is included as Appendix H.

8.3 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT (QHHEA)

A comprehensive QHHEA (on-Site and off-Site) will be performed following the collection of all remedial investigation 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 environmental assessment (DER-10; Appendix 3B). The results of the QHHEA will be provided in the RIR.

Based on the requirements stipulated in Section 3.10 and the decision key in Appendix 3C of DER-10, there was no need to prepare a Fish and Wildlife Resource Impact Analysis (FWRIA) for the Site. This is due to the fact that while the site is a concern for a discharge event (item 1 of the Decision Key), the contamination at the Site is not a threat to the fish and wildlife resources (item 13 of the Decision Key) as listed in Appendix 3C. Therefore as per Item 14 of the Decision Key, no FWRIA is required.

9. Reporting

Daily reports will be submitted to NYSDEC and NYSDOH summarizing the Site activities completed during the remedial investigation. Daily reports will include a Site figure, a description of Site activities, a photo log, and CAMP data. Daily reports will be submitted by the following business day after Site work is completed.

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

- A description of existing Site conditions;
- A summary of the fieldwork performed during remedial investigation activities;
- Figure showing sampling locations;
- Tables summarizing laboratory analytical results;
- Laboratory analytical data reports;
- DUSRs;
- CAMP logs;
- Soil boring, test pit, and monitoring well logs;
- Daily reports;
- Findings regarding the nature and extent of contamination at the Site; and
- Conclusions and recommendations.

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

10. Schedule

The Site owner plans to implement this RIWP promptly after its approval.

Task	Duration (days)	Start	End	2025		2026												2027											
				Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Preparation and Submission of BCP Application, RIWP and CPP	90	11/1/2025	1/30/2026	▨	▨	▨																							
30-Day Public Comment Period for BCP Application	30	1/30/2026	3/1/2026				▨																						
Execute BCA and NYSDEC & NYSDOH Approval of RIWP	60	3/1/2026	4/30/2026					▨	▨																				
Implementation of Remedial Investigation	30	4/30/2026	5/30/2026							▨																			
Preparation and Submission of RIR and RAWP	90	5/30/2026	8/28/2026								▨	▨	▨																
NYSDEC & NYSDOH Review of RIR & RAWP	60	8/28/2026	10/27/2026											▨	▨														
45-Day Public Comment Period for RAWP and Issuance of Decision Document	45	10/27/2026	12/11/2026													▨	▨												
Implementation of RAWP with Engineering Oversight	180	12/11/2026	7/1/2027														▨	▨	▨	▨	▨	▨							
Preparation of FER and SMP (if required)	90	6/1/2027	8/30/2027																				▨	▨	▨				
NYSDEC & NYSDOH Review of FER (and SMP, if required)	60	9/1/2027	11/1/2027																							▨	▨		
NYSDEC Issues COC	60	11/1/2027	12/31/2027																									▨	▨

Notes:

1. Schedule is estimated and subject to change
2. Implementation of RAWP does not include completion of building construction
3. NYSDEC - New York State Department of Environmental Conservation
4. NYSDOH - New York State Department of Health
5. BCP - Brownfield Cleanup Program
6. BCA - Brownfield Cleanup Agreement
7. RIWP - Remedial Investigation Work Plan
8. CPP - Citizen Participation Plan
9. RIR - Remedial Investigation Report
10. RAWP - Remedial Action Work Plan
11. FER - Final Engineering Report
12. SMP - Site Management Plan
13. COC - Certificate of Completion
14. COC issuance estimated for October 2026 and prior to December 31, 2027

References

1. Brownfield Cleanup Program Application. Proposed 98-114 Berriman Street Development. Prepared by Berriman Residents LLC & Haley & Aldrich of New York. Submitted December 2025.

2. GO Environmental, 2013. Subsurface Investigation Report, 223-225 Westchester Avenue, Port Chester, New York. October 28.

3. H & A of New York Engineering and Geology, LLP, 2025a. ASTM Phase I Environmental Site Assessment, 98-114 Berriman Street, Brooklyn, New York. Prepared for Berriman Residents LLC. September.

4. H & A of New York Engineering and Geology, LLP, 2025b. Limited Phase II Environmental Site Investigation Report. 98-114 Berriman Street, Brooklyn, New York. Prepared for Berriman Residents LLC. October.

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

6. New York State Department of Environmental Conservation, 2019. Sampling for 1,4-dioxane and PFAS Under DECs Part 375 Remedial Programs. June.

7. New York State Department of Environmental Conservation, 2023. Sampling, Analysis, and Assessment of PFAS Under NYSDEC's Part 375 Remedial Programs. April.

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

TABLES

TABLE 1
SAMPLE AND ANALYSIS PLAN
98-114 BERRIMAN STREET
BROOKLYN, NEW YORK

Sample Location	Sample Rationale	Estimated Sample Depth (feet bgs)	Target Compound List VOCs (8260B)	Target Compound List SVOCs (8270C)	Total Analyte List Metals (6010)	PCBs (8082)	Pesticides (8081B)	PFAS (1633)	1,4-Dioxane (8270 SIM)	VOCs (TO-15)
SOIL										
SB01	Shallow Urban Fill	0'-0.5'	X	X	X	X	X	X	X	
	Bottom of Urban Fill	2'-8'	X	X	X	X	X	X	X	
	Proposed Development Depth	12'-14'	X	X	X	X	X	X	X	
	2' interval above groundwater interface	23'-25'	X	X	X	X	X	X	X	
SB02	Shallow Urban Fill	0'-0.5'	X	X	X	X	X	X	X	
	Bottom of Urban Fill	2'-8'	X	X	X	X	X	X	X	
	Proposed Development Depth	12'-14'	X	X	X	X	X	X	X	
	2' interval above groundwater interface	23'-25'	X	X	X	X	X	X	X	
SB03	Shallow Urban Fill	0'-0.5'	X	X	X	X	X	X	X	
	Bottom of Urban Fill	2'-8'	X	X	X	X	X	X	X	
	Proposed Development Depth	12'-14'	X	X	X	X	X	X	X	
	2' interval above groundwater interface	23'-25'	X	X	X	X	X	X	X	
SB04	Shallow Urban Fill	0'-0.5'	X	X	X	X	X	X	X	
	Bottom of Urban Fill	2'-8'	X	X	X	X	X	X	X	
	Proposed Development Depth	12'-14'	X	X	X	X	X	X	X	
	2' interval above groundwater interface	23'-25'	X	X	X	X	X	X	X	
SB05	Shallow Urban Fill	0'-0.5'	X	X	X	X	X	X	X	
	Bottom of Urban Fill	2'-8'	X	X	X	X	X	X	X	
	Proposed Development Depth	12'-14'	X	X	X	X	X	X	X	
	2' interval above groundwater interface	23'-25'	X	X	X	X	X	X	X	
SB06	Shallow Urban Fill	0'-0.5'	X	X	X	X	X	X	X	
	Bottom of Urban Fill	2'-8'	X	X	X	X	X	X	X	
	Proposed Development Depth	12'-14'	X	X	X	X	X	X	X	
	2' interval above groundwater interface	23'-25'	X	X	X	X	X	X	X	
SB07	Shallow Urban Fill	0'-0.5'	X	X	X	X	X	X	X	
	Bottom of Urban Fill	2'-8'	X	X	X	X	X	X	X	
	Proposed Development Depth	12'-14'	X	X	X	X	X	X	X	
	2' interval above groundwater interface	23'-25'	X	X	X	X	X	X	X	
SB08	Shallow Urban Fill	0'-0.5'	X	X	X	X	X	X	X	
	Bottom of Urban Fill	2'-8'	X	X	X	X	X	X	X	
	Proposed Development Depth	12'-14'	X	X	X	X	X	X	X	
	2' interval above groundwater interface	23'-25'	X	X	X	X	X	X	X	
SB09	Shallow Urban Fill	0'-0.5'	X	X	X	X	X	X	X	
	Bottom of Urban Fill	2'-8'	X	X	X	X	X	X	X	
	Proposed Development Depth	12'-14'	X	X	X	X	X	X	X	
	2' interval above groundwater interface	23'-25'	X	X	X	X	X	X	X	
SB10	Shallow Urban Fill	0'-0.5'	X	X	X	X	X	X	X	
	Bottom of Urban Fill	2'-8'	X	X	X	X	X	X	X	
	Proposed Development Depth	12'-14'	X	X	X	X	X	X	X	
	2' interval above groundwater interface	23'-25'	X	X	X	X	X	X	X	
GROUNDWATER										
MW01	Groundwater	5' below groundwater interface	X	X	X	X	X	X	X	
MW02			X	X	X	X	X	X	X	
MW03			X	X	X	X	X	X	X	
MW04			X	X	X	X	X	X	X	
MW05			X	X	X	X	X	X	X	
MW06			X	X	X	X	X	X	X	
MW07			X	X	X	X	X	X	X	
SOIL VAPOR										
SV01	Soil Vapor	2' interval above groundwater interface								X
SV02										X
SV03										X
SV04										
SV05										X
SV06										X
SV07										X

Notes:
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
PCBs - Polychlorinated biphenyls
PFAS - Per- and Polyfluoroalkyl Substances
Additional samples will be collected from any interval exhibiting elevated PID readings or where visual and olfactory evidence of impacts are observed.

QA/QC samples include:
MS/MSD - 1 for every 20 samples
Trip Blanks - 1 per cooler of samples to be analyzed for VOCs
Field Blanks - 1 for every 20 samples
Duplicates - 1 for every 20 samples

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

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

Date Created: 08/02/23
Created By: Mitch Ostrowski
File: PM14945-1
Page: 1

Table 2. Minimum Reporting Limits
TCL Volatiles - EPA 8260D (WATER)

Holding Time: 14 days
Container/Sample Preservation: 3 - Vial HCl preserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Methylene chloride	75-09-2	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,1-Dichloroethane	75-34-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Chloroform	67-66-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Carbon tetrachloride	56-23-5	0.5	0.134	ug/l	63-132	20	63-132	20	20			
1,2-Dichloropropane	78-87-5	1	0.137	ug/l	70-130	20	70-130	20	20			
Dibromochloromethane	124-48-1	0.5	0.149	ug/l	63-130	20	63-130	20	20			
1,1,2-Trichloroethane	79-00-5	1.5	0.5	ug/l	70-130	20	70-130	20	20			
Tetrachloroethene	127-18-4	0.5	0.181	ug/l	70-130	20	70-130	20	20			
Chlorobenzene	108-90-7	2.5	0.7	ug/l	75-130	20	75-130	20	20			
Trichlorofluoromethane	75-69-4	2.5	0.7	ug/l	62-150	20	62-150	20	20			
1,2-Dichloroethane	107-06-2	0.5	0.132	ug/l	70-130	20	70-130	20	20			
1,1,1-Trichloroethane	71-55-6	2.5	0.7	ug/l	67-130	20	67-130	20	20			
Bromodichloromethane	75-27-4	0.5	0.192	ug/l	67-130	20	67-130	20	20			
trans-1,3-Dichloropropene	10061-02-6	0.5	0.164	ug/l	70-130	20	70-130	20	20			
cis-1,3-Dichloropropene	10061-01-5	0.5	0.144	ug/l	70-130	20	70-130	20	20			
1,3-Dichloropropene, Total	542-75-6	0.5	0.144	ug/l				20	20			
1,1-Dichloropropene	563-58-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Bromoform	75-25-2	2	0.65	ug/l	54-136	20	54-136	20	20			
1,1,2,2-Tetrachloroethane	79-34-5	0.5	0.167	ug/l	67-130	20	67-130	20	20			
Benzene	71-43-2	0.5	0.159	ug/l	70-130	20	70-130	20	20			
Toluene	108-88-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Ethylbenzene	100-41-4	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Chloromethane	74-87-3	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Bromomethane	74-83-9	2.5	0.7	ug/l	39-139	20	39-139	20	20			
Vinyl chloride	75-01-4	1	0.0714	ug/l	55-140	20	55-140	20	20			
Chloroethane	75-00-3	2.5	0.7	ug/l	55-138	20	55-138	20	20			
1,1-Dichloroethene	75-35-4	0.5	0.169	ug/l	61-145	20	61-145	20	20			
trans-1,2-Dichloroethene	156-60-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Trichloroethene	79-01-6	0.5	0.175	ug/l	70-130	20	70-130	20	20			
1,2-Dichlorobenzene	95-50-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,3-Dichlorobenzene	541-73-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,4-Dichlorobenzene	106-46-7	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Methyl tert butyl ether	1634-04-4	2.5	0.7	ug/l	63-130	20	63-130	20	20			
p/m-Xylene	179601-23-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
o-Xylene	95-47-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Xylene (Total)	1330-20-7	2.5	0.7	ug/l				20	20			
cis-1,2-Dichloroethene	156-59-2	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2-Dichloroethene (total)	540-59-0	2.5	0.7	ug/l				20	20			
Dibromomethane	74-95-3	5	1	ug/l	70-130	20	70-130	20	20			
1,2,3-Trichloropropane	96-18-4	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Acrylonitrile	107-13-1	5	1.5	ug/l	70-130	20	70-130	20	20			
Styrene	100-42-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Table 2. Minimum Reporting Limits
TCL Volatiles - EPA 8260D (WATER)

Holding Time: 14 days
Container/Sample Preservation: 3 - Vial HCl preserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria
Dichlorodifluoromethane	75-71-8	5	1	ug/l	36-147	20	36-147	20	20	
Acetone	67-64-1	5	1.46	ug/l	58-148	20	58-148	20	20	
Carbon disulfide	75-15-0	5	1	ug/l	51-130	20	51-130	20	20	
2-Butanone	78-93-3	5	1.94	ug/l	63-138	20	63-138	20	20	
Vinyl acetate	108-05-4	5	1	ug/l	70-130	20	70-130	20	20	
4-Methyl-2-pentanone	108-10-1	5	1	ug/l	59-130	20	59-130	20	20	
2-Hexanone	591-78-6	5	1	ug/l	57-130	20	57-130	20	20	
Bromochloromethane	74-97-5	2.5	0.7	ug/l	70-130	20	70-130	20	20	
2,2-Dichloropropane	594-20-7	2.5	0.7	ug/l	63-133	20	63-133	20	20	
1,2-Dibromoethane	106-93-4	2	0.65	ug/l	70-130	20	70-130	20	20	
1,3-Dichloropropane	142-28-9	2.5	0.7	ug/l	70-130	20	70-130	20	20	
1,1,1,2-Tetrachloroethane	630-20-6	2.5	0.7	ug/l	64-130	20	64-130	20	20	
Bromobenzene	108-86-1	2.5	0.7	ug/l	70-130	20	70-130	20	20	
n-Butylbenzene	104-51-8	2.5	0.7	ug/l	53-136	20	53-136	20	20	
sec-Butylbenzene	135-98-8	2.5	0.7	ug/l	70-130	20	70-130	20	20	
tert-Butylbenzene	98-06-6	2.5	0.7	ug/l	70-130	20	70-130	20	20	
o-Chlorotoluene	95-49-8	2.5	0.7	ug/l	70-130	20	70-130	20	20	
p-Chlorotoluene	106-43-4	2.5	0.7	ug/l	70-130	20	70-130	20	20	
1,2-Dibromo-3-chloropropane	96-12-8	2.5	0.7	ug/l	41-144	20	41-144	20	20	
Hexachlorobutadiene	87-68-3	2.5	0.7	ug/l	63-130	20	63-130	20	20	
Isopropylbenzene	98-82-8	2.5	0.7	ug/l	70-130	20	70-130	20	20	
p-Isopropyltoluene	99-87-6	2.5	0.7	ug/l	70-130	20	70-130	20	20	
Naphthalene	91-20-3	2.5	0.7	ug/l	70-130	20	70-130	20	20	
n-Propylbenzene	103-65-1	2.5	0.7	ug/l	69-130	20	69-130	20	20	
1,2,3-Trichlorobenzene	87-61-6	2.5	0.7	ug/l	70-130	20	70-130	20	20	
1,2,4-Trichlorobenzene	120-82-1	2.5	0.7	ug/l	70-130	20	70-130	20	20	
1,3,5-Trimethylbenzene	108-67-8	2.5	0.7	ug/l	64-130	20	64-130	20	20	
1,2,4-Trimethylbenzene	95-63-6	2.5	0.7	ug/l	70-130	20	70-130	20	20	
1,4-Dioxane	123-91-1	250	60.8	ug/l	56-162	20	56-162	20	20	
1,4-Diethylbenzene	105-05-5	2	0.7	ug/l	70-130	20	70-130	20	20	
4-Ethyltoluene	622-96-8	2	0.7	ug/l	70-130	20	70-130	20	20	
1,2,4,5-Tetramethylbenzene	95-93-2	2	0.542	ug/l	70-130	20	70-130	20	20	
Ethyl ether	60-29-7	2.5	0.7	ug/l	59-134	20	59-134	20	20	
trans-1,4-Dichloro-2-butene	110-57-6	2.5	0.7	ug/l	70-130	20	70-130	20	20	
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*
Toluene-d8	*2037-26-5*									*70-130*
4-Bromofluorobenzene	*460-00-4*									*70-130*
Dibromofluoromethane	*1868-53-7*									*70-130*

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Table 2. Minimum Reporting Limits
TCL Volatiles - EPA 8260D/5035 High&Low (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - 1 Vial MeOH/2 Vial Water

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Methylene chloride	75-09-2	5	2.29	ug/kg	70-130	30	70-130	30	30			
1,1-Dichloroethane	75-34-3	1	0.145	ug/kg	70-130	30	70-130	30	30			
Chloroform	67-66-3	1.5	0.14	ug/kg	70-130	30	70-130	30	30			
Carbon tetrachloride	56-23-5	1	0.23	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloropropane	78-87-5	1	0.125	ug/kg	70-130	30	70-130	30	30			
Dibromochloromethane	124-48-1	1	0.14	ug/kg	70-130	30	70-130	30	30			
1,1,2-Trichloroethane	79-00-5	1	0.267	ug/kg	70-130	30	70-130	30	30			
Tetrachloroethene	127-18-4	0.5	0.196	ug/kg	70-130	30	70-130	30	30			
Chlorobenzene	108-90-7	0.5	0.127	ug/kg	70-130	30	70-130	30	30			
Trichlorofluoromethane	75-69-4	4	0.695	ug/kg	70-139	30	70-139	30	30			
1,2-Dichloroethane	107-06-2	1	0.257	ug/kg	70-130	30	70-130	30	30			
1,1,1-Trichloroethane	71-55-6	0.5	0.167	ug/kg	70-130	30	70-130	30	30			
Bromodichloromethane	75-27-4	0.5	0.109	ug/kg	70-130	30	70-130	30	30			
trans-1,3-Dichloropropene	10061-02-6	1	0.273	ug/kg	70-130	30	70-130	30	30			
cis-1,3-Dichloropropene	10061-01-5	0.5	0.158	ug/kg	70-130	30	70-130	30	30			
1,3-Dichloropropene, Total	542-75-6	0.5	0.158	ug/kg				30	30			
1,1-Dichloropropene	563-58-6	0.5	0.159	ug/kg	70-130	30	70-130	30	30			
Bromoform	75-25-2	4	0.246	ug/kg	70-130	30	70-130	30	30			
1,1,2,2-Tetrachloroethane	79-34-5	0.5	0.166	ug/kg	70-130	30	70-130	30	30			
Benzene	71-43-2	0.5	0.166	ug/kg	70-130	30	70-130	30	30			
Toluene	108-88-3	1	0.543	ug/kg	70-130	30	70-130	30	30			
Ethylbenzene	100-41-4	1	0.141	ug/kg	70-130	30	70-130	30	30			
Chloromethane	74-87-3	4	0.932	ug/kg	52-130	30	52-130	30	30			
Bromomethane	74-83-9	2	0.581	ug/kg	57-147	30	57-147	30	30			
Vinyl chloride	75-01-4	1	0.335	ug/kg	67-130	30	67-130	30	30			
Chloroethane	75-00-3	2	0.452	ug/kg	50-151	30	50-151	30	30			
1,1-Dichloroethene	75-35-4	1	0.238	ug/kg	65-135	30	65-135	30	30			
trans-1,2-Dichloroethene	156-60-5	1.5	0.137	ug/kg	70-130	30	70-130	30	30			
Trichloroethene	79-01-6	0.5	0.137	ug/kg	70-130	30	70-130	30	30			
1,2-Dichlorobenzene	95-50-1	2	0.144	ug/kg	70-130	30	70-130	30	30			
1,3-Dichlorobenzene	541-73-1	2	0.148	ug/kg	70-130	30	70-130	30	30			
1,4-Dichlorobenzene	106-46-7	2	0.171	ug/kg	70-130	30	70-130	30	30			
Methyl tert butyl ether	1634-04-4	2	0.201	ug/kg	66-130	30	66-130	30	30			
p/m-Xylene	179601-23-1	2	0.56	ug/kg	70-130	30	70-130	30	30			
o-Xylene	95-47-6	1	0.291	ug/kg	70-130	30	70-130	30	30			
Xylene (Total)	1330-20-7	1	0.291	ug/kg				30	30			
cis-1,2-Dichloroethene	156-59-2	1	0.175	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloroethene (total)	540-59-0	1	0.137	ug/kg				30	30			
Dibromomethane	74-95-3	2	0.238	ug/kg	70-130	30	70-130	30	30			
Styrene	100-42-5	1	0.196	ug/kg	70-130	30	70-130	30	30			
Dichlorodifluoromethane	75-71-8	10	0.915	ug/kg	30-146	30	30-146	30	30			
Acetone	67-64-1	10	4.811	ug/kg	54-140	30	54-140	30	30			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/02/23
Created By: Mitch Ostrowski
File: PM14945-1
Page: 2

Table 2. Minimum Reporting Limits
TCL Volatiles - EPA 8260D/5035 High&Low (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - 1 Vial MeOH/2 Vial Water

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Carbon disulfide	75-15-0	10	4.55	ug/kg	59-130	30	59-130	30	30			
2-Butanone	78-93-3	10	2.22	ug/kg	70-130	30	70-130	30	30			
Vinyl acetate	108-05-4	10	2.15	ug/kg	70-130	30	70-130	30	30			
4-Methyl-2-pentanone	108-10-1	10	1.28	ug/kg	70-130	30	70-130	30	30			
1,2,3-Trichloropropane	96-18-4	2	0.127	ug/kg	68-130	30	68-130	30	30			
2-Hexanone	591-78-6	10	1.18	ug/kg	70-130	30	70-130	30	30			
Bromochloromethane	74-97-5	2	0.205	ug/kg	70-130	30	70-130	30	30			
2,2-Dichloropropane	594-20-7	2	0.202	ug/kg	70-130	30	70-130	30	30			
1,2-Dibromoethane	106-93-4	1	0.279	ug/kg	70-130	30	70-130	30	30			
1,3-Dichloropropane	142-28-9	2	0.167	ug/kg	69-130	30	69-130	30	30			
1,1,1,2-Tetrachloroethane	630-20-6	0.5	0.132	ug/kg	70-130	30	70-130	30	30			
Bromobenzene	108-86-1	2	0.145	ug/kg	70-130	30	70-130	30	30			
n-Butylbenzene	104-51-8	1	0.167	ug/kg	70-130	30	70-130	30	30			
sec-Butylbenzene	135-98-8	1	0.146	ug/kg	70-130	30	70-130	30	30			
tert-Butylbenzene	98-06-6	2	0.118	ug/kg	70-130	30	70-130	30	30			
o-Chlorotoluene	95-49-8	2	0.191	ug/kg	70-130	30	70-130	30	30			
p-Chlorotoluene	106-43-4	2	0.108	ug/kg	70-130	30	70-130	30	30			
1,2-Dibromo-3-chloropropane	96-12-8	3	0.998	ug/kg	68-130	30	68-130	30	30			
Hexachlorobutadiene	87-68-3	4	0.169	ug/kg	67-130	30	67-130	30	30			
Isopropylbenzene	98-82-8	1	0.109	ug/kg	70-130	30	70-130	30	30			
p-Isopropyltoluene	99-87-6	1	0.109	ug/kg	70-130	30	70-130	30	30			
Naphthalene	91-20-3	4	0.65	ug/kg	70-130	30	70-130	30	30			
Acrylonitrile	107-13-1	4	1.15	ug/kg	70-130	30	70-130	30	30			
n-Propylbenzene	103-65-1	1	0.171	ug/kg	70-130	30	70-130	30	30			
1,2,3-Trichlorobenzene	87-61-6	2	0.322	ug/kg	70-130	30	70-130	30	30			
1,2,4-Trichlorobenzene	120-82-1	2	0.272	ug/kg	70-130	30	70-130	30	30			
1,3,5-Trimethylbenzene	108-67-8	2	0.193	ug/kg	70-130	30	70-130	30	30			
1,2,4-Trimethylbenzene	95-63-6	2	0.334	ug/kg	70-130	30	70-130	30	30			
1,4-Dioxane	123-91-1	80	35.1	ug/kg	65-136	30	65-136	30	30			
1,4-Diethylbenzene	105-05-5	2	0.177	ug/kg	70-130	30	70-130	30	30			
4-Ethyltoluene	622-96-8	2	0.384	ug/kg	70-130	30	70-130	30	30			
1,2,4,5-Tetramethylbenzene	95-93-2	2	0.191	ug/kg	70-130	30	70-130	30	30			
Ethyl ether	60-29-7	2	0.341	ug/kg	67-130	30	67-130	30	30			
trans-1,4-Dichloro-2-butene	110-57-6	5	1.42	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
2-Chloroethoxyethane												
Toluene-d8	*2037-26-5*									*70-130*		
4-Bromofluorobenzene	*460-00-4*									*70-130*		
Dibromofluoromethane	*1868-53-7*									*70-130*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
NYTCL Semivolatiles - EPA 8270E (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Acenaphthene	83-32-9	133.6	17.3012	ug/kg	31-137	50	31-137	50	50			
1,2,4-Trichlorobenzene	120-82-1	167	19.1048	ug/kg	38-107	50	38-107	50	50			
Hexachlorobenzene	118-74-1	100.2	18.704	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroethyl)ether	111-44-4	150.3	22.6452	ug/kg	40-140	50	40-140	50	50			
2-Chloronaphthalene	91-58-7	167	16.5664	ug/kg	40-140	50	40-140	50	50			
1,2-Dichlorobenzene	95-50-1	167	29.9932	ug/kg	40-140	50	40-140	50	50			
1,3-Dichlorobenzene	541-73-1	167	28.724	ug/kg	40-140	50	40-140	50	50			
1,4-Dichlorobenzene	106-46-7	167	29.1582	ug/kg	28-104	50	28-104	50	50			
3,3'-Dichlorobenzidine	91-94-1	167	44.422	ug/kg	40-140	50	40-140	50	50			
2,4-Dinitrotoluene	121-14-2	167	33.4	ug/kg	40-132	50	40-132	50	50			
2,6-Dinitrotoluene	606-20-2	167	28.6572	ug/kg	40-140	50	40-140	50	50			
Fluoranthene	206-44-0	100.2	19.1716	ug/kg	40-140	50	40-140	50	50			
4-Chlorophenyl phenyl ether	7005-72-3	167	17.869	ug/kg	40-140	50	40-140	50	50			
4-Bromophenyl phenyl ether	101-55-3	167	25.4842	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroisopropyl)ether	108-60-1	200.4	28.5236	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroethoxy)methane	111-91-1	180.36	16.7334	ug/kg	40-117	50	40-117	50	50			
Hexachlorobutadiene	87-68-3	167	24.4488	ug/kg	40-140	50	40-140	50	50			
Hexachlorocyclopentadiene	77-47-4	477.62	151.302	ug/kg	40-140	50	40-140	50	50			
Hexachloroethane	67-72-1	133.6	27.0206	ug/kg	40-140	50	40-140	50	50			
Isophorone	78-59-1	150.3	21.6766	ug/kg	40-140	50	40-140	50	50			
Naphthalene	91-20-3	167	20.3406	ug/kg	40-140	50	40-140	50	50			
Nitrobenzene	98-95-3	150.3	24.716	ug/kg	40-140	50	40-140	50	50			
NitrosoDiPhenylAmine(NDPA)/DPA	86-30-6	133.6	19.0046	ug/kg	36-157	50	36-157	50	50			
n-Nitrosodi-n-propylamine	621-64-7	167	25.7848	ug/kg	32-121	50	32-121	50	50			
Bis(2-Ethylhexyl)phthalate	117-81-7	167	57.782	ug/kg	40-140	50	40-140	50	50			
Butyl benzyl phthalate	85-68-7	167	42.084	ug/kg	40-140	50	40-140	50	50			
Di-n-butylphthalate	84-74-2	167	31.6632	ug/kg	40-140	50	40-140	50	50			
Di-n-octylphthalate	117-84-0	167	56.78	ug/kg	40-140	50	40-140	50	50			
Diethyl phthalate	84-66-2	167	15.4642	ug/kg	40-140	50	40-140	50	50			
Dimethyl phthalate	131-11-3	167	35.07	ug/kg	40-140	50	40-140	50	50			
Benzo(a)anthracene	56-55-3	100.2	18.8042	ug/kg	40-140	50	40-140	50	50			
Benzo(a)pyrene	50-32-8	133.6	40.748	ug/kg	40-140	50	40-140	50	50			
Benzo(b)fluoranthene	205-99-2	100.2	28.1228	ug/kg	40-140	50	40-140	50	50			
Benzo(k)fluoranthene	207-08-9	100.2	26.72	ug/kg	40-140	50	40-140	50	50			
Chrysene	218-01-9	100.2	17.368	ug/kg	40-140	50	40-140	50	50			
Acenaphthylene	208-96-8	133.6	25.7848	ug/kg	40-140	50	40-140	50	50			
Anthracene	120-12-7	100.2	32.565	ug/kg	40-140	50	40-140	50	50			
Benzo(ghi)perylene	191-24-2	133.6	19.6392	ug/kg	40-140	50	40-140	50	50			
Fluorene	86-73-7	167	16.2324	ug/kg	40-140	50	40-140	50	50			
Phenanthrene	85-01-8	100.2	20.3072	ug/kg	40-140	50	40-140	50	50			
Dibenzo(a,h)anthracene	53-70-3	100.2	19.3052	ug/kg	40-140	50	40-140	50	50			
Indeno(1,2,3-cd)Pyrene	193-39-5	133.6	23.2798	ug/kg	40-140	50	40-140	50	50			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Table 2. Minimum Reporting Limits
NYTCL Semivolatiles - EPA 8270E (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Pyrene	129-00-0	100.2	16.5998	ug/kg	35-142	50	35-142	50	50			
Biphenyl	92-52-4	380.76	21.71	ug/kg	37-127	50	37-127	50	50			
4-Chloroaniline	106-47-8	167	30.394	ug/kg	40-140	50	40-140	50	50			
2-Nitroaniline	88-74-4	167	32.1976	ug/kg	47-134	50	47-134	50	50			
3-Nitroaniline	99-09-2	167	31.4962	ug/kg	26-129	50	26-129	50	50			
4-Nitroaniline	100-01-6	167	69.138	ug/kg	41-125	50	41-125	50	50			
Dibenzofuran	132-64-9	167	15.7982	ug/kg	40-140	50	40-140	50	50			
2-Methylnaphthalene	91-57-6	200.4	20.1736	ug/kg	40-140	50	40-140	50	50			
Acetophenone	98-86-2	167	20.6746	ug/kg	14-144	50	14-144	50	50			
2,4,6-Trichlorophenol	88-06-2	100.2	31.6632	ug/kg	30-130	50	30-130	50	50			
P-Chloro-M-Cresol	59-50-7	167	24.883	ug/kg	26-103	50	26-103	50	50			
2-Chlorophenol	95-57-8	167	19.7394	ug/kg	25-102	50	25-102	50	50			
2,4-Dichlorophenol	120-83-2	150.3	26.8536	ug/kg	30-130	50	30-130	50	50			
2,4-Dimethylphenol	105-67-9	167	55.11	ug/kg	30-130	50	30-130	50	50			
2-Nitrophenol	88-75-5	360.72	62.792	ug/kg	30-130	50	30-130	50	50			
4-Nitrophenol	100-02-7	233.8	68.136	ug/kg	11-114	50	11-114	50	50			
2,4-Dinitrophenol	51-28-5	801.6	77.822	ug/kg	4-130	50	4-130	50	50			
4,6-Dinitro-o-cresol	534-52-1	434.2	80.16	ug/kg	10-130	50	10-130	50	50			
Pentachlorophenol	87-86-5	133.6	36.74	ug/kg	17-109	50	17-109	50	50			
Phenol	108-95-2	167	25.217	ug/kg	26-90	50	26-90	50	50			
2-Methylphenol	95-48-7	167	25.885	ug/kg	30-130.	50	30-130.	50	50			
3-Methylphenol/4-Methylphenol	106-44-5	240.48	26.1522	ug/kg	30-130	50	30-130	50	50			
2,4,5-Trichlorophenol	95-95-4	167	31.9972	ug/kg	30-130	50	30-130	50	50			
Benzoic Acid	65-85-0	541.08	169.004	ug/kg	10-110	50	10-110	50	50			
Benzyl Alcohol	100-51-6	167	51.102	ug/kg	40-140	50	40-140	50	50			
Carbazole	86-74-8	167	16.2324	ug/kg	54-128	50	54-128	50	50			
1,4-Dioxane	123-91-1	25.05	7.682	ug/kg	40-140	50	40-140	50	50			
2-Fluorophenol	*367-12-4*									*25-120*		
Phenol-d6	*13127-88-3*									*10-120*		
Nitrobenzene-d5	*4165-60-0*									*23-120*		
2-Fluorobiphenyl	*321-60-8*									*30-120*		
2,4,6-Tribromophenol	*118-79-6*									*10-136*		
4-Terphenyl-d14	*1718-51-0*									*18-120*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
NYTCL Semivolatiles - EPA 8270E (LVI) (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 250ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Acenaphthene	83-32-9	2.002	0.44408	ug/l	37-111	30	37-111	30	30			
1,2,4-Trichlorobenzene	120-82-1	5.0232	0.49868	ug/l	39-98	30	39-98	30	30			
Hexachlorobenzene	118-74-1	2.002	0.46592	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroethyl)ether	111-44-4	2.002	0.50596	ug/l	40-140	30	40-140	30	30			
2-Chloronaphthalene	91-58-7	2.002	0.4368	ug/l	40-140	30	40-140	30	30			
1,2-Dichlorobenzene	95-50-1	2.002	0.455	ug/l	40-140	30	40-140	30	30			
1,3-Dichlorobenzene	541-73-1	2.002	0.40404	ug/l	40-140	30	40-140	30	30			
1,4-Dichlorobenzene	106-46-7	2.002	0.43316	ug/l	36-97	30	36-97	30	30			
3,3'-Dichlorobenzidine	91-94-1	5.0232	1.62344	ug/l	40-140	30	40-140	30	30			
2,4-Dinitrotoluene	121-14-2	5.0232	1.1648	ug/l	48-143	30	48-143	30	30			
2,6-Dinitrotoluene	606-20-2	5.0232	0.93184	ug/l	40-140	30	40-140	30	30			
Fluoranthene	206-44-0	2.002	0.257348	ug/l	40-140	30	40-140	30	30			
4-Chlorophenyl phenyl ether	7005-72-3	2.002	0.48776	ug/l	40-140	30	40-140	30	30			
4-Bromophenyl phenyl ether	101-55-3	2.002	0.37856	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroisopropyl)ether	108-60-1	2.002	0.5278	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroethoxy)methane	111-91-1	5.0232	0.50232	ug/l	40-140	30	40-140	30	30			
Hexachlorobutadiene	87-68-3	2.002	0.65884	ug/l	40-140	30	40-140	30	30			
Hexachlorocyclopentadiene	77-47-4	20.02	0.68796	ug/l	40-140	30	40-140	30	30			
Hexachloroethane	67-72-1	2.002	0.58604	ug/l	40-140	30	40-140	30	30			
Isophorone	78-59-1	5.0232	1.20484	ug/l	40-140	30	40-140	30	30			
Naphthalene	91-20-3	2.002	0.46592	ug/l	40-140	30	40-140	30	30			
Nitrobenzene	98-95-3	2.002	0.77168	ug/l	40-140	30	40-140	30	30			
NitrosoDiPhenylAmine(NDPA)/DPA	86-30-6	2.002	0.4186	ug/l	40-140	30	40-140	30	30			
n-Nitrosodi-n-propylamine	621-64-7	5.0232	0.64428	ug/l	29-132	30	29-132	30	30			
Bis(2-Ethylhexyl)phthalate	117-81-7	3.003	1.53608	ug/l	40-140	30	40-140	30	30			
Butyl benzyl phthalate	85-68-7	5.0232	1.17208	ug/l	40-140	30	40-140	30	30			
Di-n-butylphthalate	84-74-2	5.0232	0.38948	ug/l	40-140	30	40-140	30	30			
Di-n-octylphthalate	117-84-0	5.0232	1.274	ug/l	40-140	30	40-140	30	30			
Diethyl phthalate	84-66-2	5.0232	0.3822	ug/l	40-140	30	40-140	30	30			
Dimethyl phthalate	131-11-3	5.0232	1.82	ug/l	40-140	30	40-140	30	30			
Benzo(a)anthracene	56-55-3	2.002	0.32578	ug/l	40-140	30	40-140	30	30			
Benzo(a)pyrene	50-32-8	2.002	0.40768	ug/l	40-140	30	40-140	30	30			
Benzo(b)fluoranthene	205-99-2	2.002	0.355264	ug/l	40-140	30	40-140	30	30			
Benzo(k)fluoranthene	207-08-9	2.002	0.37492	ug/l	40-140	30	40-140	30	30			
Chrysene	218-01-9	2.002	0.341068	ug/l	40-140	30	40-140	30	30			
Acenaphthylene	208-96-8	2.002	0.46592	ug/l	45-123	30	45-123	30	30			
Anthracene	120-12-7	2.002	0.32942	ug/l	40-140	30	40-140	30	30			
Benzo(ghi)perylene	191-24-2	2.002	0.296296	ug/l	40-140	30	40-140	30	30			
Fluorene	86-73-7	2.002	0.41496	ug/l	40-140	30	40-140	30	30			
Phenanthrene	85-01-8	2.002	0.33124	ug/l	40-140	30	40-140	30	30			
Dibenzo(a,h)anthracene	53-70-3	2.002	0.323232	ug/l	40-140	30	40-140	30	30			
Indeno(1,2,3-cd)Pyrene	193-39-5	2.002	0.39676	ug/l	40-140	30	40-140	30	30			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Table 2. Minimum Reporting Limits
NYTCL Semivolatiles - EPA 8270E (LVI) (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 250ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Pyrene	129-00-0	2.002	0.279552	ug/l	26-127	30	26-127	30	30			
Biphenyl	92-52-4	2.002	0.45864	ug/l	40-140	30	40-140	30	30			
4-Chloroaniline	106-47-8	5.0232	1.07016	ug/l	40-140	30	40-140	30	30			
2-Nitroaniline	88-74-4	5.0232	0.49868	ug/l	52-143	30	52-143	30	30			
3-Nitroaniline	99-09-2	5.0232	0.81536	ug/l	25-145	30	25-145	30	30			
4-Nitroaniline	100-01-6	5.0232	0.8008	ug/l	51-143	30	51-143	30	30			
Dibenzofuran	132-64-9	2.002	0.49868	ug/l	40-140	30	40-140	30	30			
2-Methylnaphthalene	91-57-6	2.002	0.455	ug/l	40-140	30	40-140	30	30			
Acetophenone	98-86-2	5.0232	0.5278	ug/l	39-129	30	39-129	30	30			
2,4,6-Trichlorophenol	88-06-2	5.0232	0.61152	ug/l	30-130	30	30-130	30	30			
P-Chloro-M-Cresol	59-50-7	2.002	0.35126	ug/l	23-97	30	23-97	30	30			
2-Chlorophenol	95-57-8	2.002	0.48048	ug/l	27-123	30	27-123	30	30			
2,4-Dichlorophenol	120-83-2	5.0232	0.41132	ug/l	30-130	30	30-130	30	30			
2,4-Dimethylphenol	105-67-9	5.0232	1.77996	ug/l	30-130	30	30-130	30	30			
2-Nitrophenol	88-75-5	10.01	0.84812	ug/l	30-130	30	30-130	30	30			
4-Nitrophenol	100-02-7	10.01	0.6734	ug/l	10-80	30	10-80	30	30			
2,4-Dinitrophenol	51-28-5	20.02	6.6612	ug/l	20-130	30	20-130	30	30			
4,6-Dinitro-o-cresol	534-52-1	10.01	1.81636	ug/l	20-164	30	20-164	30	30			
Pentachlorophenol	87-86-5	10.01	1.79452	ug/l	9-103	30	9-103	30	30			
Phenol	108-95-2	5.0232	0.56784	ug/l	12-110	30	12-110	30	30			
2-Methylphenol	95-48-7	5.0232	0.4914	ug/l	30-130	30	30-130	30	30			
3-Methylphenol/4-Methylphenol	106-44-5	5.0232	0.48048	ug/l	30-130	30	30-130	30	30			
2,4,5-Trichlorophenol	95-95-4	5.0232	0.77532	ug/l	30-130	30	30-130	30	30			
Benzoic Acid	65-85-0	50.232	2.66084	ug/l	10-164	30	10-164	30	30			
Benzyl Alcohol	100-51-6	2.002	0.58968	ug/l	26-116	30	26-116	30	30			
Carbazole	86-74-8	2.002	0.4914	ug/l	55-144	30	55-144	30	30			
2-Fluorophenol	*367-12-4*									*21-120*		
Phenol-d6	*13127-88-3*									*10-120*		
Nitrobenzene-d5	*4165-60-0*									*23-120*		
2-Fluorobiphenyl	*321-60-8*									*15-120*		
2,4,6-Tribromophenol	*118-79-6*									*10-120*		
4-Terphenyl-d14	*1718-51-0*									*41-149*		

Please Note that the RL information provided in this table is calculated using a 100% Solids facto (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
METALS by 6010D (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Aluminum, Total	7429-90-5	4	1.08	mg/kg	48-151		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Antimony, Total	7440-36-0	2	0.152	mg/kg	1-208		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Arsenic, Total	7440-38-2	0.4	0.0832	mg/kg	79-121		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Barium, Total	7440-39-3	0.4	0.0696	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Beryllium, Total	7440-41-7	0.2	0.0132	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Cadmium, Total	7440-43-9	0.4	0.0392	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Calcium, Total	7440-70-2	4	1.4	mg/kg	81-119		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Chromium, Total	7440-47-3	0.4	0.0384	mg/kg	80-120		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Cobalt, Total	7440-48-4	0.8	0.0664	mg/kg	84-115		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Copper, Total	7440-50-8	0.4	0.1032	mg/kg	81-118		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Iron, Total	7439-89-6	2	0.3612	mg/kg	45-155		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Lead, TCLP	7439-92-1	0.5	0.027	mg/l	75-125	20	75-125	20	20		180 days	1 - Glass 250ml/8oz unpreserved
Lead, Total	7439-92-1	2	0.1072	mg/kg	81-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Lead, TCLP	7439-92-1	0.5	0.027	mg/l	75-125	20	75-125	20	20		180 days	1 - Plastic 500ml unpreserved
Magnesium, Total	7439-95-4	4	0.616	mg/kg	76-124		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Manganese, Total	7439-96-5	0.4	0.0636	mg/kg	81-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Nickel, Total	7440-02-0	1	0.0968	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Potassium, Total	7440-09-7	100	5.76	mg/kg	71-129		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Selenium, Total	7782-49-2	0.8	0.1032	mg/kg	78-122		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Silver, Total	7440-22-4	0.2	0.1132	mg/kg	75-124		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Sodium, Total	7440-23-5	80	1.26	mg/kg	72-127		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Thallium, Total	7440-28-0	0.8	0.126	mg/kg	80-120		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Vanadium, Total	7440-62-2	0.4	0.0812	mg/kg	78-122		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Zinc, Total	7440-66-6	2	0.1172	mg/kg	82-118		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved

Please Note that the RL information provided in this table is calculated using a 100% Solids facto (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, In

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
METALS by 6020B (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Aluminum, Total	7429-90-5	10	3.27	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Antimony, Total	7440-36-0	4	0.429	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Arsenic, Total	7440-38-2	0.5	0.165	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Barium, Total	7440-39-3	0.5	0.173	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Beryllium, Total	7440-41-7	0.5	0.107	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Cadmium, Total	7440-43-9	0.2	0.0599	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Calcium, Total	7440-70-2	100	39.4	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Chromium, Total	7440-47-3	1	0.178	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Cobalt, Total	7440-48-4	0.5	0.163	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Copper, Total	7440-50-8	1	0.384	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Iron, Total	7439-89-6	50	19.1	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Lead, Total	7439-92-1	1	0.343	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Magnesium, Total	7439-95-4	70	24.2	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Manganese, Total	7439-96-5	1	0.44	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Nickel, Total	7440-02-0	2	0.556	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Potassium, Total	7440-09-7	100	30.9	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Selenium, Total	7782-49-2	5	1.73	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Silver, Total	7440-22-4	0.4	0.163	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Sodium, Total	7440-23-5	100	29.3	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Thallium, Total	7440-28-0	1	0.143	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Vanadium, Total	7440-62-2	5	1.57	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Zinc, Total	7440-66-6	10	3.41	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
TCL PCBs - EPA 8082A (SOIL)

Holding Time: 365 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Aroclor 1016	12674-11-2	50	4.44	ug/kg	40-140	50	40-140	50	50			
Aroclor 1221	11104-28-2	50	5.01	ug/kg	40-140	50	40-140	50	50			
Aroclor 1232	11141-16-5	50	10.6	ug/kg	40-140	50	40-140	50	50			
Aroclor 1242	53469-21-9	50	6.74	ug/kg	40-140	50	40-140	50	50			
Aroclor 1248	12672-29-6	50	7.5	ug/kg	40-140	50	40-140	50	50			
Aroclor 1254	11097-69-1	50	5.47	ug/kg	40-140	50	40-140	50	50			
Aroclor 1260	11096-82-5	50	9.24	ug/kg	40-140	50	40-140	50	50			
Aroclor 1262	37324-23-5	50	6.35	ug/kg	40-140	50	40-140	50	50			
Aroclor 1268	11100-14-4	50	5.18	ug/kg	40-140	50	40-140	50	50			
PCBs, Total	1336-36-3	50	4.44	ug/kg				50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

***Please Note that the RL information provided in this table is calculated using a 100% Solids factor** (Soil/Solids only)*

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
TCL PCBs - EPA 8082A (LVI) (WATER)

Holding Time: 365 days
Container/Sample Preservation: 2 - Amber 120ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Aroclor 1016	12674-11-2	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1221	11104-28-2	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1232	11141-16-5	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1242	53469-21-9	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1248	12672-29-6	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1254	11097-69-1	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1260	11096-82-5	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1262	37324-23-5	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1268	11100-14-4	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
PCBs, Total	1336-36-3	0.0000714	0.000061047	mg/l				50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
TCL Pesticides - EPA 8081B (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 120ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Delta-BHC	319-86-8	1.6008	0.31349	ug/kg	30-150	30	30-150	50	50			
Delta-BHC	319-86-8	0.02	0.00467	ug/l	30-150	20	30-150	30	30			
Lindane	58-89-9	0.667	0.298149	ug/kg	30-150	30	30-150	50	50			
Lindane	58-89-9	0.02	0.00434	ug/l	30-150	20	30-150	30	30			
Alpha-BHC	319-84-6	0.667	0.189428	ug/kg	30-150	30	30-150	50	50			
Alpha-BHC	319-84-6	0.02	0.00439	ug/l	30-150	20	30-150	30	30			
Beta-BHC	319-85-7	1.6008	0.60697	ug/kg	30-150	30	30-150	50	50			
Beta-BHC	319-85-7	0.02	0.0056	ug/l	30-150	20	30-150	30	30			
Heptachlor	76-44-8	0.02	0.0031	ug/l	30-150	20	30-150	30	30			
Heptachlor	76-44-8	0.8004	0.358846	ug/kg	30-150	30	30-150	50	50			
Aldrin	309-00-2	1.6008	0.563615	ug/kg	30-150	30	30-150	50	50			
Aldrin	309-00-2	0.02	0.00216	ug/l	30-150	20	30-150	30	30			
Heptachlor epoxide	1024-57-3	3.0015	0.90045	ug/kg	30-150	30	30-150	50	50			
Heptachlor epoxide	1024-57-3	0.02	0.00415	ug/l	30-150	20	30-150	30	30			
Endrin	72-20-8	0.667	0.27347	ug/kg	30-150	30	30-150	50	50			
Endrin	72-20-8	0.04	0.00429	ug/l	30-150	20	30-150	30	30			
Endrin aldehyde	7421-93-4	2.001	0.70035	ug/kg	30-150	30	30-150	50	50			
Endrin aldehyde	7421-93-4	0.04	0.0081	ug/l	30-150	20	30-150	30	30			
Endrin ketone	53494-70-5	0.04	0.00477	ug/l	30-150	20	30-150	30	30			
Endrin ketone	53494-70-5	1.6008	0.412206	ug/kg	30-150	30	30-150	50	50			
Dieldrin	60-57-1	0.04	0.00429	ug/l	30-150	20	30-150	30	30			
Dieldrin	60-57-1	1.0005	0.50025	ug/kg	30-150	30	30-150	50	50			
4,4'-DDE	72-55-9	1.6008	0.370185	ug/kg	30-150	30	30-150	50	50			
4,4'-DDE	72-55-9	0.04	0.00381	ug/l	30-150	20	30-150	30	30			
4,4'-DDD	72-54-8	1.6008	0.570952	ug/kg	30-150	30	30-150	50	50			
4,4'-DDD	72-54-8	0.04	0.00464	ug/l	30-150	20	30-150	30	30			
4,4'-DDT	50-29-3	1.6008	1.28731	ug/kg	30-150	30	30-150	50	50			
4,4'-DDT	50-29-3	0.04	0.00432	ug/l	30-150	20	30-150	30	30			
Endosulfan I	959-98-8	0.02	0.00345	ug/l	30-150	20	30-150	30	30			
Endosulfan I	959-98-8	1.6008	0.378189	ug/kg	30-150	30	30-150	50	50			
Endosulfan II	33213-65-9	0.04	0.00519	ug/l	30-150	20	30-150	30	30			
Endosulfan II	33213-65-9	1.6008	0.534934	ug/kg	30-150	30	30-150	50	50			
Endosulfan sulfate	1031-07-8	0.04	0.00481	ug/l	30-150	20	30-150	30	30			
Endosulfan sulfate	1031-07-8	0.667	0.317492	ug/kg	30-150	30	30-150	50	50			
Methoxychlor	72-43-5	3.0015	0.9338	ug/kg	30-150	30	30-150	50	50			
Methoxychlor	72-43-5	0.2	0.00684	ug/l	30-150	20	30-150	30	30			
Toxaphene	8001-35-2	30.015	8.4042	ug/kg	30-150	30	30-150	50	50			
Toxaphene	8001-35-2	0.2	0.0627	ug/l	30-150	20	30-150	30	30			
cis-Chlordane	5103-71-9	2.001	0.557612	ug/kg	30-150	30	30-150	50	50			
cis-Chlordane	5103-71-9	0.02	0.00666	ug/l	30-150	20	30-150	30	30			
trans-Chlordane	5103-74-2	0.02	0.00627	ug/l	30-150	20	30-150	30	30			
trans-Chlordane	5103-74-2	2.001	0.528264	ug/kg	30-150	30	30-150	50	50			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 2

Table 2. Minimum Reporting Limits
TCL Pesticides - EPA 8081B (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 120ml unpreserved

vvvvvvv

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Chlordane	57-74-9	13.34	5.30265	ug/kg	30-150	30	30-150	50	50			
Chlordane	57-74-9	0.2	0.0463	ug/l	30-150	20	30-150	30	30			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
METALS by 7471B (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Mercury, Total	7439-97-6	0.08	0.05216	mg/kg	72-128		80-120	20	20		28 days	Metals Only-Glass 60mL/2oz unpreserved

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
METALS by 7470A (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Mercury, Total	7439-97-6	0.2	0.0915	ug/l	80-120		75-125	20	20		28 days	1 - Plastic 500ml HNO3 preserved

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
1,4 Dioxane via EPA 8270E-SIM (ug/L) (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 250ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,4-Dioxane	123-91-1	0.15	0.0339	ug/l	40-140	30	40-140	30	30			
1,4-Dioxane-d8	*17647-74-4*									*15-110*		
1,4-Dioxane-d8 (IS)	17647-74-4			ug/l								

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
WETCHEM (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Method	Holding Time	Container
Cyanide, Total	57-12-5	5	1.8	ug/l	85-115	20	80-120	20	20	9010C/9012B	14 days	1 - Plastic 250ml NaOH preserved
Chromium, Hexavalent	18540-29-9	0.8	0.16	mg/kg	80-120	20	75-125	20	20	7196A	30 days	1 - Glass 120ml/4oz unpreserved
Chromium, Hexavalent	18540-29-9	10	3	ug/l	85-115	20	85-115	20	20	7196A	24 hours	1 - Plastic 500ml unpreserved
Cyanide, Total	57-12-5	1	0.212	mg/kg	80-120	35	75-125	35	35	9010C/9012B	14 days	1 - Glass 250ml/8oz unpreserved

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table 2. Minimum Reporting Limits
PFAAs via EPA 1633 (WATER)

Holding Time: 28 days
Container/Sample Preservation: 3 - Plastic 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluorobutanoic Acid (PFBA)	375-22-4	6.4	1.024	ng/l	40-150	30	40-150	30	30			
Perfluorobutanoic Acid (PFBA)	375-22-4	0.8	0.0504	ng/g	40-150	30	40-150	30	30			
Perfluoropentanoic Acid (PFPeA)	2706-90-3	0.4	0.056	ng/g	40-150	30	40-150	30	30			
Perfluoropentanoic Acid (PFPeA)	2706-90-3	3.2	0.856	ng/l	40-150	30	40-150	30	30			
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	0.2	0.0432	ng/g	40-150	30	40-150	30	30			
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	1.6	0.536	ng/l	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	757124-72-4	0.8	0.0808	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	757124-72-4	6.4	1.672	ng/l	40-150	30	40-150	30	30			
Perfluorohexanoic Acid (PFHxA)	307-24-4	0.2	0.0464	ng/g	40-150	30	40-150	30	30			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1.6	0.472	ng/l	40-150	30	40-150	30	30			
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	1.6	0.28	ng/l	40-150	30	40-150	30	30			
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	0.2	0.0232	ng/g	40-150	30	40-150	30	30			
Perfluoroheptanoic Acid (PFHpA)	375-85-9	1.6	0.32	ng/l	40-150	30	40-150	30	30			
Perfluoroheptanoic Acid (PFHpA)	375-85-9	0.2	0.0232	ng/g	40-150	30	40-150	30	30			
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	0.2	0.0592	ng/g	40-150	30	40-150	30	30			
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	1.6	0.384	ng/l	40-150	30	40-150	30	30			
Perfluorooctanoic Acid (PFOA)	335-67-1	1.6	0.696	ng/l	40-150	30	40-150	30	30			
Perfluorooctanoic Acid (PFOA)	335-67-1	0.2	0.052	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	0.8	0.28	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	6.4	2.16	ng/l	40-150	30	40-150	30	30			
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	0.2	0.0368	ng/g	40-150	30	40-150	30	30			
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	1.6	0.432	ng/l	40-150	30	40-150	30	30			
Perfluorononanoic Acid (PFNA)	375-95-1	1.6	0.504	ng/l	40-150	30	40-150	30	30			
Perfluorononanoic Acid (PFNA)	375-95-1	0.2	0.0784	ng/g	40-150	30	40-150	30	30			
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	1.6	0.728	ng/l	40-150	30	40-150	30	30			
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	0.2	0.0792	ng/g	40-150	30	40-150	30	30			
Perfluorodecanoic Acid (PFDA)	335-76-2	1.6	0.648	ng/l	40-150	30	40-150	30	30			
Perfluorodecanoic Acid (PFDA)	335-76-2	0.2	0.0752	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	0.8	0.3872	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	6.4	2.488	ng/l	40-150	30	40-150	30	30			
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	0.2	0.0424	ng/g	40-150	30	40-150	30	30			
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	1.6	0.496	ng/l	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSA	2355-31-9	0.2	0.1	ng/g	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSA	2355-31-9	1.6	0.872	ng/l	40-150	30	40-150	30	30			
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1.6	0.696	ng/l	40-150	30	40-150	30	30			
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	0.2	0.0512	ng/g	40-150	30	40-150	30	30			
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	1.6	0.368	ng/l	40-150	30	40-150	30	30			
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	0.2	0.032	ng/g	40-150	30	40-150	30	30			
Perfluorooctanesulfonamide (FOSA)	754-91-6	1.6	0.432	ng/l	40-150	30	40-150	30	30			
Perfluorooctanesulfonamide (FOSA)	754-91-6	0.2	0.0432	ng/g	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	1.6	0.864	ng/l	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	0.2	0.0824	ng/g	40-150	30	40-150	30	30			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor ***(Soil/Solids only)***

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Table 2. Minimum Reporting Limits
PFAAs via EPA 1633 (WATER)

Holding Time: 28 days
Container/Sample Preservation: 3 - Plastic 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluorododecanoic Acid (PFDoA)	307-55-1	1.6	0.736	ng/l	40-150	30	40-150	30	30			
Perfluorododecanoic Acid (PFDoA)	307-55-1	0.2	0.0408	ng/g	40-150	30	40-150	30	30			
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1.6	0.6	ng/l	40-150	30	40-150	30	30			
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	0.2	0.0528	ng/g	40-150	30	40-150	30	30			
Perfluorotetradecanoic Acid (PFTA)	376-06-7	0.2	0.1064	ng/g	40-150	30	40-150	30	30			
Perfluorotetradecanoic Acid (PFTA)	376-06-7	1.6	0.424	ng/l	40-150	30	40-150	30	30			
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Pr	13252-13-6	0.8	0.0984	ng/g	40-150	30	40-150	30	30			
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Pr	13252-13-6	6.4	0.896	ng/l	40-150	30	40-150	30	30			
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	919005-14-4	6.4	1.008	ng/l	40-150	30	40-150	30	30			
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	919005-14-4	0.8	0.1464	ng/g	40-150	30	40-150	30	30			
Perfluorododecane Sulfonic Acid (PFDoDS)	79780-39-5	0.2	0.0384	ng/g	40-150	30	40-150	30	30			
Perfluorododecane Sulfonic Acid (PFDoDS)	79780-39-5	1.6	0.608	ng/l	40-150	30	40-150	30	30			
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF	756426-58-1	0.8	0.196	ng/g	40-150	30	40-150	30	30			
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF	756426-58-1	6.4	1.32	ng/l	40-150	30	40-150	30	30			
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl	763051-92-9	6.4	1.32	ng/l	40-150	30	40-150	30	30			
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl	763051-92-9	0.8	0.1672	ng/g	40-150	30	40-150	30	30			
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	31506-32-8	0.2	0.1	ng/g	40-150	30	40-150	30	30			
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	31506-32-8	1.6	0.696	ng/l	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	4151-50-2	0.2	0.112	ng/g	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	4151-50-2	1.6	0.736	ng/l	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	24448-09-7	16	3.76	ng/l	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	24448-09-7	2	0.2504	ng/g	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	1691-99-2	16	1.96	ng/l	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	1691-99-2	2	0.5104	ng/g	40-150	30	40-150	30	30			
Perfluoro-3-Methoxypropanoic Acid (PFMPA)	377-73-1	3.2	0.456	ng/l	40-150	30	40-150	30	30			
Perfluoro-3-Methoxypropanoic Acid (PFMPA)	377-73-1	0.4	0.0408	ng/g	40-150	30	40-150	30	30			
Perfluoro-4-Methoxybutanoic Acid (PFMBA)	863090-89-5	0.4	0.0312	ng/g	40-150	30	40-150	30	30			
Perfluoro-4-Methoxybutanoic Acid (PFMBA)	863090-89-5	3.2	0.424	ng/l	40-150	30	40-150	30	30			
Perfluoro(2-Ethoxyethane)Sulfonic Acid (PFEESA)	113507-82-7	0.4	0.0832	ng/g	40-150	30	40-150	30	30			
Perfluoro(2-Ethoxyethane)Sulfonic Acid (PFEESA)	113507-82-7	3.2	0.352	ng/l	40-150	30	40-150	30	30			
Nonafluoro-3,6-Dioxaheptanoic Acid (NFDHA)	151772-58-6	3.2	1.888	ng/l	40-150	30	40-150	30	30			
Nonafluoro-3,6-Dioxaheptanoic Acid (NFDHA)	151772-58-6	0.4	0.0952	ng/g	40-150	30	40-150	30	30			
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	1	0.144	ng/g	40-150	30	40-150	30	30			
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	8	2.64	ng/l	40-150	30	40-150	30	30			
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	40	9.36	ng/l	40-150	30	40-150	30	30			
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	5	0.5048	ng/g	40-150	30	40-150	30	30			
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	40	6.312	ng/l	40-150	30	40-150	30	30			
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	5	1.76	ng/g	40-150	30	40-150	30	30			
Perfluoro[13C4]Butanoic Acid (MPFBA)	*NONE*									*20-150*		
Perfluoro[13C4]Butanoic Acid (MPFBA)	*NONE*									*20-150*		
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	*NONE*									*20-150*		
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	*NONE*									*20-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 3

Table 2. Minimum Reporting Limits
PFAAs via EPA 1633 (WATER)

Holding Time: 28 days
Container/Sample Preservation: 3 - Plastic 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	*NONE*									*20-150*		
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-	*NONE*									*20-150*		
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	*NONE*									*20-150*		
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	*NONE*									*20-150*		
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	*NONE*									*20-150*		
Perfluoro[13C8]Octanoic Acid (M8PFOA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanoic Acid (M8PFOA)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-	*NONE*									*20-150*		
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	*NONE*									*20-150*		
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-	*NONE*									*20-150*		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid	*NONE*									*20-150*		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	*NONE*									*20-150*		
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (	*NONE*									*20-150*		
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	*NONE*									*20-150*		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-1	*NONE*									*20-150*		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-1	*NONE*									*20-150*		
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA	*NONE*									*20-150*		
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA	*NONE*									*20-150*		
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	*NONE*									*20-150*		
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	*NONE*									*20-150*		
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-o	*1265205-95-5*									*20-150*		
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-o	*1265205-95-5*									*20-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 4

Table 2. Minimum Reporting Limits
PFAAs via EPA 1633 (WATER)

Holding Time: 28 days
Container/Sample Preservation: 3 - Plastic 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (	*NONE*									*20-150*		
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (	*NONE*									*20-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Table 2. Minimum Reporting Limits
Volatile Organics in Air: TO-15 (AIR)

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Holding Time: 30 days
Container/Sample Preservation: 1 - Canister - 2.7 Liter

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,1,1-Trichloroethane	71-55-6	0.2	0.0614	ppbV	70-130			25	25			
1,1,2,2-Tetrachloroethane	79-34-5	0.2	0.052	ppbV	70-130			25	25			
1,1,2-Trichloroethane	79-00-5	0.2	0.0582	ppbV	70-130			25	25			
1,1-Dichloroethane	75-34-3	0.2	0.0568	ppbV	70-130			25	25			
1,1-Dichloroethene	75-35-4	0.2	0.0568	ppbV	70-130			25	25			
1,2,3-Trimethylbenzene	526-73-8	0.2	0.0576	ppbV	70-130			25	25			
1,2,4-Trichlorobenzene	120-82-1	0.2	0.1	ppbV	70-130			25	25			
1,2,4-Trimethylbenzene	95-63-6	0.2	0.0577	ppbV	70-130			25	25			
1,2,4,5-Tetramethylbenzene	95-93-2	0.2	0.135	ppbV	70-130			25	25			
1,2-Dibromoethane	106-93-4	0.2	0.0544	ppbV	70-130			25	25			
1,2-Dichlorobenzene	95-50-1	0.2	0.0619	ppbV	70-130			25	25			
1,2-Dichloroethane	107-06-2	0.2	0.0787	ppbV	70-130			25	25			
1,2-Dichloropropane	78-87-5	0.2	0.0631	ppbV	70-130			25	25			
1,3,5-Trimethylbenzene	108-67-8	0.2	0.06	ppbV	70-130			25	25			
1,3-Butadiene	106-99-0	0.2	0.0619	ppbV	70-130			25	25			
1,3-Dichlorobenzene	541-73-1	0.2	0.0777	ppbV	70-130			25	25			
1,4-Dichlorobenzene	106-46-7	0.2	0.0826	ppbV	70-130			25	25			
1,4-Dioxane	123-91-1	0.2	0.0538	ppbV	70-130			25	25			
2,2,4-Trimethylpentane	540-84-1	0.2	0.0692	ppbV	70-130			25	25			
2-Butanone	78-93-3	0.5	0.099	ppbV	70-130			25	25			
2-Hexanone	591-78-6	0.2	0.0912	ppbV	70-130			25	25			
2-Methylthiophene	554-14-3	0.2	0.0622	ppbV	70-130			25	25			
3-Methylthiophene	616-44-4	0.2	0.0634	ppbV	70-130			25	25			
3-Chloropropene	107-05-1	0.2	0.086	ppbV	70-130			25	25			
2-Ethylthiophene	872-55-9	0.2	0.0612	ppbV	70-130			25	25			
4-Ethyltoluene	622-96-8	0.2	0.0554	ppbV	70-130			25	25			
Acetone	67-64-1	1	0.515	ppbV	40-160			25	25			
Benzene	71-43-2	0.2	0.0643	ppbV	70-130			25	25			
Benzyl chloride	100-44-7	0.2	0.0939	ppbV	70-130			25	25			
Benzothiophene	95-15-8	0.5	0.273	ppbV	70-130			25	25			
Bromodichloromethane	75-27-4	0.2	0.0689	ppbV	70-130			25	25			
Bromoform	75-25-2	0.2	0.0596	ppbV	70-130			25	25			
Bromomethane	74-83-9	0.2	0.0547	ppbV	70-130			25	25			
Carbon disulfide	75-15-0	0.2	0.0465	ppbV	70-130			25	25			
Carbon tetrachloride	56-23-5	0.2	0.0686	ppbV	70-130			25	25			
Chlorobenzene	108-90-7	0.2	0.0516	ppbV	70-130			25	25			
Chloroethane	75-00-3	0.2	0.0649	ppbV	70-130			25	25			
Chloroform	67-66-3	0.2	0.0552	ppbV	70-130			25	25			
Chloromethane	74-87-3	0.2	0.0576	ppbV	70-130			25	25			
cis-1,2-Dichloroethene	156-59-2	0.2	0.0595	ppbV	70-130			25	25			
cis-1,3-Dichloropropene	10061-01-5	0.2	0.0674	ppbV	70-130			25	25			
Cyclohexane	110-82-7	0.2	0.0728	ppbV	70-130			25	25			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 2

Table 2. Minimum Reporting Limits
Volatile Organics in Air: TO-15 (AIR)

Holding Time: 30 days
Container/Sample Preservation: 1 - Canister - 2.7 Liter

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Dibromochloromethane	124-48-1	0.2	0.0566	ppbV	70-130			25	25			
Dichlorodifluoromethane	75-71-8	0.2	0.0757	ppbV	70-130			25	25			
Ethyl Alcohol	GCDAI06	5	1.74	ppbV	40-160			25	25			
Ethyl Acetate	141-78-6	0.5	0.297	ppbV	70-130			25	25			
Ethylbenzene	100-41-4	0.2	0.0575	ppbV	70-130			25	25			
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	0.2	0.0506	ppbV	70-130			25	25			
1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	0.2	0.0504	ppbV	70-130			25	25			
Hexachlorobutadiene	87-68-3	0.2	0.0607	ppbV	70-130			25	25			
iso-Propyl Alcohol	67-63-0	0.5	0.272	ppbV	40-160			25	25			
Methylene chloride	75-09-2	0.5	0.125	ppbV	70-130			25	25			
4-Methyl-2-pentanone	108-10-1	0.5	0.19	ppbV	70-130			25	25			
Methyl tert butyl ether	1634-04-4	0.2	0.045	ppbV	70-130			25	25			
Methyl Methacrylate	80-62-6	0.5	0.226	ppbV	40-160			25	25			
p/m-Xylene	179601-23-1	0.4	0.125	ppbV	70-130			25	25			
o-Xylene	95-47-6	0.2	0.0621	ppbV	70-130			25	25			
Xylene (Total)	1330-20-7	0.2	0.0621	ppbV				25	25			
Heptane	142-82-5	0.2	0.0828	ppbV	70-130			25	25			
n-Heptane	142-82-5	0.2	0.0828	ppbV	70-130			25	25			
n-Hexane	110-54-3	0.2	0.0743	ppbV	70-130			25	25			
Propylene	115-07-1	0.5	0.135	ppbV	70-130			25	25			
Styrene	100-42-5	0.2	0.0596	ppbV	70-130			25	25			
Tetrachloroethene	127-18-4	0.2	0.0627	ppbV	70-130			25	25			
Thiophene	110-02-1	0.2	0.052	ppbV	70-130			25	25			
Tetrahydrofuran	109-99-9	0.5	0.117	ppbV	70-130			25	25			
Toluene	108-88-3	0.2	0.0867	ppbV	70-130			25	25			
trans-1,2-Dichloroethene	156-60-5	0.2	0.0755	ppbV	70-130			25	25			
1,2-Dichloroethene (total)	540-59-0	0.2	0.0595	ppbV				25	25			
trans-1,3-Dichloropropene	10061-02-6	0.2	0.0783	ppbV	70-130			25	25			
1,3-Dichloropropene, Total	542-75-6	0.2	0.0674	ppbV				25	25			
Trichloroethene	79-01-6	0.2	0.0548	ppbV	70-130			25	25			
Trichlorofluoromethane	75-69-4	0.2	0.0787	ppbV	70-130			25	25			
Vinyl acetate	108-05-4	1	0.323	ppbV	70-130			25	25			
Vinyl bromide	593-60-2	0.2	0.0722	ppbV	70-130			25	25			
Vinyl chloride	75-01-4	0.2	0.0582	ppbV	70-130			25	25			
Naphthalene	91-20-3	0.2	0.078	ppbV	70-130			25	25			
Total HC As Hexane	NONE	10	0.0743	ppbV	70-130			25	25			
Total VOCs As Toluene	NONE	10	0.0867	ppbV	70-130			25	25			
Propane	74-98-6	0.5	0.152	ppbV	70-130			25	25			
Acrylonitrile	107-13-1	0.5	0.0894	ppbV	70-130			25	25			
Acrolein	107-02-8	0.5	0.149	ppbV	60-113			25	25			
1,1,1,2-Tetrachloroethane	630-20-6	0.2	0.0508	ppbV	70-130			25	25			
Isopropylbenzene	98-82-8	0.2	0.0621	ppbV	70-130			25	25			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Table 2. Minimum Reporting Limits
Volatile Organics in Air: TO-15 (AIR)

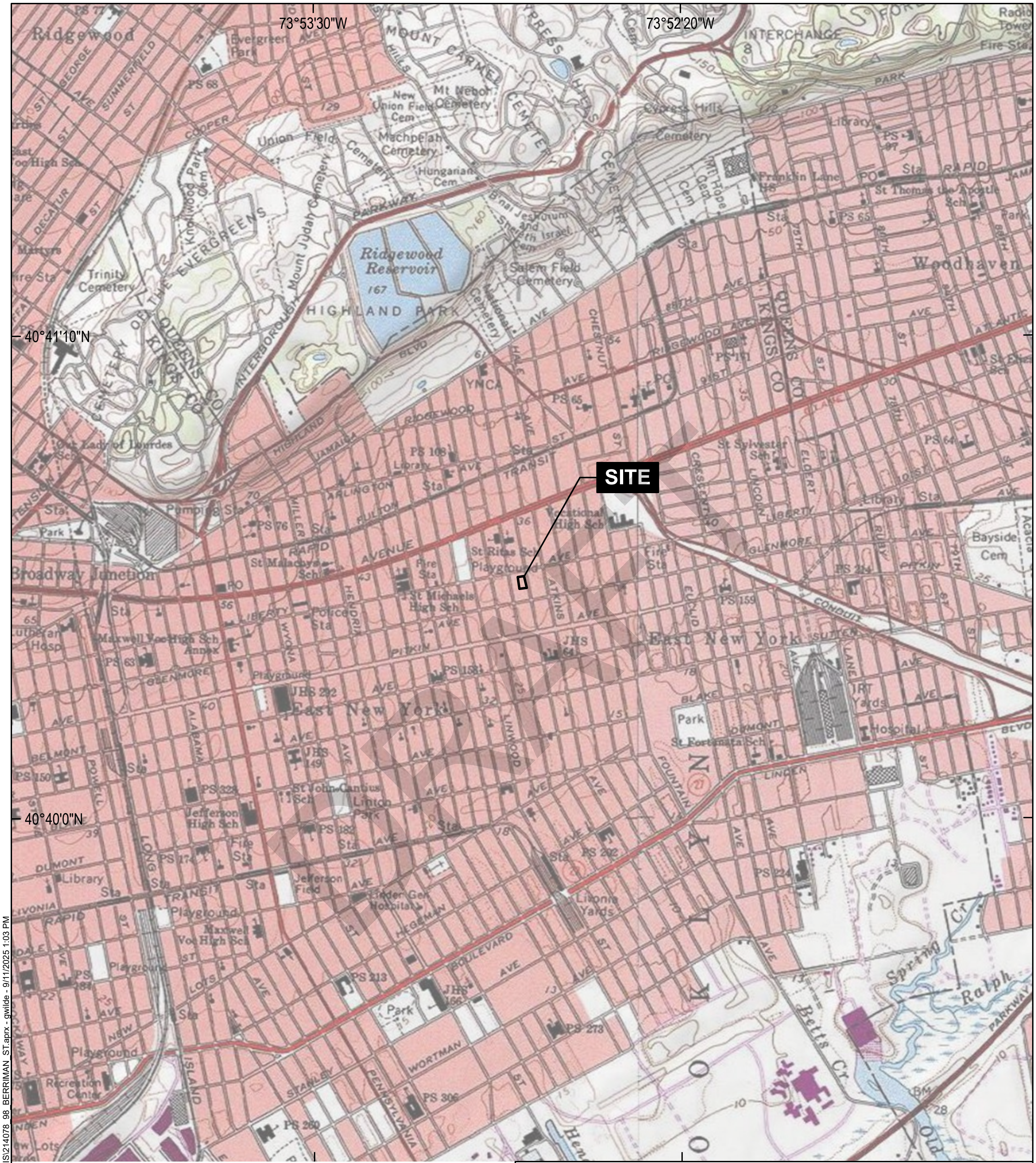
Holding Time: 30 days
Container/Sample Preservation: 1 - Canister - 2.7 Liter

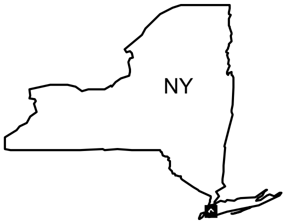
Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,2,3-Trichloropropane	96-18-4	0.2	0.0575	ppbV	70-130			25	25			
Acetonitrile	75-05-8	0.2	0.101	ppbV	70-130			25	25			
Bromobenzene	108-86-1	0.2	0.0579	ppbV	70-130			25	25			
Chlorodifluoromethane	75-45-6	0.2	0.0463	ppbV	70-130			25	25			
Dichlorofluoromethane	75-43-4	0.2	0.112	ppbV	70-130			25	25			
Dibromomethane	74-95-3	0.2	0.0598	ppbV	70-130			25	25			
Pentane	109-66-0	0.2	0.113	ppbV	70-130			25	25			
Octane	111-65-9	0.2	0.0676	ppbV	70-130			25	25			
Tertiary-Amyl Methyl Ether	994-05-8	0.2	0.0672	ppbV	70-130			25	25			
o-Chlorotoluene	95-49-8	0.2	0.0761	ppbV	70-130			25	25			
p-Chlorotoluene	106-43-4	0.2	0.0765	ppbV	70-130			25	25			
2,2-Dichloropropane	594-20-7	0.2	0.0429	ppbV	70-130			25	25			
1,1-Dichloropropene	563-58-6	0.2	0.0593	ppbV	70-130			25	25			
Isopropyl Ether	108-20-3	0.2	0.0631	ppbV	70-130			25	25			
Ethyl-Tert-Butyl-Ether	637-92-3	0.2	0.0731	ppbV	70-130			25	25			
1,2,3-Trichlorobenzene	87-61-6	0.2	0.0738	ppbV	70-130			25	25			
Ethyl ether	60-29-7	0.2	0.0853	ppbV	70-130			25	25			
n-Butylbenzene	104-51-8	0.2	0.0536	ppbV	70-130			25	25			
sec-Butylbenzene	135-98-8	0.2	0.0547	ppbV	70-130			25	25			
tert-Butylbenzene	98-06-6	0.2	0.0551	ppbV	70-130			25	25			
1,2-Dibromo-3-chloropropane	96-12-8	0.2	0.0624	ppbV	70-130			25	25			
p-Isopropyltoluene	99-87-6	0.2	0.0567	ppbV	70-130			25	25			
n-Propylbenzene	103-65-1	0.2	0.0633	ppbV	70-130			25	25			
1,3-Dichloropropane	142-28-9	0.2	0.0536	ppbV	70-130			25	25			
Methanol	67-56-1	5	3.029	ppbV	70-130			25	25			
Acetaldehyde	75-07-0	2.5	1.73	ppbV	70-130			25	25			
Butane	106-97-8	0.2	0.08	ppbV	70-130			25	25			
Nonane (C9)	111-84-2	0.2	0.0737	ppbV	70-130			25	25			
Decane (C10)	124-18-5	0.2	0.0697	ppbV	70-130			25	25			
Undecane	1120-21-4	0.2	0.0709	ppbV	70-130			25	25			
Indane	496-11-7	0.2	0.0591	ppbV	70-130			25	25			
Indene	95-13-6	0.2	0.0711	ppbV	70-130			25	25			
1-Methylnaphthalene	90-12-0	1	0.264	ppbV	70-130			25	25			
Dodecane (C12)	112-40-3	0.2	0.0891	ppbV	70-130			25	25			
Butyl Acetate	123-86-4	0.5	0.208	ppbV	70-130			25	25			
tert-Butyl Alcohol	75-65-0	0.5	0.132	ppbV	70-130			25	25			
2-Methylnaphthalene	91-57-6	1	0.259	ppbV	70-130			25	25			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
Toluene-d8	*2037-26-5*									*70-130*		
Bromofluorobenzene	*460-00-4*									*70-130*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

FIGURES





MAP SOURCE: USGS
SITE COORDINATES: 40°40'34"N, 73°52'50"W

HALEY ALDRICH

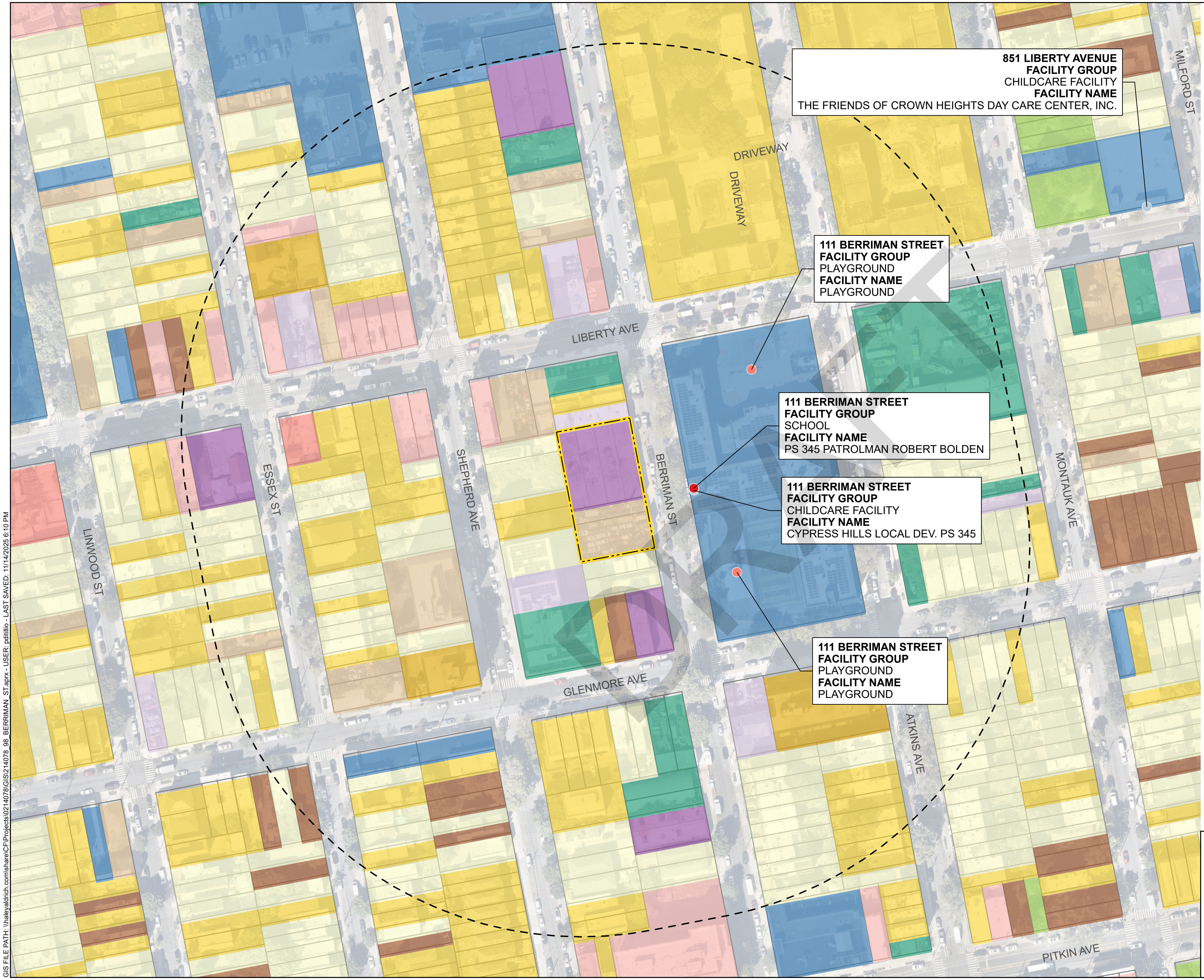
98-114 BERRIMAN STREET
BROOKLYN, NEW YORK

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
SEPTEMBER 2025

FIGURE 1

GIS: \\haleyaldrich.com\share\CF\Projects\0214078\GIS\214078_98_BERRIMAN_ST.aprx - gwilde - 9/11/2025 1:03 PM



LEGEND

SENSITIVE RECEPTOR

- ● CHILDCARE FACILITY
- ● PLAYGROUND
- ● SCHOOL

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
- 🟩 OPEN SPACE AND OUTDOOR RECREATION
- 🟫 PARKING FACILITIES
- 🟫 VACANT LAND
- 🟩 NOT CATEGORIZED
- ▭ 500-FT BUFFER OF SITE BOUNDARY
- ▭ SITE BOUNDARY
- ▭ PARCEL BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ASSESSOR PARCEL DATA SOURCE: NYC DEPARTMENT OF CITY PLANNING, INFORMATION TECHNOLOGY DIVISION
3. SENSITIVE RECEPTOR DATA SOURCES: NEW YORK STATE OFFICE OF INFORMTION TECHNOLOGY SERVICES, NATIONAL CENTER FOR EDUCATION STATISTICS (NCES)
4. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 1, 2025

N

0 130 260
SCALE IN FEET

HALEY ALDRICH

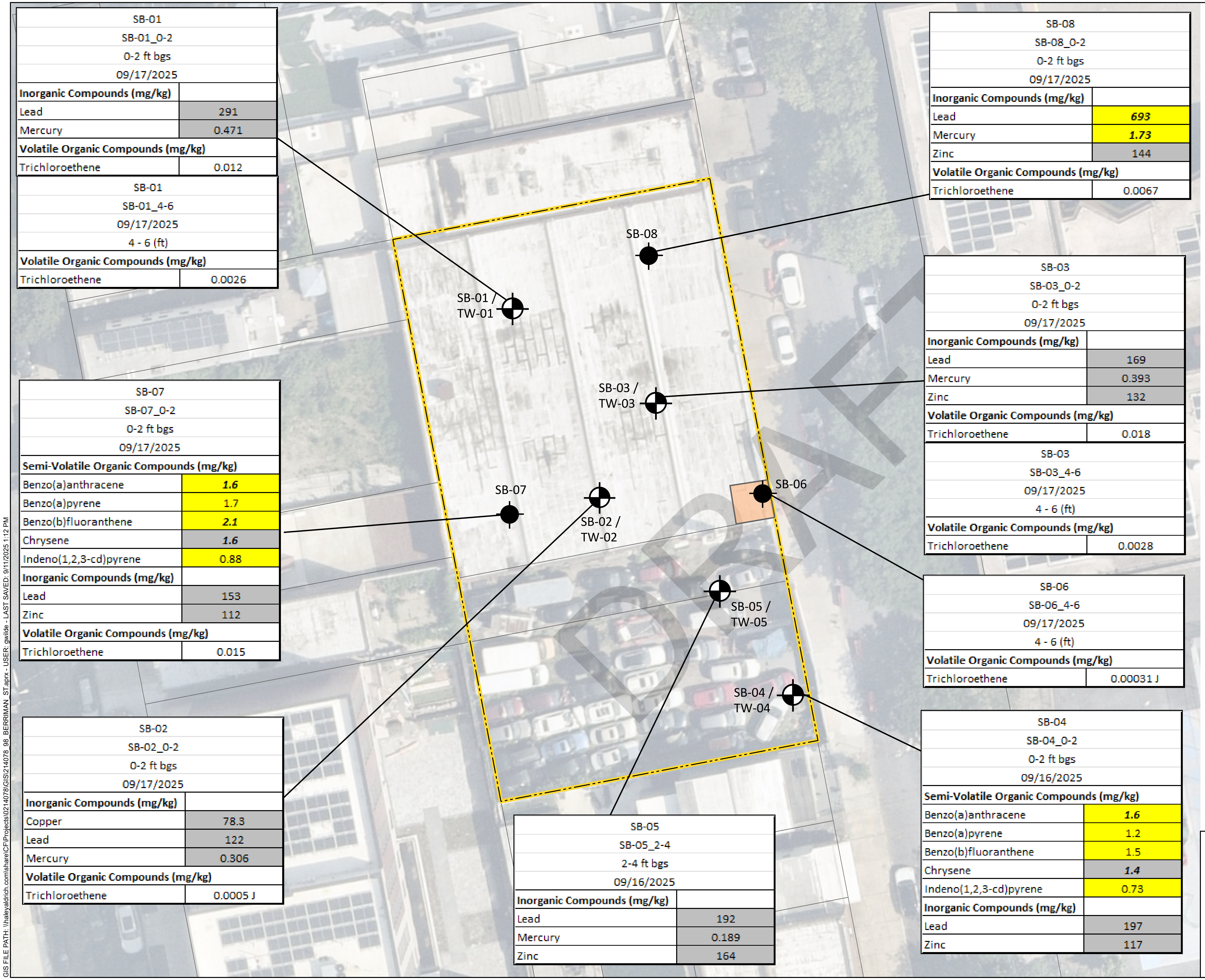
98-114 BERRIMAN STREET
BROOKLYN, NEW YORK

SURROUNDING LAND USE -
SENSITIVE RECEPTOR MAP

NOVEMBER 2025

FIGURE 2

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0214078\GIS\214078_98_BERRIMAN_ST.aprx - USER: pditillio - LAST SAVED: 11/14/2025 6:10 PM



SB-01	
SB-01_0-2	
0-2 ft bgs	
09/17/2025	
Inorganic Compounds (mg/kg)	
Lead	291
Mercury	0.471
Volatile Organic Compounds (mg/kg)	
Trichloroethene	0.012

SB-01	
SB-01_4-6	
09/17/2025	
4 - 6 (ft)	
Volatile Organic Compounds (mg/kg)	
Trichloroethene	0.0026

SB-07	
SB-07_0-2	
0-2 ft bgs	
09/17/2025	
Semi-Volatile Organic Compounds (mg/kg)	
Benzo(a)anthracene	***1.6***
Benzo(a)pyrene	1.7
Benzo(b)fluoranthene	***2.1***
Chrysene	***1.6***
Indeno(1,2,3-cd)pyrene	0.88
Inorganic Compounds (mg/kg)	
Lead	153
Zinc	112
Volatile Organic Compounds (mg/kg)	
Trichloroethene	0.015

SB-02	
SB-02_0-2	
0-2 ft bgs	
09/17/2025	
Inorganic Compounds (mg/kg)	
Copper	78.3
Lead	122
Mercury	0.306
Volatile Organic Compounds (mg/kg)	
Trichloroethene	0.0005 J

SB-05	
SB-05_2-4	
2-4 ft bgs	
09/16/2025	
Inorganic Compounds (mg/kg)	
Lead	192
Mercury	0.189
Zinc	164

SB-08	
SB-08_0-2	
0-2 ft bgs	
09/17/2025	
Inorganic Compounds (mg/kg)	
Lead	***693***
Mercury	***1.73***
Zinc	144
Volatile Organic Compounds (mg/kg)	
Trichloroethene	0.0067

SB-03	
SB-03_0-2	
0-2 ft bgs	
09/17/2025	
Inorganic Compounds (mg/kg)	
Lead	169
Mercury	0.393
Zinc	132
Volatile Organic Compounds (mg/kg)	
Trichloroethene	0.018

SB-03	
SB-03_4-6	
09/17/2025	
4 - 6 (ft)	
Volatile Organic Compounds (mg/kg)	
Trichloroethene	0.0028

SB-06	
SB-06_4-6	
09/17/2025	
4 - 6 (ft)	
Volatile Organic Compounds (mg/kg)	
Trichloroethene	0.00031 J

SB-04	
SB-04_0-2	
0-2 ft bgs	
09/16/2025	
Semi-Volatile Organic Compounds (mg/kg)	
Benzo(a)anthracene	***1.6***
Benzo(a)pyrene	1.2
Benzo(b)fluoranthene	1.5
Chrysene	***1.4***
Indeno(1,2,3-cd)pyrene	0.73
Inorganic Compounds (mg/kg)	
Lead	197
Zinc	117

LEGEND

- ▭ SITE BOUNDARY
- ▭ PARCEL BOUNDARY
- ● SOIL BORING
- ⊕ SOIL BORING AND TEMPORARY MONITORING WELL
- ▨ APPX LOCATION OF CELLAR

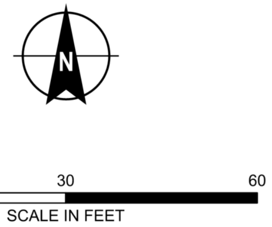
NYSDEC SOIL CLEANUP OBJECTIVES			
	UUSCOs	RRSCOs	***PGWSCOs***
Semi-Volatile Organic Compounds (mg/kg)			
Benzo(a)anthracene	1	1	1
Benzo(a)pyrene	1	1	22
Benzo(b)fluoranthene	1	1	1.7
Chrysene	1	3.9	1
Indeno(1,2,3-cd)pyrene	0.5	0.5	8.2
Inorganic Compounds (mg/kg)			
Copper	50	270	1720
Lead	63	400	450
Mercury	0.18	0.81	0.73
Zinc	109	10000	2480

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.

2. SOIL SAMPLE ANALYTICAL RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TITLE 6 OF THE OFFICIAL COMPILATION OF NEW YORK CODES, RULES, AND REGULATIONS (NYCRR) PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVES (SCOS), RESTRICTED-RESIDENTIAL SCOS, AND PROTECTION OF GROUNDWATER SCOS.

3. DEFINITIONS:
J = ESTIMATED VALUE
RRSCOs = NYSDEC PART 375 RESTRICTED-RESIDENTIAL USE SCO (YELLOW)
UUSCOs = NYSDEC PART 375 UNRESTRICTED USE SCO (GREY)
PGWSCOS = NYSDEC RESTRICTED USE SCO - PROTECTION OF GROUNDWATER (BOLD + ITALICS)



HALEY ALDRICH

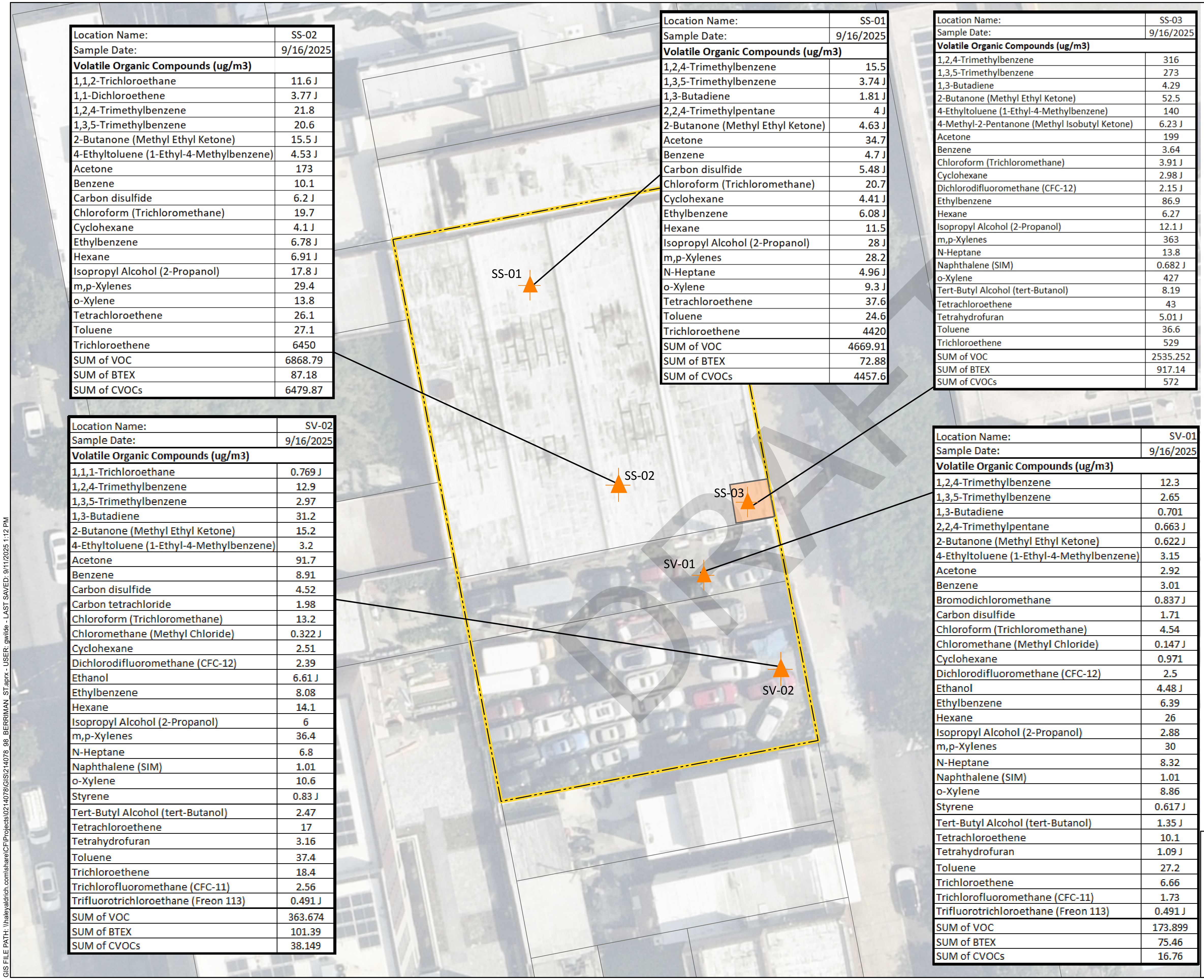
98-114 BERRIMAN STREET
BROOKLYN, NEW YORK

MAP OF SOIL CHEMISTRY

OCTOBER 2025

FIGURE 3

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0214078\GIS\214078_98_BERRIMAN_ST.aprx - USER: gwilde - LAST SAVED: 9/11/2025 1:12 PM



Location Name:	SS-02
Sample Date:	9/16/2025
Volatile Organic Compounds (ug/m3)	
1,1,2-Trichloroethane	11.6 J
1,1-Dichloroethene	3.77 J
1,2,4-Trimethylbenzene	21.8
1,3,5-Trimethylbenzene	20.6
2-Butanone (Methyl Ethyl Ketone)	15.5 J
4-Ethyltoluene (1-Ethyl-4-Methylbenzene)	4.53 J
Acetone	173
Benzene	10.1
Carbon disulfide	6.2 J
Chloroform (Trichloromethane)	19.7
Cyclohexane	4.1 J
Ethylbenzene	6.78 J
Hexane	6.91 J
Isopropyl Alcohol (2-Propanol)	17.8 J
m,p-Xylenes	29.4
o-Xylene	13.8
Tetrachloroethene	26.1
Toluene	27.1
Trichloroethene	6450
SUM of VOC	6868.79
SUM of BTEX	87.18
SUM of CVOCs	6479.87

Location Name:	SS-01
Sample Date:	9/16/2025
Volatile Organic Compounds (ug/m3)	
1,2,4-Trimethylbenzene	15.5
1,3,5-Trimethylbenzene	3.74 J
1,3-Butadiene	1.81 J
2,2,4-Trimethylpentane	4 J
2-Butanone (Methyl Ethyl Ketone)	4.63 J
Acetone	34.7
Benzene	4.7 J
Carbon disulfide	5.48 J
Chloroform (Trichloromethane)	20.7
Cyclohexane	4.41 J
Ethylbenzene	6.08 J
Hexane	11.5
Isopropyl Alcohol (2-Propanol)	28 J
m,p-Xylenes	28.2
N-Heptane	4.96 J
o-Xylene	9.3 J
Tetrachloroethene	37.6
Toluene	24.6
Trichloroethene	4420
SUM of VOC	4669.91
SUM of BTEX	72.88
SUM of CVOCs	4457.6

Location Name:	SS-03
Sample Date:	9/16/2025
Volatile Organic Compounds (ug/m3)	
1,2,4-Trimethylbenzene	316
1,3,5-Trimethylbenzene	273
1,3-Butadiene	4.29
2-Butanone (Methyl Ethyl Ketone)	52.5
4-Ethyltoluene (1-Ethyl-4-Methylbenzene)	140
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	6.23 J
Acetone	199
Benzene	3.64
Chloroform (Trichloromethane)	3.91 J
Cyclohexane	2.98 J
Dichlorodifluoromethane (CFC-12)	2.15 J
Ethylbenzene	86.9
Hexane	6.27
Isopropyl Alcohol (2-Propanol)	12.1 J
m,p-Xylenes	363
N-Heptane	13.8
Naphthalene (SIM)	0.682 J
o-Xylene	427
Tert-Butyl Alcohol (tert-Butanol)	8.19
Tetrachloroethene	43
Tetrahydrofuran	5.01 J
Toluene	36.6
Trichloroethene	529
SUM of VOC	2535.252
SUM of BTEX	917.14
SUM of CVOCs	572

Location Name:	SV-02
Sample Date:	9/16/2025
Volatile Organic Compounds (ug/m3)	
1,1,1-Trichloroethane	0.769 J
1,2,4-Trimethylbenzene	12.9
1,3,5-Trimethylbenzene	2.97
1,3-Butadiene	31.2
2-Butanone (Methyl Ethyl Ketone)	15.2
4-Ethyltoluene (1-Ethyl-4-Methylbenzene)	3.2
Acetone	91.7
Benzene	8.91
Carbon disulfide	4.52
Carbon tetrachloride	1.98
Chloroform (Trichloromethane)	13.2
Chloromethane (Methyl Chloride)	0.322 J
Cyclohexane	2.51
Dichlorodifluoromethane (CFC-12)	2.39
Ethanol	6.61 J
Ethylbenzene	8.08
Hexane	14.1
Isopropyl Alcohol (2-Propanol)	6
m,p-Xylenes	36.4
N-Heptane	6.8
Naphthalene (SIM)	1.01
o-Xylene	10.6
Styrene	0.83 J
Tert-Butyl Alcohol (tert-Butanol)	2.47
Tetrachloroethene	17
Tetrahydrofuran	3.16
Toluene	37.4
Trichloroethene	18.4
Trichlorofluoromethane (CFC-11)	2.56
Trifluorotrichloroethane (Freon 113)	0.491 J
SUM of VOC	363.674
SUM of BTEX	101.39
SUM of CVOCs	38.149

Location Name:	SV-01
Sample Date:	9/16/2025
Volatile Organic Compounds (ug/m3)	
1,2,4-Trimethylbenzene	12.3
1,3,5-Trimethylbenzene	2.65
1,3-Butadiene	0.701
2,2,4-Trimethylpentane	0.663 J
2-Butanone (Methyl Ethyl Ketone)	0.622 J
4-Ethyltoluene (1-Ethyl-4-Methylbenzene)	3.15
Acetone	2.92
Benzene	3.01
Bromodichloromethane	0.837 J
Carbon disulfide	1.71
Chloroform (Trichloromethane)	4.54
Chloromethane (Methyl Chloride)	0.147 J
Cyclohexane	0.971
Dichlorodifluoromethane (CFC-12)	2.5
Ethanol	4.48 J
Ethylbenzene	6.39
Hexane	26
Isopropyl Alcohol (2-Propanol)	2.88
m,p-Xylenes	30
N-Heptane	8.32
Naphthalene (SIM)	1.01
o-Xylene	8.86
Styrene	0.617 J
Tert-Butyl Alcohol (tert-Butanol)	1.35 J
Tetrachloroethene	10.1
Tetrahydrofuran	1.09 J
Toluene	27.2
Trichloroethene	6.66
Trichlorofluoromethane (CFC-11)	1.73
Trifluorotrichloroethane (Freon 113)	0.491 J
SUM of VOC	173.899
SUM of BTEX	75.46
SUM of CVOCs	16.76

LEGEND

▭	SITE BOUNDARY
▭	PARCEL BOUNDARY
▲	SUB-SLAB/SOIL VAPOR SAMPLE
▨	APPX LOCATION OF CELLAR

NOTES

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

N

0 30 60
SCALE IN FEET

HALEY ALDRICH

98-114 BERRIMAN STREET
BROOKLYN, NEW YORK

MAP OF SOIL VAPOR CHEMISTRY

OCTOBER 2025

FIGURE 4

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0214078\GIS\214078_98_BERRIMAN_ST.aprx - USER: gwilde - LAST SAVED: 9/11/2025 1:12 PM

LEGEND

- ▭ PROPOSED BCP SITE BOUNDARY (PENDING FUTURE LOT MERGER)
- ▭ CURRENT PARCEL BOUNDARY
- ⊕ PROPOSED MONITORING WELL/ SOIL BORING LOCATION
- ● PROPOSED SOIL BORING LOCATION
- △ PROPOSED SOIL VAPOR LOCATION

NOTES

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

N

0 30 60
SCALE IN FEET

HALEY ALDRICH

98-114 BERRIMAN STREET
BROOKLYN, NEW YORK

PROPOSED SAMPLE LOCATION PLAN

NOVEMBER 2025

FIGURE 5

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0214078\GIS\214078_98_BERRIMAN_ST.aprx - USER: gwilde - LAST SAVED: 9/11/2025 1:12 PM

APPENDIX A
Previous Reports (Provided as Separate Files)

APPENDIX B

September 2025 GPR Findings Report

JOB SUMMARY REPORT

Order Number:	Work Order #825958	**Job Date:**	Sep 16, 2025 8:25:00 AM
Customer:	140724 [CTN] HALEY AND ALDRICH INC : HALEY AND ALDRICH INC - NEW YORK NY	**Billing Address:**	HALEY AND ALDRICH INC 213 West 35th St 7th Floor New York NY 10001 United States

JOB DETAILS

Jobsite Location	98 Berriman Street, Brooklyn, New York 11208
Work Order Number	Work Order #825958
Job Number	98-114 Berriman Street Development
PO Number	0214078-000 – Limited Phase II

GPRS Project Manager: James Daidone

Thank you for using GPRS on your project. We appreciate the opportunity to work with you. If you have questions regarding the results of this scanning, please contact the lead GPRS project manager on this project.

EQUIPMENT USED

The following equipment was used on this project:

- **Underground GPR Antenna:** This GPR Antenna uses frequencies ranging from 250 MHz to 450 MHz and is mounted in a stroller frame that rolls over the surface. Data is displayed on a screen and marked in the field in real time. The surface needs to be reasonably smooth and unobstructed to obtain readable scans. Obstructions such as curbs, landscaping, and vegetation will limit the efficacy of GPR. The total effective scan depth can be as much as 8’ or more with this antenna but can vary widely depending on the soil conditions and composition. Some soil types, such as clay, may limit maximum depths to 3’ or less. As depth increases, targets must be larger to be detected, and non-metallic targets can be challenging to locate. The depths provided should always be treated as estimates as their accuracy can be affected by multiple factors. For more information, please visit: Link
- **EM Pipe Locator:** Electromagnetic Pipe and Cable Locator. Detects electromagnetic fields. Used to actively trace conductive pipes and tracer wires, or passively detect power and radio signals traveling along conductive pipes and utilities. For more information, please visit: Link

JOB SUMMARY REPORT

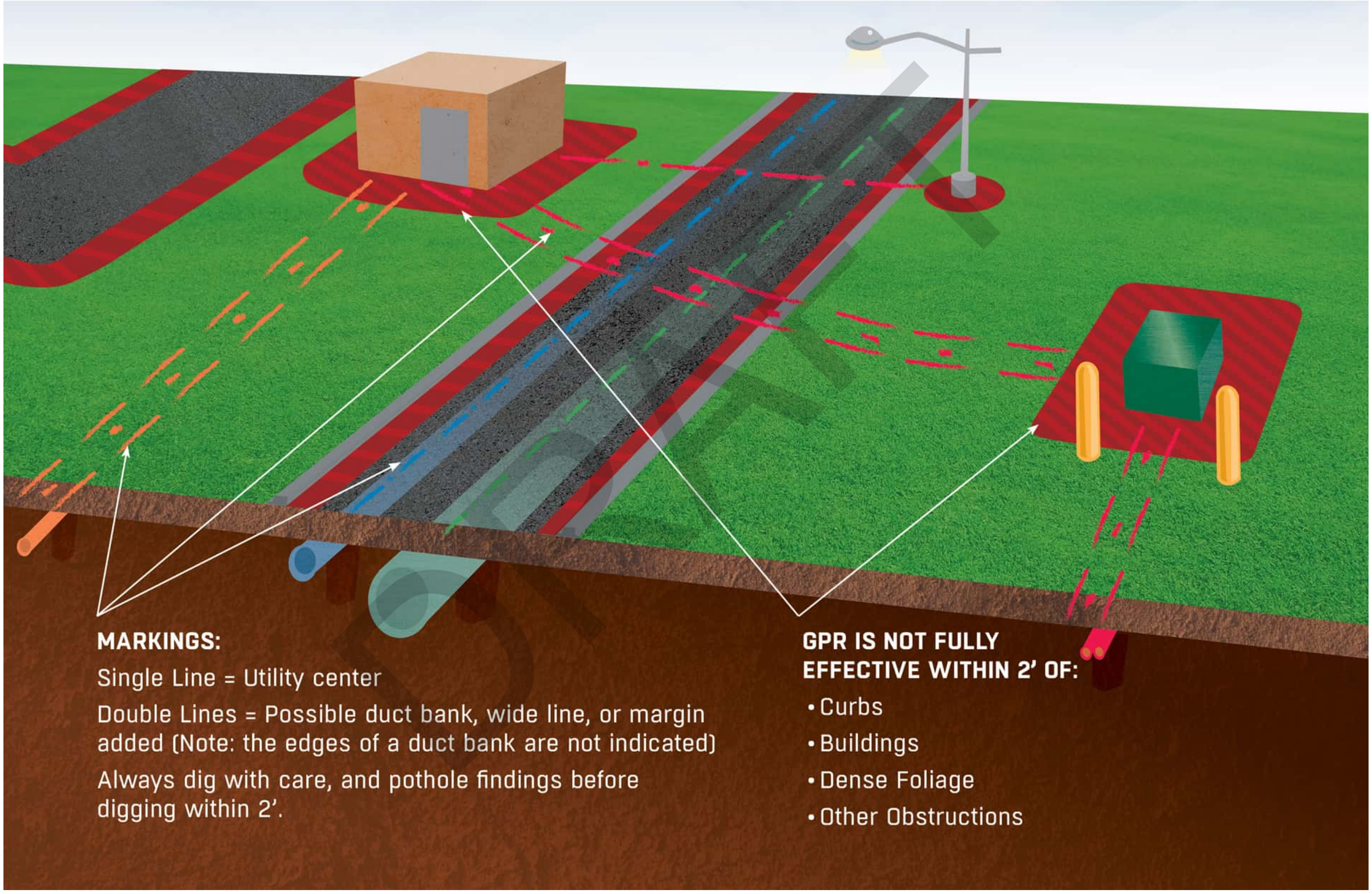
WORK PERFORMED

UNDERGROUND UTILITY	
Client Provided Drawings	No
Client completed 811 locate request	No
Scope of Work	GPRS came out to locate utilities near or in the path of 8 soil boring locations
Limitations Encountered	- Surface obstructions
Marking Medium	- Spray Paint - Chalk
Results Notes	GPRS found evidence of unknown lines around one of the proposed soil boring locations. The max GPR visibility was between 2’-3’ and this was consistent across all boring locations. Equipment and materials on the surface throughout the property limited our ability to complete full scans in some areas. Please note there are some items that may not carry a EM signal and are not conductive, such as: plastic pipes, concrete pipes, clay pipes, asbestos pipes...etc. If GPRS cannot see these items with GPR and an item cannot carry or produce a EM signal these items are undetectable. GPRS recommends you employ caution within 2’ of all marked utilities and hand auger when possible, and recommends potholing each marked utility for verification of utility type, location and depth.

SUPPLEMENTAL INFORMATION

COMMON UTILITY LOCATING LIMITATIONS

There are many limitations to locating utilities, due to a variety of factors, with several more common examples illustrated here.



MARKINGS:

Single Line = Utility center

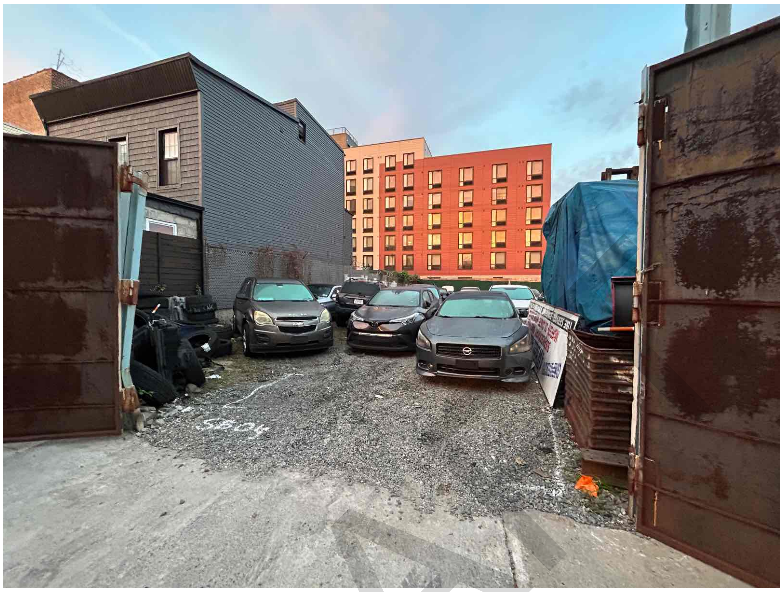
Double Lines = Possible duct bank, wide line, or margin added (Note: the edges of a duct bank are not indicated)

Always dig with care, and pothole findings before digging within 2'.

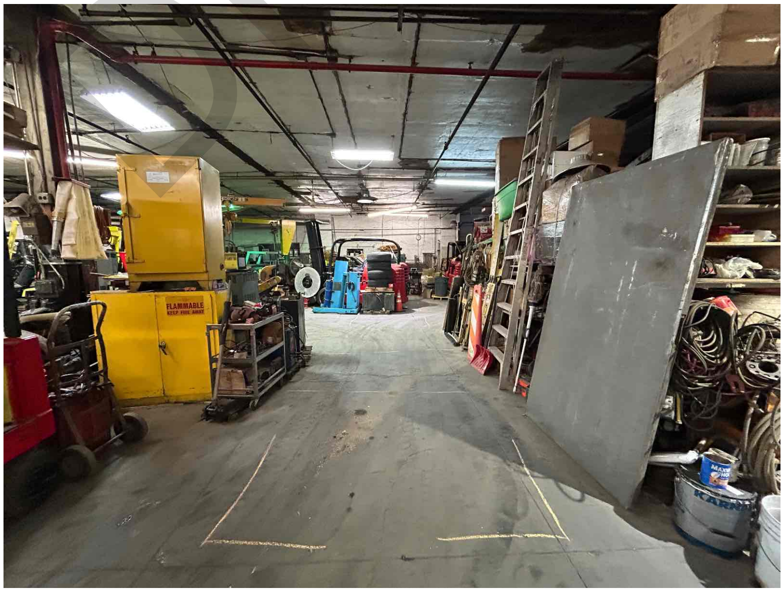
GPR IS NOT FULLY EFFECTIVE WITHIN 2' OF:

- Curbs
- Buildings
- Dense Foliage
- Other Obstructions

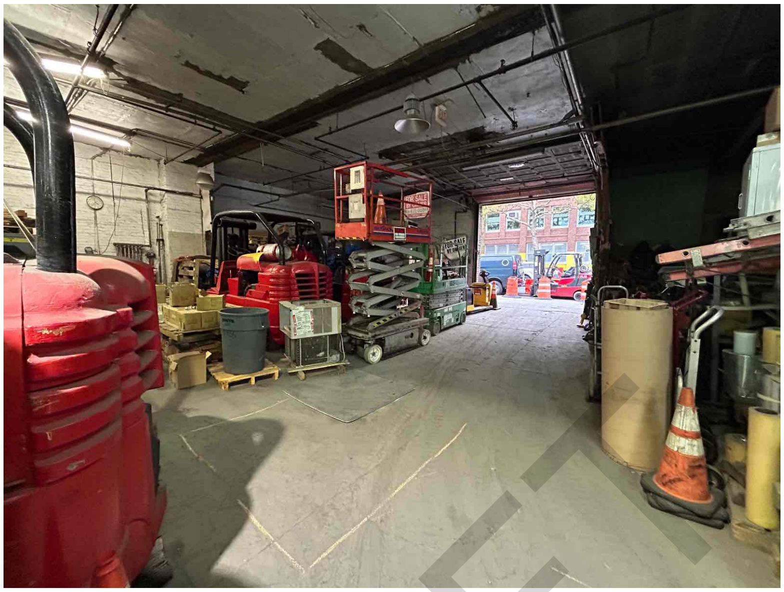
JOBSITE IMAGES



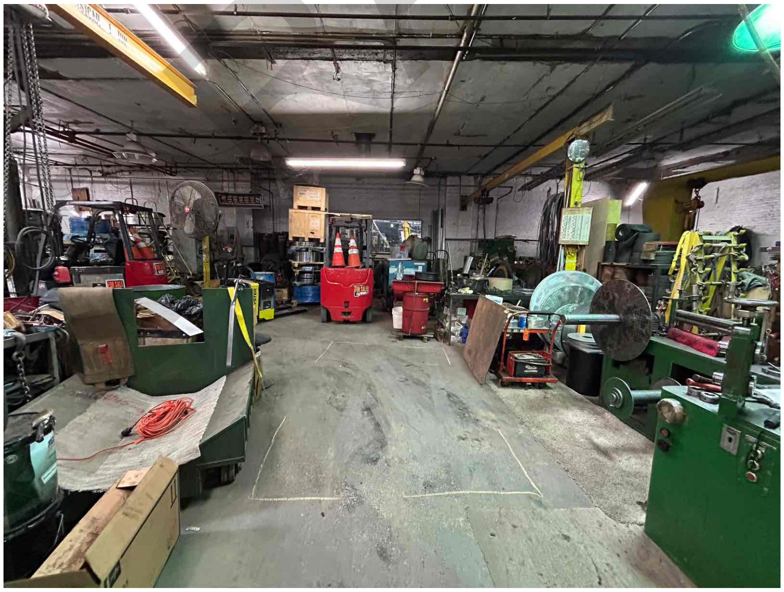
Jobsite Photo #1



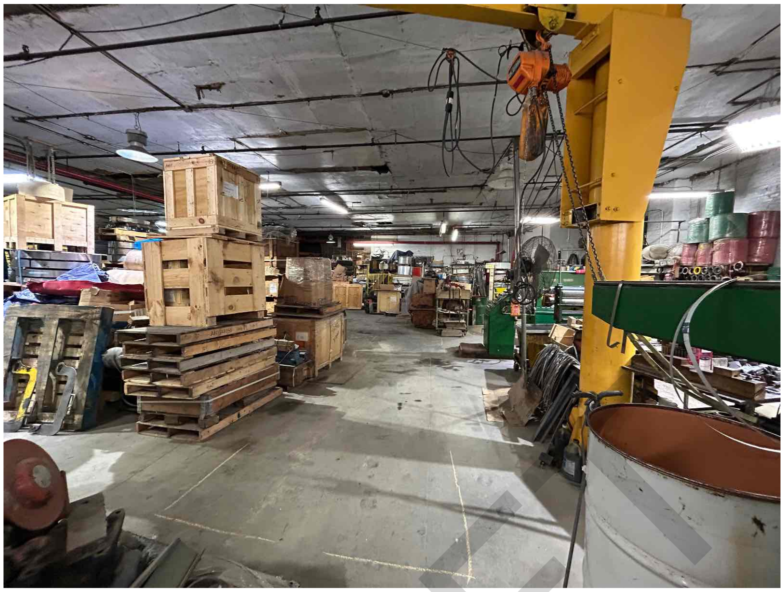
Jobsite Photo #2



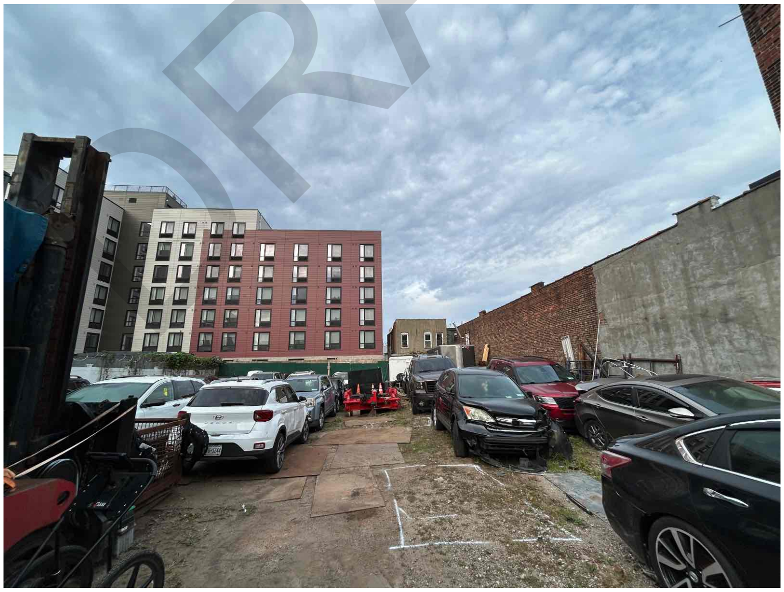
Jobsite Photo #3



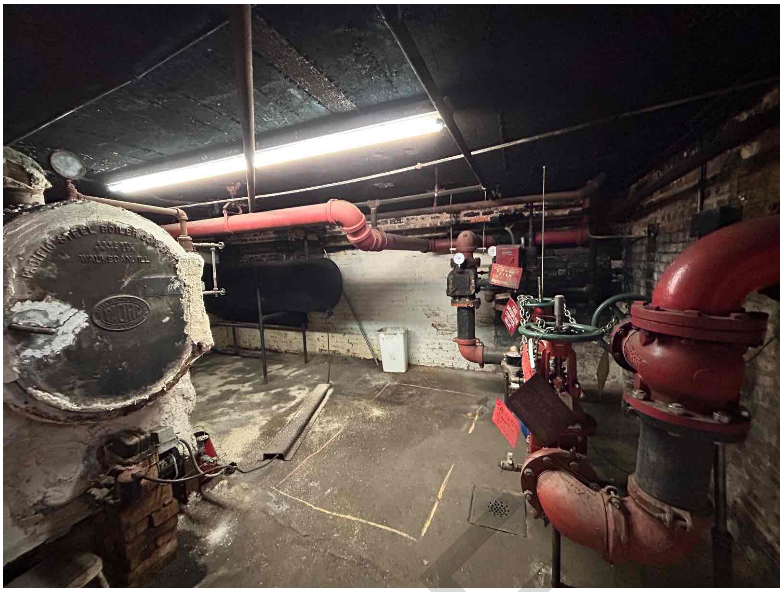
Jobsite Photo #4



Jobsite Photo #5



Jobsite Photo #6



Jobsite Photo #7

CONTACT / SIGNATURE INFORMATION

SIGNATURE

Contact Information

Contact Name	Elizabeth Fitzgerald	**Email**	erfitzgerald@haleyaldrich.com

TERMS & CONDITIONS

http://www.gprsinc.com/termsandconditions.html

APPENDIX C

Field Sampling Plan

HALEY ALDRICH

www.haleyaldrich.com

FIELD SAMPLING PLAN
PROPOSED 98-114 BERRIMAN STREET DEVELOPMENT
98-114 BERRIMAN STREET
BROOKLYN, NEW YORK

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

for
Berriman Residents LLC
130 Lee Avenue, #174
Brooklyn, New York 11206

File No. 0214078
December 2025

Table of Contents Page

List of Appendices iv

1. Introduction 1

2. Field Program 2

3. Utility Clearance 3

4. Field Data Recording 6

4.1 WRITTEN FIELD DATA 6
4.2 ELECTRONIC DATA 7

5. Aquifer Characterization 9

5.1 PROCEDURE 9

6. Sample Collection for Laboratory Analysis 10

6.1 SOIL SAMPLE COLLECTION FOR LABORATORY ANALYSIS 10
6.1.1 Preparatory Requirements 10
6.1.2 Soil Classification 10
6.1.3 Soil Sampling 11
6.1.4 Sampling Techniques 12
6.2 GROUNDWATER SAMPLE COLLECTION FOR LABORATORY ANALYSIS 12
6.2.1 Preparatory Requirements 13
6.2.2 Well Development 13
6.2.3 Well Purging and Stabilization Monitoring (Low-Stress/Low-Flow Method) 14
6.2.4 Sampling Techniques 15
6.3 SOIL VAPOR SAMPLING 17
6.3.1 Preparatory Requirements 17
6.3.2 Sampling Techniques 18
6.4 SAMPLE HANDLING AND SHIPPING 18
6.4.1 Sample Handling 18
6.4.2 Sample Labeling 18
6.4.3 Field Code 19
6.4.4 Packaging 20
6.4.5 Chain of Custody Records 20
6.4.6 Shipment 21

7. Field Instruments – Use and Calibration 22

7.1 GENERAL PROCEDURE DISCUSSION 22
7.2 DECONTAMINATION OF MONITORING EQUIPMENT 23
7.3 DISPOSAL OF WASH SOLUTIONS AND CONTAMINATED EQUIPMENT 23

8. Investigation-Derived Waste Disposal 24

8.1 RATIONALE/ASSUMPTIONS 24
8.2 PROCEDURE 24

References 25

List of Appendices

Appendix	**Title**
A	Field Forms

1. Introduction

This Field Sampling Plan (FSP) has been prepared as a component of the Remedial Investigation Work Plan (RIWP) for the proposed Brownfield Cleanup Program (BCP) site located at 98-114 Berriman Street, Brooklyn, New York (Site). This document was prepared to establish field procedures for field data collection to be performed to support the RIWP for the Site.

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

The standard operating procedures (SOPs) included as components of this plan will provide the procedures necessary to meet the project objectives. The SOPs will be used as a reference for the methods to be employed for field sample collection and handling and the management of field data collected during the execution of the approved RIWP activities. 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 (DER-10) 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 wastes (IDWs) as needed for disposal.

Based on the findings of the September 2025 Limited Phase II Environmental Site Investigation (ESI), primary contaminants of concern at the Site include semi-volatile organic compounds (SVOCs), specifically polycyclic aromatic hydrocarbons (PAHs), and heavy metals in shallow soils up to 4 feet below ground surface (bgs) and volatile organic compounds (VOCs), specifically chlorinated volatile organic compounds (CVOCs), including tetrachloroethene (PCE), and petroleum-related compounds (benzene, toluene, ethylbenzene, and xylenes [BTEX]) in sub-slab soil vapor. Previous investigations did not comprehensively delineate the extent of soil, groundwater, and soil vapor contamination at the Site. Results of the additional sample analyses proposed in this RIWP will be used to confirm the results of the previous Site characterization activities, address data gaps, delineate any on-Site source(s), and determine a course for remedial action.

Previous investigations did not comprehensively delineate the extent of soil, groundwater, and soil vapor contamination at the Site. A remedial investigation (RI) will be performed upon acceptance of the Site into the Brownfield Cleanup Program (BCP) and approval of the RIWP that will include additional targeted soil, groundwater, and soil vapor sampling. Results of the additional sample analyses will be used to confirm the results of the previous Site characterization activities, potentially identify an on-Site/off-Site source, and determine a course for remedial action.

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 property, 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 as well. 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 by other means. All markings of proposed locations should be made in white, in accordance with the generally-accepted universal color code for facilities identification (AWMA 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

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 include 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 entities:

- 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 light of 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 stake-out 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 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 judgment 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 stake-out 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 stake-out 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 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 solve 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 presence and location. In northern climates, this may require advancing to below 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 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, 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 log book. Log books must be hard cover, 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 use of field log forms and log books:

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 a new form/page.
5. At the end of each day, the current log book 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 log book 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. Log books should be dedicated to one project only, i.e., do not record data from multiple projects in one log book.

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 proper recording and management of electronic field data:

1. Field data management should follow requirements of a project-specific data management plan, if applicable.
2. Use only instruments that have been calibrated in accordance with 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 data 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 CD disks 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. 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; and
- Laptop computer (if required).

5. Aquifer Characterization

This procedure describes 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

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; 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 northern 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) the water is reached. The probe will be raised above 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 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 methods described in 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 RI 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 and their influence and significance in the subsurface environment. The accuracy of the stratigraphic log is to be verified by the person responsible for interpreting the 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 pattern 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 Haley & Aldrich 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 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 head space 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 per- and polyfluoroalkyl substances (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®) 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 varies 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 the NYSDEC-issued “Sampling, Analysis and Assessment of PFAS under NYSDEC Part 375 Remedial Programs” (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 consists of the minimum amount of soil necessary to make up the volume of 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), PAHs, and metals.

The "Typical Sampling Methods" will be employed where the collection of 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 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 water-tight 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 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 appropriate pump and lower tubing into well.
- Gauge well and calculate one well volume. Turn on pump. If well runs dry, shut off 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 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 (NTUs) 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 5 minutes, or as appropriate. A steady flow rate should be maintained that results in 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) potential (ORP), DO, and turbidity) approximately every 5 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 milliSiemens per centimeter (mS/cm) of the average value of the three readings for conductivity <1 mS/cm and 0.01 mS/cm of the average value of the three readings for conductivity >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 NTUs.
- 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 (TAL) metals
    - PCBs and pesticides
- No sampling equipment components or sample containers should come in contact with aluminum foil, low-density polyethylene, glass, or polytetrafluoroethylene (PTFE or Teflon™) materials, including plumbers' 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 40-milliliter 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 the NYSDEC-issued "Sampling, Analysis and Assessment of PFAS under NYSDEC Part 375 Remedial Programs" (April 2023).
- All samples must be labeled with:
    - Unique sample IDs
    - 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, and temperature gauge
- Field filtration units (if required)

- Purging/sampling equipment
- Peristaltic pump
- Water level probe
- Sampling materials (containers, log book/forms, coolers, and chains 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/EPA/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 stainless steel inertia pump with HDPE tubing, peristaltic pump equipped with HDPE tubing and silicone tubing, stainless-steel bailer with stainless-steel bal,l 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 2.0 describes the data/recording procedure for field activities.
- The log book 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 collector(s)
  - Climatic conditions, including air temperature
  - Problems encountered and any deviations made from the established sampling protocol.

A standard log form 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 (MNA) 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 range from:
  - Off-site treatment at private treatment/disposal facilities or public owned treatment facilities.
  - On-site treatment at the facility.
  - 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 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) device 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 United States Environmental Protection Agency (USEPA) Method TO-15. The flow rate for both purging and sampling will not exceed 0.2 liters per minute. 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 the 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 which may affect the sample's integrity.

All sample submissions must be accompanied with 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 container can be put into a "ziplock" 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 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 COC – laboratory to spike matrix.
MD	Matrix Spike Duplicate Sample (note on ‘Comments’ field of COC – 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 which must be followed when packing samples for shipment.

- Double bag ice in "ziplock" 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 "ziplock" 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 which use 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 their 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 standard form or supplied by the analytical laboratory.
- Chains of custody must be completed in black ballpoint 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 COC 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, clearly define 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 usage of electronic instruments to monitor for environmental conditions and health and safety purposes. It is imperative 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 manufacturer's recommendations.
- Field personnel will be responsible for ensuring that the equipment is maintained and calibrated in the field in accordance with 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 circumstance will operation of such instruments be allowed on 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 washes 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;
- Contaminated liquids and solids should be segregated and containerized in Department of Transportation-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 investigation-derived waste (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 the chemical source, chemical origin, and timing of chemical introduction to the subsurface.

Consequently, waste sampling and characterization is performed to determine if the wastes exhibit a characteristic 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 warrant 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 characterization of IDW for disposal purposes. IDW may consist of soil cuttings (augering, boring, well installation soils, and test pit soils), rock core or rock flour (from coring or reaming operations), groundwater (from well development, purging, and sampling activities), decontamination fluids, PPE, and disposal equipment.

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, and 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 of 500 to 1,000 gallons) or if large volumes of groundwater are anticipated, tanker trailer (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/Disposal Equipment – A number of disposal options exists for spent PPE/disposal equipment 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 a 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/Disposal equipment – Typically not sampled and included with the disposal of the solid wastes.

Equipment/Materials:

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

References

1. American Public Works Association, April 1999, Uniform Color Code (http://www.apwa.net/).

2. ASTM D1452-80: Practice for Soil Investigation and Sampling by Auger Borings, Annual Book of ASTM Standard, Section 4, Volume 04.08.

3. ASTM D1586-92: Test Method for Penetration Test and Split-Barrel Sampling of Soils.

4. ASTM D2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System).

5. ASTM D4448: Standard Guide for Sampling Groundwater Wells.

6. ASTM D4696: Guide for Pore-liquid Sampling from the Vadose Zone.

7. ASTM D4750: Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well).

8. ASTM D5088: Practice for Decontamination of Field Equipment Used at Non-Radioactive Waste Sites

9. ASTM D5474: Guide for Selection of Data Elements for Groundwater Investigations.

10. ASTM D5903: Guide for Planning and Preparing for a Groundwater Sampling Event.

11. ASTM D5979: Guide for Conceptualization and Characterization of Groundwater Systems.

12. ASTM D6000: Guide for Presentation of Water Level Information from Ground Water Sites.

13. ASTM D6001: Standard Guide for Direct Push Water Sampling for Geo-environmental Investigations.

14. ASTM Standards on Environmental Sampling, 1995a. Standard D 2488-93, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

15. ASTM Standards on Environmental Sampling, 1995b. Standard D 4700-91, Guide for Soil Sampling from the Vadose Zone.

16. Geotechnical Gauge, Manufactured by W.F. McCollough, Beltsville, MD.

17. New York State Code Rule 753.

18. New York State Department of Environmental Conservation, 2010. Technical Guidance for Site Investigation and Remediation, DER-10. May 3.

19. 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.

20. Occupational Safety and Health Administration's (OSHA) Excavation and Trenching Standard Title 29 of the Code of Federal Regulation (CFR) Part 1926.650.

21. Sand Grading Chart, by Geological Specialty Company, Northport, Alabama.

22. USEPA, 1986a. Office of Solid Waste - SW846 Chapter 9 Sampling Plan, Chapter 10 Sampling Methods. September.

23. USEPA, 1986b. RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, OSWER-9950.1.

24. USEPA, 1987. A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001.

25. USEPA, 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER-9950.1.

26. USEPA, 1998a. RCRA - Guidance and Policies: Management of Remediation Waste Under RCRA. October.

27. USEPA, 1998b. RCRA - Management of Contaminated Media. October.

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

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

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

APPENDIX A
Field Forms

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

Page **of**

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

Location

Client

Contractor

Weather

Report No.

Date

Page of

File No.

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
CLIENT
CONTRACTOR
DRILLER

PROJECT MGR.
FIELD REP.
DATE STARTED
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

			Depth in feet to:		
Date	**Time**	**Elapsed Time (hr.)**	**Bottom of Casing**	**Bottom of Hole**	**Water**
Date					

Sample ID

O	Open End Rod
T	Thin Wall Tube
U	Undisturbed Sample
S	Split Spoon Sample
G	Geoprobe

Summary

Overburden (Linear ft.) ____________
Rock Cored (Linear ft.) ____________
Number of Samples ____________

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

APPENDIX D

Quality Assurance Project Plan

www.haleyaldrich.com

QUALITY ASSURANCE PROJECT PLAN
PROPOSED 98-114 BERRIMAN STREET DEVELOPMENT
98-114 BERRIMAN STREET
BROOKLYN, NEW YORK

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

for
Berriman Residents LLC
130 Lee Avenue, #174
Brooklyn, New York 11206

File No. 02014078
December 2025

Executive Summary

This Quality Assurance Project Plan outlines the scope of the quality assurance and quality control activities associated with the site monitoring activities associated with the Remedial Investigation Work Plan for 98-114 Berriman Street in Brooklyn, New York (Site).

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

Table of Contents

Page

Executive Summary i
List of Tables v

1. Project Description 1

1.1 PROJECT OBJECTIVES 1
1.2 SITE DESCRIPTION AND HISTORY 1
1.3 LABORATORY PARAMETERS 1
1.4 SAMPLING LOCATIONS 2

2. Project Organization and Responsibilities 3

2.1 MANAGEMENT RESPONSIBILITIES 3
2.2 QUALITY ASSURANCE RESPONSIBILITIES 3
2.2.1 Quality Assurance Officer 3
2.2.2 Data Validation Staff 3
2.3 LABORATORY RESPONSIBILITIES 4
2.3.1 Laboratory Project Manager 4
2.3.2 Laboratory Operations Manager 4
2.3.3 Laboratory QA Officer 4
2.3.4 Laboratory Sample Custodian 4
2.3.5 Laboratory Technical Personnel 4
2.4 FIELD RESPONSIBILITIES 5
2.4.1 Field Coordinator 5
2.4.2 Field Team Personnel 5

3. Sampling Procedures 6

3.1 SAMPLE CONTAINERS 6
3.2 SAMPLE LABELING 6
3.3 FIELD QC SAMPLE COLLECTION 6
3.3.1 Field Duplicate Sample Collection 6

4. Custody Procedures 8

4.1 FIELD CUSTODY PROCEDURES 8
4.1.1 Field Procedures 9
4.1.2 Transfer of Custody and Shipment Procedures 9
4.2 LABORATORY CHAIN-OF-CUSTODY PROCEDURES 10
4.3 STORAGE OF SAMPLES 10
4.4 FINAL PROJECT FILES CUSTODY PROCEDURES 10

5. Calibration Procedures and Frequency 12

Table of Contents

Page

5.1 FIELD INSTRUMENT CALIBRATION PROCEDURES 12
5.2 LABORATORY INSTRUMENT CALIBRATION PROCEDURES 12

6. Analytical Procedures 13

6.1 FIELD ANALYTICAL PROCEDURES 13
6.2 LABORATORY ANALYTICAL PROCEDURES 13
  6.2.1 List of Project Target Compounds and Laboratory Detection Limits 13
  6.2.2 List of Method Specific Quality Control Criteria 13

7. Internal Quality Control Checks 14

7.1 FIELD QUALITY CONTROL 14
  7.1.1 Field Blanks 14
  7.1.2 Trip Blanks 14
7.2 LABORATORY PROCEDURES 14
  7.2.1 Field Duplicate Samples 14
  7.2.2 Matrix Spike Samples 15
  7.2.3 Laboratory Control Sample Analyses 15
  7.2.4 Surrogate Compound/Internal Standard Recoveries 15
  7.2.5 Calibration Verification Standards 16
  7.2.6 Laboratory Method Blank Analyses 16

8. Data Quality Objectives 17

8.1 PRECISION 17
  8.1.1 Definition 17
  8.1.2 Field Precision Sample Objectives 17
  8.1.3 Laboratory Precision Sample Objectives 17
8.2 ACCURACY 18
  8.2.1 Definition 18
  8.2.2 Field Accuracy Objectives 18
8.3 LABORATORY ACCURACY OBJECTIVES 18
8.4 REPRESENTATIVENESS 19
  8.4.1 Definition 19
  8.4.2 Measures to Ensure Representativeness of Field Data 19
8.5 COMPLETENESS 19
  8.5.1 Definition 19
  8.5.2 Field Completeness Objectives 19
  8.5.3 Laboratory Completeness Objectives 19
8.6 COMPARABILITY 20
  8.6.1 Definition 20
  8.6.2 Measures to Ensure Comparability of Laboratory Data 20
8.7 LEVEL OF QUALITY CONTROL EFFORT 20

Table of Contents

Page

9. Data Reduction, Validation and Reporting 22

9.1 DATA REDUCTION 22
9.1.1 Field Data Reduction Procedures 22
9.1.2 Laboratory Data Reduction Procedures 22
9.1.3 Quality Control Data 22
9.2 DATA VALIDATION 22
9.3 DATA REPORTING 23

10. Performance and System Audits 24

10.1 FIELD PERFORMANCE AND SYSTEM AUDITS 24
10.1.1 Internal Field Audit Responsibilities 24
10.1.2 External Field Audit Responsibilities 24
10.2 LABORATORY PERFORMANCE AND SYSTEM AUDITS 24
10.2.1 Internal Laboratory Audit Responsibilities 24
10.2.2 External Laboratory Audit Responsibilities 25

11. Preventive Maintenance 26

11.1 FIELD INSTRUMENT PREVENTIVE MAINTENANCE 26
11.2 LABORATORY INSTRUMENT PREVENTIVE MAINTENANCE 26

12. Specific Routine Procedures Used to Assess Data Precision, Accuracy, and Completeness 27

12.1 FIELD MEASUREMENTS 27
12.2 LABORATORY DATA 27

13. Quality Assurance Reports 28

References 29

List of Tables

Table No.	Title
I	Summary of Analysis Method, Preservation Method, Holding Time, Sample Size Requirements, and Sample Containers
II	Minimum Reporting Limits

1. Project Description

This Quality Assurance Project Plan (QAPP) has been prepared as a component of the Remedial Investigation Work Plan (RIWP) for 98-114 Berriman Street in Brooklyn, 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 is provided in the Site Description and History Summary that accompanies the RIWP appended to the Brownfield Cleanup Program 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 8260D/5035;
- TCL semi-volatile organic compounds (SVOCs) using EPA Method 8270E;
- Total Analyte List (TAL) Metals using EPA Method 6010D;
- Polychlorinated biphenyls (PCBs) using EPA Method 8082A;
- TCL Pesticides using EPA Method 8081B;
- Per- and polyfluoroalkyl substances (PFAS) using EPA Method 1633: and
- 1,4-dioxane by EPA Method 8270E.

The laboratory parameters for groundwater include:

- TCL VOCs using EPA Method 8260D;
- TCL SVOCs using EPA Method 8270;
- Total and Dissolved Metals using EPA Methods 6010/6020;
- PCBs using EPA Method 8082;
- TCL Pesticides using EPA Method 8081B;
- PFAS using EPA Method 1633 and;
- 1,4-Dioxane using EPA Method 8270E-SIM.

Note: PFAS sampling techniques will be conducted following the New York State Department of Environmental Conservation (NYSDEC) Collection of Groundwater Samples for PFAS from Monitoring Wells and Collection of Samples for PFAS from Soils Sample Protocols.

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

The laboratory parameter for soil vapor includes:

- 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 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 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 Site Health and Safety Plan (HASP).

2.2 QUALITY ASSURANCE RESPONSIBILITIES

The Quality Assurance (QA) team will consist of a QA Officer and the Data Validation Staff. QA responsibilities are described as follows:

2.2.1 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.

2.2.2 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 be presented in a Data Usability Summary Report (DUSR) for submittal to the QA Officer.

2.3 LABORATORY RESPONSIBILITIES

Laboratory services to support the RIWP monitoring include the following personnel.

2.3.1 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.

2.3.2 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 (COC) reports, scheduling sample analyses, overseeing data review, and overseeing preparation of analytical reports.

2.3.3 Laboratory QA Officer

The Laboratory QA Officer will have sole responsibility for 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 QA Officer will also define appropriate QA procedures, overseeing QA/QC documentation.

2.3.4 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 COC 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.

2.3.5 Laboratory Technical Personnel

The Laboratory Technical Personnel will have the primary responsibility in 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).

2.4 FIELD RESPONSIBILITIES

2.4.1 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 Health & Safety Officer (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 QAO, and Project Manager; implement and document corrective action procedures; and
- Participate in preparation of the final reports.

2.4.2 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) 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 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 NYSDEC Sampling, Analysis, and Assessment of PFAS Under NYSDEC's Part 375 Remedial Programs dated April 2023, as applicable.

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. Equipment rinse blanks and field duplicate samples also will be numbered with a unique sample identifier to prevent analytical bias of field QC samples.

Refer to the FSP 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 repeated 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 as detailed in Section 3.3.1.
3. COC 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 sampling directly from acetate liners.
2. Soil for VOC analysis will be removed from the sampling device as specified in the FSP.
3. Soil for non-VOC analysis will be removed from the sampling device and collected into clean laboratory provided containers.

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:

- Detailed description of sample location;
- Equipment used to collect sample or make measurement and the date equipment was calibrated;
- Time sample was collected;
- Description of the sample conditions;
- Depth sample was collected (if applicable);
- Volume and number of containers filled with the sample; and
- 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 for sample packaging procedures.
- Samples will be assigned a unique sample number and will be affixed to a sample label. Refer to the FSP 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. Minimum reporting limits for each analytical method are presented in Table II.

4.1.2 Transfer of Custody and Shipment Procedures

- A COC 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 COC 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) which 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 COC 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 COC forms have been completed. The custodian will sign the COC 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 COC 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 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 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 COC documentation;
- Correspondence;
- References, literature;
- Laboratory data deliverables;
- Data validation and assessment reports;
- Progress reports and QA reports; and

- A final report.

The laboratory will be responsible for maintaining analytical logbooks, laboratory data and sample COC 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 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.

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 SOP.

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 VOCs 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 Register, 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 which contribute to maintenance of overall laboratory quality assurance and control 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% and aqueous matrices will be 35% (or the absolute difference rule was satisfied if detects were less than 5 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.

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

If the QC value falls outside the control limits (upper or lower control limit) 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 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 standard immediately before analysis for quantitation via internal standardization techniques.

Method specific QC limits are provided in the attached 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 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 SOPs. 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 to assess 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, and 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 the RPD. RPD is defined as the absolute difference of duplicate measurements divided by the mean of these analyses normalized to percentage.

8.1.2 Field Precision Sample Objectives

Field precision will be assessed through 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% for soil and +/- 35 % for groundwater for parameters of analysis detected at concentrations greater than 5 times (5X) the laboratory reporting limit (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 % for parameters of analysis detected at concentrations greater than 5 times (5X) 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 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 VOCs. 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 of the 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 by the following equation.

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

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. Field completeness objective for this project will be greater than (>) 90%.

8.5.3 Laboratory Completeness Objectives

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 dataset. The completeness goal will be >90%.

8.6 COMPARABILITY

8.6.1 Definition

Comparability is a qualitative parameter expressing the confidence with which one dataset 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 (µg/kg) for PFAS analyses; milligrams per kilogram (mg/kg) of media (dry weight).
- Aqueous Matrices – nanograms per liter (ng/L) for PFAS analyses; micrograms per liter (µg/L) of media for organic analyses and milligrams per liter (mg/L) 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.

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 Avangrid Field Sampling Plan. (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.

Matrix spikes 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 VOC 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, "Test Methods for Evaluating Solid Waste," SW-846, Third Edition. Errors will be noted; corrections 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, MSs, and MSDs) 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 QA Officer or designee using the following documents as guidance for the review process:

- "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 PPFAS Under NYSDEC's Part 375 Remedial Programs," and the "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 QAO. 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 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 Department 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
- COC 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 health and safety plans;
- 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, COC 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 de-certification. An audit may consist of but not limited to:

- Sample receipt procedures;
- Custody, sample security and log-in procedures;
- Review of instrument calibration logs;
- Review of QA procedures;
- Review of log books;
- 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 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 down time. 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 deduce instrument failure and/or extend useful instrument life. Between visits, routine operator maintenance and cleaning will be performed according to 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 include 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 Section 7.0 of this QAPP. The accuracy of pH and specific conductance will be assessed using daily instrument calibration, calibration check, 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:

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

12.2 LABORATORY DATA

Laboratory data will be assessed by the Haley & Aldrich QA Officer or designee who will review the laboratory results for compliance with the established QC criteria that are specified in Sections 7.0 and 8.0 of this QAPP.

13. Quality Assurance Reports

Critically important to the successful implementation of the QA Plan 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 and 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 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, 2010. Division of Environmental Remediation, Technical Guidance for Site Investigation and Remediation, DER-10. May.

2. New York State Department of Environmental Conservation, 2023. Division of Environmental Remediation, Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs. April.

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

4. 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.

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

6. 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.

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

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

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

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

TABLES

TABLE I
SUMMARY OF ANALYSIS METHOD, PRESERVATION METHOD, HOLDING TIME, SAMPLE SIZE REQUIREMENTS, AND SAMPLE CONTAINERS
98-114 BERRIMAN STREET
BROOKLYN, NEW YORK

Analysis/Method[3]	Sample Type	Preservation	Holding Time	Volume/Weight	Container[4]
Volatile Organic Compounds/8260C	Soil	1 - 1 Vial MeOH/2 Vial Water, Cool, 4 ± 2 °C	14 days[1]	120 mL	3 - 40ml glass vials
Semivolatile Organic Compounds/8270D	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 8 oz Glass
Pesticides/8081B	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 4 oz Glass
Polychlorinated Biphenyls/8082A	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 4 oz Glass
Metals/6010D	Soil	Cool, 4 ± 2 °C	180 days	60 mL	1 - 4 oz Glass
PFAS/1633	Soil	Cool, 4 ± 2 °C	28 days extraction / 40 days analysis	To be determined by laboratory	1 - HDPE container
1,4-Dioxane/8270	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 8 oz Glass
Volatile Organic Compounds/8260C	Groundwater	HCl, Cool, 4 ± 2 °C	14 days	120 mL	3 - 40 mL glass vials
Semivolatile Organic Compounds/8270D	Groundwater	Cool, 4 ± 2 °C	7 days extraction / 40 days analysis	500 mL	2 - 250 mL amber glass
TAL Metals/6020	Groundwater	HNO_3Cool, 4 ± 2 °C	180 days	500 mL	1 - 500 mL plastic bottle
TCL Pesticides/8081B	Groundwater	Cool, 4 ± 2 °C	7 days	1000 mL	2 - 500 mL amber glass
PFAS/1633	Groundwater	H2O Cool, 4 ± 2 °C	28 days extraction / 28 days analysis	To be determined by laboratory	2 - HDPE container
1,4-Dioxane/8270SIM	Groundwater	Cool, 4 ± 2 °C	7 days extraction / 40 days analysis	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 L Summa Canister

Notes:

1. *Terracores and encores must be frozen within 48 hours of collection*
2. *Refer to text for additional information.*
3. *Equivalent method can be used.*
4. *Volume may vary by laboratory and/or equivalent method.*

Date Created: 08/02/23
Created By: Mitch Ostrowski
File: PM14945-1
Page: 1

Table II. Minimum Reporting Limits
TCL Volatiles - EPA 8260D (WATER)

Holding Time: 14 days
Container/Sample Preservation: 3 - Vial HCl preserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Methylene chloride	75-09-2	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,1-Dichloroethane	75-34-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Chloroform	67-66-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Carbon tetrachloride	56-23-5	0.5	0.134	ug/l	63-132	20	63-132	20	20			
1,2-Dichloropropane	78-87-5	1	0.137	ug/l	70-130	20	70-130	20	20			
Dibromochloromethane	124-48-1	0.5	0.149	ug/l	63-130	20	63-130	20	20			
1,1,2-Trichloroethane	79-00-5	1.5	0.5	ug/l	70-130	20	70-130	20	20			
Tetrachloroethene	127-18-4	0.5	0.181	ug/l	70-130	20	70-130	20	20			
Chlorobenzene	108-90-7	2.5	0.7	ug/l	75-130	20	75-130	20	20			
Trichlorofluoromethane	75-69-4	2.5	0.7	ug/l	62-150	20	62-150	20	20			
1,2-Dichloroethane	107-06-2	0.5	0.132	ug/l	70-130	20	70-130	20	20			
1,1,1-Trichloroethane	71-55-6	2.5	0.7	ug/l	67-130	20	67-130	20	20			
Bromodichloromethane	75-27-4	0.5	0.192	ug/l	67-130	20	67-130	20	20			
trans-1,3-Dichloropropene	10061-02-6	0.5	0.164	ug/l	70-130	20	70-130	20	20			
cis-1,3-Dichloropropene	10061-01-5	0.5	0.144	ug/l	70-130	20	70-130	20	20			
1,3-Dichloropropene, Total	542-75-6	0.5	0.144	ug/l				20	20			
1,1-Dichloropropene	563-58-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Bromoform	75-25-2	2	0.65	ug/l	54-136	20	54-136	20	20			
1,1,2,2-Tetrachloroethane	79-34-5	0.5	0.167	ug/l	67-130	20	67-130	20	20			
Benzene	71-43-2	0.5	0.159	ug/l	70-130	20	70-130	20	20			
Toluene	108-88-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Ethylbenzene	100-41-4	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Chloromethane	74-87-3	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Bromomethane	74-83-9	2.5	0.7	ug/l	39-139	20	39-139	20	20			
Vinyl chloride	75-01-4	1	0.0714	ug/l	55-140	20	55-140	20	20			
Chloroethane	75-00-3	2.5	0.7	ug/l	55-138	20	55-138	20	20			
1,1-Dichloroethene	75-35-4	0.5	0.169	ug/l	61-145	20	61-145	20	20			
trans-1,2-Dichloroethene	156-60-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Trichloroethene	79-01-6	0.5	0.175	ug/l	70-130	20	70-130	20	20			
1,2-Dichlorobenzene	95-50-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,3-Dichlorobenzene	541-73-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,4-Dichlorobenzene	106-46-7	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Methyl tert butyl ether	1634-04-4	2.5	0.7	ug/l	63-130	20	63-130	20	20			
p/m-Xylene	179601-23-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
o-Xylene	95-47-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Xylene (Total)	1330-20-7	2.5	0.7	ug/l				20	20			
cis-1,2-Dichloroethene	156-59-2	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2-Dichloroethene (total)	540-59-0	2.5	0.7	ug/l				20	20			
Dibromomethane	74-95-3	5	1	ug/l	70-130	20	70-130	20	20			
1,2,3-Trichloropropane	96-18-4	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Acrylonitrile	107-13-1	5	1.5	ug/l	70-130	20	70-130	20	20			
Styrene	100-42-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/02/23
Created By: Mitch Ostrowski
File: PM14945-1
Page: 2

Table II. Minimum Reporting Limits TCL Volatiles - EPA 8260D (WATER)

Holding Time: 14 days
Container/Sample Preservation: 3 - Vial HCl preserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Dichlorodifluoromethane	75-71-8	5	1	ug/l	36-147	20	36-147	20	20			
Acetone	67-64-1	5	1.46	ug/l	58-148	20	58-148	20	20			
Carbon disulfide	75-15-0	5	1	ug/l	51-130	20	51-130	20	20			
2-Butanone	78-93-3	5	1.94	ug/l	63-138	20	63-138	20	20			
Vinyl acetate	108-05-4	5	1	ug/l	70-130	20	70-130	20	20			
4-Methyl-2-pentanone	108-10-1	5	1	ug/l	59-130	20	59-130	20	20			
2-Hexanone	591-78-6	5	1	ug/l	57-130	20	57-130	20	20			
Bromochloromethane	74-97-5	2.5	0.7	ug/l	70-130	20	70-130	20	20			
2,2-Dichloropropane	594-20-7	2.5	0.7	ug/l	63-133	20	63-133	20	20			
1,2-Dibromoethane	106-93-4	2	0.65	ug/l	70-130	20	70-130	20	20			
1,3-Dichloropropane	142-28-9	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,1,1,2-Tetrachloroethane	630-20-6	2.5	0.7	ug/l	64-130	20	64-130	20	20			
Bromobenzene	108-86-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
n-Butylbenzene	104-51-8	2.5	0.7	ug/l	53-136	20	53-136	20	20			
sec-Butylbenzene	135-98-8	2.5	0.7	ug/l	70-130	20	70-130	20	20			
tert-Butylbenzene	98-06-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
o-Chlorotoluene	95-49-8	2.5	0.7	ug/l	70-130	20	70-130	20	20			
p-Chlorotoluene	106-43-4	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2-Dibromo-3-chloropropane	96-12-8	2.5	0.7	ug/l	41-144	20	41-144	20	20			
Hexachlorobutadiene	87-68-3	2.5	0.7	ug/l	63-130	20	63-130	20	20			
Isopropylbenzene	98-82-8	2.5	0.7	ug/l	70-130	20	70-130	20	20			
p-Isopropyltoluene	99-87-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
Naphthalene	91-20-3	2.5	0.7	ug/l	70-130	20	70-130	20	20			
n-Propylbenzene	103-65-1	2.5	0.7	ug/l	69-130	20	69-130	20	20			
1,2,3-Trichlorobenzene	87-61-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2,4-Trichlorobenzene	120-82-1	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,3,5-Trimethylbenzene	108-67-8	2.5	0.7	ug/l	64-130	20	64-130	20	20			
1,2,4-Trimethylbenzene	95-63-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,4-Dioxane	123-91-1	250	60.8	ug/l	56-162	20	56-162	20	20			
1,4-Diethylbenzene	105-05-5	2	0.7	ug/l	70-130	20	70-130	20	20			
4-Ethyltoluene	622-96-8	2	0.7	ug/l	70-130	20	70-130	20	20			
1,2,4,5-Tetramethylbenzene	95-93-2	2	0.542	ug/l	70-130	20	70-130	20	20			
Ethyl ether	60-29-7	2.5	0.7	ug/l	59-134	20	59-134	20	20			
trans-1,4-Dichloro-2-butene	110-57-6	2.5	0.7	ug/l	70-130	20	70-130	20	20			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
Toluene-d8	*2037-26-5*									*70-130*		
4-Bromofluorobenzene	*460-00-4*									*70-130*		
Dibromofluoromethane	*1868-53-7*									*70-130*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/02/23
Created By: Mitch Ostrowski
File: PM14945-1
Page: 1

Table II. Minimum Reporting Limits
TCL Volatiles - EPA 8260D/5035 High&Low (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - 1 Vial MeOH/2 Vial Water

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Methylene chloride	75-09-2	5	2.29	ug/kg	70-130	30	70-130	30	30			
1,1-Dichloroethane	75-34-3	1	0.145	ug/kg	70-130	30	70-130	30	30			
Chloroform	67-66-3	1.5	0.14	ug/kg	70-130	30	70-130	30	30			
Carbon tetrachloride	56-23-5	1	0.23	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloropropane	78-87-5	1	0.125	ug/kg	70-130	30	70-130	30	30			
Dibromochloromethane	124-48-1	1	0.14	ug/kg	70-130	30	70-130	30	30			
1,1,2-Trichloroethane	79-00-5	1	0.267	ug/kg	70-130	30	70-130	30	30			
Tetrachloroethene	127-18-4	0.5	0.196	ug/kg	70-130	30	70-130	30	30			
Chlorobenzene	108-90-7	0.5	0.127	ug/kg	70-130	30	70-130	30	30			
Trichlorofluoromethane	75-69-4	4	0.695	ug/kg	70-139	30	70-139	30	30			
1,2-Dichloroethane	107-06-2	1	0.257	ug/kg	70-130	30	70-130	30	30			
1,1,1-Trichloroethane	71-55-6	0.5	0.167	ug/kg	70-130	30	70-130	30	30			
Bromodichloromethane	75-27-4	0.5	0.109	ug/kg	70-130	30	70-130	30	30			
trans-1,3-Dichloropropene	10061-02-6	1	0.273	ug/kg	70-130	30	70-130	30	30			
cis-1,3-Dichloropropene	10061-01-5	0.5	0.158	ug/kg	70-130	30	70-130	30	30			
1,3-Dichloropropene, Total	542-75-6	0.5	0.158	ug/kg				30	30			
1,1-Dichloropropene	563-58-6	0.5	0.159	ug/kg	70-130	30	70-130	30	30			
Bromoform	75-25-2	4	0.246	ug/kg	70-130	30	70-130	30	30			
1,1,2,2-Tetrachloroethane	79-34-5	0.5	0.166	ug/kg	70-130	30	70-130	30	30			
Benzene	71-43-2	0.5	0.166	ug/kg	70-130	30	70-130	30	30			
Toluene	108-88-3	1	0.543	ug/kg	70-130	30	70-130	30	30			
Ethylbenzene	100-41-4	1	0.141	ug/kg	70-130	30	70-130	30	30			
Chloromethane	74-87-3	4	0.932	ug/kg	52-130	30	52-130	30	30			
Bromomethane	74-83-9	2	0.581	ug/kg	57-147	30	57-147	30	30			
Vinyl chloride	75-01-4	1	0.335	ug/kg	67-130	30	67-130	30	30			
Chloroethane	75-00-3	2	0.452	ug/kg	50-151	30	50-151	30	30			
1,1-Dichloroethene	75-35-4	1	0.238	ug/kg	65-135	30	65-135	30	30			
trans-1,2-Dichloroethene	156-60-5	1.5	0.137	ug/kg	70-130	30	70-130	30	30			
Trichloroethene	79-01-6	0.5	0.137	ug/kg	70-130	30	70-130	30	30			
1,2-Dichlorobenzene	95-50-1	2	0.144	ug/kg	70-130	30	70-130	30	30			
1,3-Dichlorobenzene	541-73-1	2	0.148	ug/kg	70-130	30	70-130	30	30			
1,4-Dichlorobenzene	106-46-7	2	0.171	ug/kg	70-130	30	70-130	30	30			
Methyl tert butyl ether	1634-04-4	2	0.201	ug/kg	66-130	30	66-130	30	30			
p/m-Xylene	179601-23-1	2	0.56	ug/kg	70-130	30	70-130	30	30			
o-Xylene	95-47-6	1	0.291	ug/kg	70-130	30	70-130	30	30			
Xylene (Total)	1330-20-7	1	0.291	ug/kg				30	30			
cis-1,2-Dichloroethene	156-59-2	1	0.175	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloroethene (total)	540-59-0	1	0.137	ug/kg				30	30			
Dibromomethane	74-95-3	2	0.238	ug/kg	70-130	30	70-130	30	30			
Styrene	100-42-5	1	0.196	ug/kg	70-130	30	70-130	30	30			
Dichlorodifluoromethane	75-71-8	10	0.915	ug/kg	30-146	30	30-146	30	30			
Acetone	67-64-1	10	4.811	ug/kg	54-140	30	54-140	30	30			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/02/23
Created By: Mitch Ostrowski
File: PM14945-1
Page: 2

Table II. Minimum Reporting Limits
TCL Volatiles - EPA 8260D/5035 High&Low (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - 1 Vial MeOH/2 Vial Water

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Carbon disulfide	75-15-0	10	4.55	ug/kg	59-130	30	59-130	30	30			
2-Butanone	78-93-3	10	2.22	ug/kg	70-130	30	70-130	30	30			
Vinyl acetate	108-05-4	10	2.15	ug/kg	70-130	30	70-130	30	30			
4-Methyl-2-pentanone	108-10-1	10	1.28	ug/kg	70-130	30	70-130	30	30			
1,2,3-Trichloropropane	96-18-4	2	0.127	ug/kg	68-130	30	68-130	30	30			
2-Hexanone	591-78-6	10	1.18	ug/kg	70-130	30	70-130	30	30			
Bromochloromethane	74-97-5	2	0.205	ug/kg	70-130	30	70-130	30	30			
2,2-Dichloropropane	594-20-7	2	0.202	ug/kg	70-130	30	70-130	30	30			
1,2-Dibromoethane	106-93-4	1	0.279	ug/kg	70-130	30	70-130	30	30			
1,3-Dichloropropane	142-28-9	2	0.167	ug/kg	69-130	30	69-130	30	30			
1,1,1,2-Tetrachloroethane	630-20-6	0.5	0.132	ug/kg	70-130	30	70-130	30	30			
Bromobenzene	108-86-1	2	0.145	ug/kg	70-130	30	70-130	30	30			
n-Butylbenzene	104-51-8	1	0.167	ug/kg	70-130	30	70-130	30	30			
sec-Butylbenzene	135-98-8	1	0.146	ug/kg	70-130	30	70-130	30	30			
tert-Butylbenzene	98-06-6	2	0.118	ug/kg	70-130	30	70-130	30	30			
o-Chlorotoluene	95-49-8	2	0.191	ug/kg	70-130	30	70-130	30	30			
p-Chlorotoluene	106-43-4	2	0.108	ug/kg	70-130	30	70-130	30	30			
1,2-Dibromo-3-chloropropane	96-12-8	3	0.998	ug/kg	68-130	30	68-130	30	30			
Hexachlorobutadiene	87-68-3	4	0.169	ug/kg	67-130	30	67-130	30	30			
Isopropylbenzene	98-82-8	1	0.109	ug/kg	70-130	30	70-130	30	30			
p-Isopropyltoluene	99-87-6	1	0.109	ug/kg	70-130	30	70-130	30	30			
Naphthalene	91-20-3	4	0.65	ug/kg	70-130	30	70-130	30	30			
Acrylonitrile	107-13-1	4	1.15	ug/kg	70-130	30	70-130	30	30			
n-Propylbenzene	103-65-1	1	0.171	ug/kg	70-130	30	70-130	30	30			
1,2,3-Trichlorobenzene	87-61-6	2	0.322	ug/kg	70-130	30	70-130	30	30			
1,2,4-Trichlorobenzene	120-82-1	2	0.272	ug/kg	70-130	30	70-130	30	30			
1,3,5-Trimethylbenzene	108-67-8	2	0.193	ug/kg	70-130	30	70-130	30	30			
1,2,4-Trimethylbenzene	95-63-6	2	0.334	ug/kg	70-130	30	70-130	30	30			
1,4-Dioxane	123-91-1	80	35.1	ug/kg	65-136	30	65-136	30	30			
1,4-Diethylbenzene	105-05-5	2	0.177	ug/kg	70-130	30	70-130	30	30			
4-Ethyltoluene	622-96-8	2	0.384	ug/kg	70-130	30	70-130	30	30			
1,2,4,5-Tetramethylbenzene	95-93-2	2	0.191	ug/kg	70-130	30	70-130	30	30			
Ethyl ether	60-29-7	2	0.341	ug/kg	67-130	30	67-130	30	30			
trans-1,4-Dichloro-2-butene	110-57-6	5	1.42	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
2-Chloroethoxyethane												
Toluene-d8	*2037-26-5*									*70-130*		
4-Bromofluorobenzene	*460-00-4*									*70-130*		
Dibromofluoromethane	*1868-53-7*									*70-130*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits
NYTCL Semivolatiles - EPA 8270E (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Acenaphthene	83-32-9	133.6	17.3012	ug/kg	31-137	50	31-137	50	50			
1,2,4-Trichlorobenzene	120-82-1	167	19.1048	ug/kg	38-107	50	38-107	50	50			
Hexachlorobenzene	118-74-1	100.2	18.704	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroethyl)ether	111-44-4	150.3	22.6452	ug/kg	40-140	50	40-140	50	50			
2-Chloronaphthalene	91-58-7	167	16.5664	ug/kg	40-140	50	40-140	50	50			
1,2-Dichlorobenzene	95-50-1	167	29.9932	ug/kg	40-140	50	40-140	50	50			
1,3-Dichlorobenzene	541-73-1	167	28.724	ug/kg	40-140	50	40-140	50	50			
1,4-Dichlorobenzene	106-46-7	167	29.1582	ug/kg	28-104	50	28-104	50	50			
3,3'-Dichlorobenzidine	91-94-1	167	44.422	ug/kg	40-140	50	40-140	50	50			
2,4-Dinitrotoluene	121-14-2	167	33.4	ug/kg	40-132	50	40-132	50	50			
2,6-Dinitrotoluene	606-20-2	167	28.6572	ug/kg	40-140	50	40-140	50	50			
Fluoranthene	206-44-0	100.2	19.1716	ug/kg	40-140	50	40-140	50	50			
4-Chlorophenyl phenyl ether	7005-72-3	167	17.869	ug/kg	40-140	50	40-140	50	50			
4-Bromophenyl phenyl ether	101-55-3	167	25.4842	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroisopropyl)ether	108-60-1	200.4	28.5236	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroethoxy)methane	111-91-1	180.36	16.7334	ug/kg	40-117	50	40-117	50	50			
Hexachlorobutadiene	87-68-3	167	24.4488	ug/kg	40-140	50	40-140	50	50			
Hexachlorocyclopentadiene	77-47-4	477.62	151.302	ug/kg	40-140	50	40-140	50	50			
Hexachloroethane	67-72-1	133.6	27.0206	ug/kg	40-140	50	40-140	50	50			
Isophorone	78-59-1	150.3	21.6766	ug/kg	40-140	50	40-140	50	50			
Naphthalene	91-20-3	167	20.3406	ug/kg	40-140	50	40-140	50	50			
Nitrobenzene	98-95-3	150.3	24.716	ug/kg	40-140	50	40-140	50	50			
NitrosoDiPhenylAmine(NDPA)/DPA	86-30-6	133.6	19.0046	ug/kg	36-157	50	36-157	50	50			
n-Nitrosodi-n-propylamine	621-64-7	167	25.7848	ug/kg	32-121	50	32-121	50	50			
Bis(2-Ethylhexyl)phthalate	117-81-7	167	57.782	ug/kg	40-140	50	40-140	50	50			
Butyl benzyl phthalate	85-68-7	167	42.084	ug/kg	40-140	50	40-140	50	50			
Di-n-butylphthalate	84-74-2	167	31.6632	ug/kg	40-140	50	40-140	50	50			
Di-n-octylphthalate	117-84-0	167	56.78	ug/kg	40-140	50	40-140	50	50			
Diethyl phthalate	84-66-2	167	15.4642	ug/kg	40-140	50	40-140	50	50			
Dimethyl phthalate	131-11-3	167	35.07	ug/kg	40-140	50	40-140	50	50			
Benzo(a)anthracene	56-55-3	100.2	18.8042	ug/kg	40-140	50	40-140	50	50			
Benzo(a)pyrene	50-32-8	133.6	40.748	ug/kg	40-140	50	40-140	50	50			
Benzo(b)fluoranthene	205-99-2	100.2	28.1228	ug/kg	40-140	50	40-140	50	50			
Benzo(k)fluoranthene	207-08-9	100.2	26.72	ug/kg	40-140	50	40-140	50	50			
Chrysene	218-01-9	100.2	17.368	ug/kg	40-140	50	40-140	50	50			
Acenaphthylene	208-96-8	133.6	25.7848	ug/kg	40-140	50	40-140	50	50			
Anthracene	120-12-7	100.2	32.565	ug/kg	40-140	50	40-140	50	50			
Benzo(ghi)perylene	191-24-2	133.6	19.6392	ug/kg	40-140	50	40-140	50	50			
Fluorene	86-73-7	167	16.2324	ug/kg	40-140	50	40-140	50	50			
Phenanthrene	85-01-8	100.2	20.3072	ug/kg	40-140	50	40-140	50	50			
Dibenzo(a,h)anthracene	53-70-3	100.2	19.3052	ug/kg	40-140	50	40-140	50	50			
Indeno(1,2,3-cd)Pyrene	193-39-5	133.6	23.2798	ug/kg	40-140	50	40-140	50	50			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor ***(Soil/Solids only)***

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 2

Table II. Minimum Reporting Limits
NYTCL Semivolatiles - EPA 8270E (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria
Pyrene	129-00-0	100.2	16.5998	ug/kg	35-142	50	35-142	50	50	
Biphenyl	92-52-4	380.76	21.71	ug/kg	37-127	50	37-127	50	50	
4-Chloroaniline	106-47-8	167	30.394	ug/kg	40-140	50	40-140	50	50	
2-Nitroaniline	88-74-4	167	32.1976	ug/kg	47-134	50	47-134	50	50	
3-Nitroaniline	99-09-2	167	31.4962	ug/kg	26-129	50	26-129	50	50	
4-Nitroaniline	100-01-6	167	69.138	ug/kg	41-125	50	41-125	50	50	
Dibenzofuran	132-64-9	167	15.7982	ug/kg	40-140	50	40-140	50	50	
2-Methylnaphthalene	91-57-6	200.4	20.1736	ug/kg	40-140	50	40-140	50	50	
Acetophenone	98-86-2	167	20.6746	ug/kg	14-144	50	14-144	50	50	
2,4,6-Trichlorophenol	88-06-2	100.2	31.6632	ug/kg	30-130	50	30-130	50	50	
P-Chloro-M-Cresol	59-50-7	167	24.883	ug/kg	26-103	50	26-103	50	50	
2-Chlorophenol	95-57-8	167	19.7394	ug/kg	25-102	50	25-102	50	50	
2,4-Dichlorophenol	120-83-2	150.3	26.8536	ug/kg	30-130	50	30-130	50	50	
2,4-Dimethylphenol	105-67-9	167	55.11	ug/kg	30-130	50	30-130	50	50	
2-Nitrophenol	88-75-5	360.72	62.792	ug/kg	30-130	50	30-130	50	50	
4-Nitrophenol	100-02-7	233.8	68.136	ug/kg	11-114	50	11-114	50	50	
2,4-Dinitrophenol	51-28-5	801.6	77.822	ug/kg	4-130	50	4-130	50	50	
4,6-Dinitro-o-cresol	534-52-1	434.2	80.16	ug/kg	10-130	50	10-130	50	50	
Pentachlorophenol	87-86-5	133.6	36.74	ug/kg	17-109	50	17-109	50	50	
Phenol	108-95-2	167	25.217	ug/kg	26-90	50	26-90	50	50	
2-Methylphenol	95-48-7	167	25.885	ug/kg	30-130.	50	30-130.	50	50	
3-Methylphenol/4-Methylphenol	106-44-5	240.48	26.1522	ug/kg	30-130	50	30-130	50	50	
2,4,5-Trichlorophenol	95-95-4	167	31.9972	ug/kg	30-130	50	30-130	50	50	
Benzoic Acid	65-85-0	541.08	169.004	ug/kg	10-110	50	10-110	50	50	
Benzyl Alcohol	100-51-6	167	51.102	ug/kg	40-140	50	40-140	50	50	
Carbazole	86-74-8	167	16.2324	ug/kg	54-128	50	54-128	50	50	
1,4-Dioxane	123-91-1	25.05	7.682	ug/kg	40-140	50	40-140	50	50	
2-Fluorophenol	*367-12-4*									*25-120*
Phenol-d6	*13127-88-3*									*10-120*
Nitrobenzene-d5	*4165-60-0*									*23-120*
2-Fluorobiphenyl	*321-60-8*									*30-120*
2,4,6-Tribromophenol	*118-79-6*									*10-136*
4-Terphenyl-d14	*1718-51-0*									*18-120*

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits
NYTCL Semivolatiles - EPA 8270E (LVI) (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 250ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Acenaphthene	83-32-9	2.002	0.44408	ug/l	37-111	30	37-111	30	30			
1,2,4-Trichlorobenzene	120-82-1	5.0232	0.49868	ug/l	39-98	30	39-98	30	30			
Hexachlorobenzene	118-74-1	2.002	0.46592	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroethyl)ether	111-44-4	2.002	0.50596	ug/l	40-140	30	40-140	30	30			
2-Chloronaphthalene	91-58-7	2.002	0.4368	ug/l	40-140	30	40-140	30	30			
1,2-Dichlorobenzene	95-50-1	2.002	0.455	ug/l	40-140	30	40-140	30	30			
1,3-Dichlorobenzene	541-73-1	2.002	0.40404	ug/l	40-140	30	40-140	30	30			
1,4-Dichlorobenzene	106-46-7	2.002	0.43316	ug/l	36-97	30	36-97	30	30			
3,3'-Dichlorobenzidine	91-94-1	5.0232	1.62344	ug/l	40-140	30	40-140	30	30			
2,4-Dinitrotoluene	121-14-2	5.0232	1.1648	ug/l	48-143	30	48-143	30	30			
2,6-Dinitrotoluene	606-20-2	5.0232	0.93184	ug/l	40-140	30	40-140	30	30			
Fluoranthene	206-44-0	2.002	0.257348	ug/l	40-140	30	40-140	30	30			
4-Chlorophenyl phenyl ether	7005-72-3	2.002	0.48776	ug/l	40-140	30	40-140	30	30			
4-Bromophenyl phenyl ether	101-55-3	2.002	0.37856	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroisopropyl)ether	108-60-1	2.002	0.5278	ug/l	40-140	30	40-140	30	30			
Bis(2-chloroethoxy)methane	111-91-1	5.0232	0.50232	ug/l	40-140	30	40-140	30	30			
Hexachlorobutadiene	87-68-3	2.002	0.65884	ug/l	40-140	30	40-140	30	30			
Hexachlorocyclopentadiene	77-47-4	20.02	0.68796	ug/l	40-140	30	40-140	30	30			
Hexachloroethane	67-72-1	2.002	0.58604	ug/l	40-140	30	40-140	30	30			
Isophorone	78-59-1	5.0232	1.20484	ug/l	40-140	30	40-140	30	30			
Naphthalene	91-20-3	2.002	0.46592	ug/l	40-140	30	40-140	30	30			
Nitrobenzene	98-95-3	2.002	0.77168	ug/l	40-140	30	40-140	30	30			
NitrosoDiPhenylAmine(NDPA)/DPA	86-30-6	2.002	0.4186	ug/l	40-140	30	40-140	30	30			
n-Nitrosodi-n-propylamine	621-64-7	5.0232	0.64428	ug/l	29-132	30	29-132	30	30			
Bis(2-Ethylhexyl)phthalate	117-81-7	3.003	1.53608	ug/l	40-140	30	40-140	30	30			
Butyl benzyl phthalate	85-68-7	5.0232	1.17208	ug/l	40-140	30	40-140	30	30			
Di-n-butylphthalate	84-74-2	5.0232	0.38948	ug/l	40-140	30	40-140	30	30			
Di-n-octylphthalate	117-84-0	5.0232	1.274	ug/l	40-140	30	40-140	30	30			
Diethyl phthalate	84-66-2	5.0232	0.3822	ug/l	40-140	30	40-140	30	30			
Dimethyl phthalate	131-11-3	5.0232	1.82	ug/l	40-140	30	40-140	30	30			
Benzo(a)anthracene	56-55-3	2.002	0.32578	ug/l	40-140	30	40-140	30	30			
Benzo(a)pyrene	50-32-8	2.002	0.40768	ug/l	40-140	30	40-140	30	30			
Benzo(b)fluoranthene	205-99-2	2.002	0.355264	ug/l	40-140	30	40-140	30	30			
Benzo(k)fluoranthene	207-08-9	2.002	0.37492	ug/l	40-140	30	40-140	30	30			
Chrysene	218-01-9	2.002	0.341068	ug/l	40-140	30	40-140	30	30			
Acenaphthylene	208-96-8	2.002	0.46592	ug/l	45-123	30	45-123	30	30			
Anthracene	120-12-7	2.002	0.32942	ug/l	40-140	30	40-140	30	30			
Benzo(ghi)perylene	191-24-2	2.002	0.296296	ug/l	40-140	30	40-140	30	30			
Fluorene	86-73-7	2.002	0.41496	ug/l	40-140	30	40-140	30	30			
Phenanthrene	85-01-8	2.002	0.33124	ug/l	40-140	30	40-140	30	30			
Dibenzo(a,h)anthracene	53-70-3	2.002	0.323232	ug/l	40-140	30	40-140	30	30			
Indeno(1,2,3-cd)Pyrene	193-39-5	2.002	0.39676	ug/l	40-140	30	40-140	30	30			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 2

Table II. Minimum Reporting Limits
NYTCL Semivolatiles - EPA 8270E (LVI) (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 250ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Pyrene	129-00-0	2.002	0.279552	ug/l	26-127	30	26-127	30	30			
Biphenyl	92-52-4	2.002	0.45864	ug/l	40-140	30	40-140	30	30			
4-Chloroaniline	106-47-8	5.0232	1.07016	ug/l	40-140	30	40-140	30	30			
2-Nitroaniline	88-74-4	5.0232	0.49868	ug/l	52-143	30	52-143	30	30			
3-Nitroaniline	99-09-2	5.0232	0.81536	ug/l	25-145	30	25-145	30	30			
4-Nitroaniline	100-01-6	5.0232	0.8008	ug/l	51-143	30	51-143	30	30			
Dibenzofuran	132-64-9	2.002	0.49868	ug/l	40-140	30	40-140	30	30			
2-Methylnaphthalene	91-57-6	2.002	0.455	ug/l	40-140	30	40-140	30	30			
Acetophenone	98-86-2	5.0232	0.5278	ug/l	39-129	30	39-129	30	30			
2,4,6-Trichlorophenol	88-06-2	5.0232	0.61152	ug/l	30-130	30	30-130	30	30			
P-Chloro-M-Cresol	59-50-7	2.002	0.35126	ug/l	23-97	30	23-97	30	30			
2-Chlorophenol	95-57-8	2.002	0.48048	ug/l	27-123	30	27-123	30	30			
2,4-Dichlorophenol	120-83-2	5.0232	0.41132	ug/l	30-130	30	30-130	30	30			
2,4-Dimethylphenol	105-67-9	5.0232	1.77996	ug/l	30-130	30	30-130	30	30			
2-Nitrophenol	88-75-5	10.01	0.84812	ug/l	30-130	30	30-130	30	30			
4-Nitrophenol	100-02-7	10.01	0.6734	ug/l	10-80	30	10-80	30	30			
2,4-Dinitrophenol	51-28-5	20.02	6.6612	ug/l	20-130	30	20-130	30	30			
4,6-Dinitro-o-cresol	534-52-1	10.01	1.81636	ug/l	20-164	30	20-164	30	30			
Pentachlorophenol	87-86-5	10.01	1.79452	ug/l	9-103	30	9-103	30	30			
Phenol	108-95-2	5.0232	0.56784	ug/l	12-110	30	12-110	30	30			
2-Methylphenol	95-48-7	5.0232	0.4914	ug/l	30-130	30	30-130	30	30			
3-Methylphenol/4-Methylphenol	106-44-5	5.0232	0.48048	ug/l	30-130	30	30-130	30	30			
2,4,5-Trichlorophenol	95-95-4	5.0232	0.77532	ug/l	30-130	30	30-130	30	30			
Benzoic Acid	65-85-0	50.232	2.66084	ug/l	10-164	30	10-164	30	30			
Benzyl Alcohol	100-51-6	2.002	0.58968	ug/l	26-116	30	26-116	30	30			
Carbazole	86-74-8	2.002	0.4914	ug/l	55-144	30	55-144	30	30			
2-Fluorophenol	*367-12-4*									*21-120*		
Phenol-d6	*13127-88-3*									*10-120*		
Nitrobenzene-d5	*4165-60-0*									*23-120*		
2-Fluorobiphenyl	*321-60-8*									*15-120*		
2,4,6-Tribromophenol	*118-79-6*									*10-120*		
4-Terphenyl-d14	*1718-51-0*									*41-149*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits METALS by 6010D (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Aluminum, Total	7429-90-5	4	1.08	mg/kg	48-151		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Antimony, Total	7440-36-0	2	0.152	mg/kg	1-208		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Arsenic, Total	7440-38-2	0.4	0.0832	mg/kg	79-121		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Barium, Total	7440-39-3	0.4	0.0696	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Beryllium, Total	7440-41-7	0.2	0.0132	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Cadmium, Total	7440-43-9	0.4	0.0392	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Calcium, Total	7440-70-2	4	1.4	mg/kg	81-119		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Chromium, Total	7440-47-3	0.4	0.0384	mg/kg	80-120		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Cobalt, Total	7440-48-4	0.8	0.0664	mg/kg	84-115		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Copper, Total	7440-50-8	0.4	0.1032	mg/kg	81-118		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Iron, Total	7439-89-6	2	0.3612	mg/kg	45-155		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Lead, TCLP	7439-92-1	0.5	0.027	mg/l	75-125	20	75-125	20	20		180 days	1 - Glass 250ml/8oz unpreserved
Lead, Total	7439-92-1	2	0.1072	mg/kg	81-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Lead, TCLP	7439-92-1	0.5	0.027	mg/l	75-125	20	75-125	20	20		180 days	1 - Plastic 500ml unpreserved
Magnesium, Total	7439-95-4	4	0.616	mg/kg	76-124		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Manganese, Total	7439-96-5	0.4	0.0636	mg/kg	81-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Nickel, Total	7440-02-0	1	0.0968	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Potassium, Total	7440-09-7	100	5.76	mg/kg	71-129		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Selenium, Total	7782-49-2	0.8	0.1032	mg/kg	78-122		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Silver, Total	7440-22-4	0.2	0.1132	mg/kg	75-124		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Sodium, Total	7440-23-5	80	1.26	mg/kg	72-127		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Thallium, Total	7440-28-0	0.8	0.126	mg/kg	80-120		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Vanadium, Total	7440-62-2	0.4	0.0812	mg/kg	78-122		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Zinc, Total	7440-66-6	2	0.1172	mg/kg	82-118		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits METALS by 6020B (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Aluminum, Total	7429-90-5	10	3.27	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Antimony, Total	7440-36-0	4	0.429	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Arsenic, Total	7440-38-2	0.5	0.165	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Barium, Total	7440-39-3	0.5	0.173	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Beryllium, Total	7440-41-7	0.5	0.107	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Cadmium, Total	7440-43-9	0.2	0.0599	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Calcium, Total	7440-70-2	100	39.4	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Chromium, Total	7440-47-3	1	0.178	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Cobalt, Total	7440-48-4	0.5	0.163	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Copper, Total	7440-50-8	1	0.384	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Iron, Total	7439-89-6	50	19.1	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Lead, Total	7439-92-1	1	0.343	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Magnesium, Total	7439-95-4	70	24.2	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Manganese, Total	7439-96-5	1	0.44	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Nickel, Total	7440-02-0	2	0.556	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Potassium, Total	7440-09-7	100	30.9	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Selenium, Total	7782-49-2	5	1.73	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Silver, Total	7440-22-4	0.4	0.163	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Sodium, Total	7440-23-5	100	29.3	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Thallium, Total	7440-28-0	1	0.143	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Vanadium, Total	7440-62-2	5	1.57	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Zinc, Total	7440-66-6	10	3.41	ug/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits TCL PCBs - EPA 8082A (SOIL)

Holding Time: 365 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Aroclor 1016	12674-11-2	50	4.44	ug/kg	40-140	50	40-140	50	50			
Aroclor 1221	11104-28-2	50	5.01	ug/kg	40-140	50	40-140	50	50			
Aroclor 1232	11141-16-5	50	10.6	ug/kg	40-140	50	40-140	50	50			
Aroclor 1242	53469-21-9	50	6.74	ug/kg	40-140	50	40-140	50	50			
Aroclor 1248	12672-29-6	50	7.5	ug/kg	40-140	50	40-140	50	50			
Aroclor 1254	11097-69-1	50	5.47	ug/kg	40-140	50	40-140	50	50			
Aroclor 1260	11096-82-5	50	9.24	ug/kg	40-140	50	40-140	50	50			
Aroclor 1262	37324-23-5	50	6.35	ug/kg	40-140	50	40-140	50	50			
Aroclor 1268	11100-14-4	50	5.18	ug/kg	40-140	50	40-140	50	50			
PCBs, Total	1336-36-3	50	4.44	ug/kg				50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits
TCL PCBs - EPA 8082A (LVI) (WATER)

Holding Time: 365 days
Container/Sample Preservation: 2 - Amber 120ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Aroclor 1016	12674-11-2	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1221	11104-28-2	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1232	11141-16-5	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1242	53469-21-9	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1248	12672-29-6	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1254	11097-69-1	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1260	11096-82-5	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1262	37324-23-5	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
Aroclor 1268	11100-14-4	0.0000714	0.000061047	mg/l	40-140	50	40-140	50	50			
PCBs, Total	1336-36-3	0.0000714	0.000061047	mg/l				50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits
TCL Pesticides - EPA 8081B (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 120ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Delta-BHC	319-86-8	1.6008	0.31349	ug/kg	30-150	30	30-150	50	50			
Delta-BHC	319-86-8	0.02	0.00467	ug/l	30-150	20	30-150	30	30			
Lindane	58-89-9	0.667	0.298149	ug/kg	30-150	30	30-150	50	50			
Lindane	58-89-9	0.02	0.00434	ug/l	30-150	20	30-150	30	30			
Alpha-BHC	319-84-6	0.667	0.189428	ug/kg	30-150	30	30-150	50	50			
Alpha-BHC	319-84-6	0.02	0.00439	ug/l	30-150	20	30-150	30	30			
Beta-BHC	319-85-7	1.6008	0.60697	ug/kg	30-150	30	30-150	50	50			
Beta-BHC	319-85-7	0.02	0.0056	ug/l	30-150	20	30-150	30	30			
Heptachlor	76-44-8	0.02	0.0031	ug/l	30-150	20	30-150	30	30			
Heptachlor	76-44-8	0.8004	0.358846	ug/kg	30-150	30	30-150	50	50			
Aldrin	309-00-2	1.6008	0.563615	ug/kg	30-150	30	30-150	50	50			
Aldrin	309-00-2	0.02	0.00216	ug/l	30-150	20	30-150	30	30			
Heptachlor epoxide	1024-57-3	3.0015	0.90045	ug/kg	30-150	30	30-150	50	50			
Heptachlor epoxide	1024-57-3	0.02	0.00415	ug/l	30-150	20	30-150	30	30			
Endrin	72-20-8	0.667	0.27347	ug/kg	30-150	30	30-150	50	50			
Endrin	72-20-8	0.04	0.00429	ug/l	30-150	20	30-150	30	30			
Endrin aldehyde	7421-93-4	2.001	0.70035	ug/kg	30-150	30	30-150	50	50			
Endrin aldehyde	7421-93-4	0.04	0.0081	ug/l	30-150	20	30-150	30	30			
Endrin ketone	53494-70-5	0.04	0.00477	ug/l	30-150	20	30-150	30	30			
Endrin ketone	53494-70-5	1.6008	0.412206	ug/kg	30-150	30	30-150	50	50			
Dieldrin	60-57-1	0.04	0.00429	ug/l	30-150	20	30-150	30	30			
Dieldrin	60-57-1	1.0005	0.50025	ug/kg	30-150	30	30-150	50	50			
4,4'-DDE	72-55-9	1.6008	0.370185	ug/kg	30-150	30	30-150	50	50			
4,4'-DDE	72-55-9	0.04	0.00381	ug/l	30-150	20	30-150	30	30			
4,4'-DDD	72-54-8	1.6008	0.570952	ug/kg	30-150	30	30-150	50	50			
4,4'-DDD	72-54-8	0.04	0.00464	ug/l	30-150	20	30-150	30	30			
4,4'-DDT	50-29-3	1.6008	1.28731	ug/kg	30-150	30	30-150	50	50			
4,4'-DDT	50-29-3	0.04	0.00432	ug/l	30-150	20	30-150	30	30			
Endosulfan I	959-98-8	0.02	0.00345	ug/l	30-150	20	30-150	30	30			
Endosulfan I	959-98-8	1.6008	0.378189	ug/kg	30-150	30	30-150	50	50			
Endosulfan II	33213-65-9	0.04	0.00519	ug/l	30-150	20	30-150	30	30			
Endosulfan II	33213-65-9	1.6008	0.534934	ug/kg	30-150	30	30-150	50	50			
Endosulfan sulfate	1031-07-8	0.04	0.00481	ug/l	30-150	20	30-150	30	30			
Endosulfan sulfate	1031-07-8	0.667	0.317492	ug/kg	30-150	30	30-150	50	50			
Methoxychlor	72-43-5	3.0015	0.9338	ug/kg	30-150	30	30-150	50	50			
Methoxychlor	72-43-5	0.2	0.00684	ug/l	30-150	20	30-150	30	30			
Toxaphene	8001-35-2	30.015	8.4042	ug/kg	30-150	30	30-150	50	50			
Toxaphene	8001-35-2	0.2	0.0627	ug/l	30-150	20	30-150	30	30			
cis-Chlordane	5103-71-9	2.001	0.557612	ug/kg	30-150	30	30-150	50	50			
cis-Chlordane	5103-71-9	0.02	0.00666	ug/l	30-150	20	30-150	30	30			
trans-Chlordane	5103-74-2	0.02	0.00627	ug/l	30-150	20	30-150	30	30			
trans-Chlordane	5103-74-2	2.001	0.528264	ug/kg	30-150	30	30-150	50	50			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 2

Table II. Minimum Reporting Limits
TCL Pesticides - EPA 8081B (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 120ml unpreserved
vvvvvvv

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria
Chlordane	57-74-9	13.34	5.30265	ug/kg	30-150	30	30-150	50	50	
Chlordane	57-74-9	0.2	0.0463	ug/l	30-150	20	30-150	30	30	
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*
Decachlorobiphenyl	*2051-24-3*									*30-150*
Decachlorobiphenyl	*2051-24-3*									*30-150*

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits METALS by 7471B (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Mercury, Total	7439-97-6	0.08	0.05216	mg/kg	72-128		80-120	20	20		28 days	Metals Only-Glass 60mL/2oz unpreserved

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits METALS by 7470A (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container
Mercury, Total	7439-97-6	0.2	0.0915	ug/l	80-120		75-125	20	20		28 days	1 - Plastic 500ml HNO3 preserved

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits
1,4 Dioxane via EPA 8270E-SIM (ug/L) (WATER)

Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 250ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria
1,4-Dioxane	123-91-1	0.15	0.0339	ug/l	40-140	30	40-140	30	30	
1,4-Dioxane-d8	*17647-74-4*									*15-110*
1,4-Dioxane-d8 (IS)	17647-74-4			ug/l						

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits WETCHEM (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Method	Holding Time	Container
Cyanide, Total	57-12-5	5	1.8	ug/l	85-115	20	80-120	20	20	9010C/9012B	14 days	1 - Plastic 250ml NaOH preserved
Chromium, Hexavalent	18540-29-9	0.8	0.16	mg/kg	80-120	20	75-125	20	20	7196A	30 days	1 - Glass 120ml/4oz unpreserved
Chromium, Hexavalent	18540-29-9	10	3	ug/l	85-115	20	85-115	20	20	7196A	24 hours	1 - Plastic 500ml unpreserved
Cyanide, Total	57-12-5	1	0.212	mg/kg	80-120	35	75-125	35	35	9010C/9012B	14 days	1 - Glass 250ml/8oz unpreserved

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits PFAAs via EPA 1633 (WATER)

Holding Time: 28 days
Container/Sample Preservation: 3 - Plastic 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluorobutanoic Acid (PFBA)	375-22-4	6.4	1.024	ng/l	40-150	30	40-150	30	30			
Perfluorobutanoic Acid (PFBA)	375-22-4	0.8	0.0504	ng/g	40-150	30	40-150	30	30			
Perfluoropentanoic Acid (PFPeA)	2706-90-3	0.4	0.056	ng/g	40-150	30	40-150	30	30			
Perfluoropentanoic Acid (PFPeA)	2706-90-3	3.2	0.856	ng/l	40-150	30	40-150	30	30			
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	0.2	0.0432	ng/g	40-150	30	40-150	30	30			
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	1.6	0.536	ng/l	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	757124-72-4	0.8	0.0808	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	757124-72-4	6.4	1.672	ng/l	40-150	30	40-150	30	30			
Perfluorohexanoic Acid (PFHxA)	307-24-4	0.2	0.0464	ng/g	40-150	30	40-150	30	30			
Perfluorohexanoic Acid (PFHxA)	307-24-4	1.6	0.472	ng/l	40-150	30	40-150	30	30			
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	1.6	0.28	ng/l	40-150	30	40-150	30	30			
Perfluoropentanesulfonic Acid (PFPeS)	2706-91-4	0.2	0.0232	ng/g	40-150	30	40-150	30	30			
Perfluoroheptanoic Acid (PFHpA)	375-85-9	1.6	0.32	ng/l	40-150	30	40-150	30	30			
Perfluoroheptanoic Acid (PFHpA)	375-85-9	0.2	0.0232	ng/g	40-150	30	40-150	30	30			
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	0.2	0.0592	ng/g	40-150	30	40-150	30	30			
Perfluorohexanesulfonic Acid (PFHxS)	355-46-4	1.6	0.384	ng/l	40-150	30	40-150	30	30			
Perfluorooctanoic Acid (PFOA)	335-67-1	1.6	0.696	ng/l	40-150	30	40-150	30	30			
Perfluorooctanoic Acid (PFOA)	335-67-1	0.2	0.052	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	0.8	0.28	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	27619-97-2	6.4	2.16	ng/l	40-150	30	40-150	30	30			
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	0.2	0.0368	ng/g	40-150	30	40-150	30	30			
Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	1.6	0.432	ng/l	40-150	30	40-150	30	30			
Perfluorononanoic Acid (PFNA)	375-95-1	1.6	0.504	ng/l	40-150	30	40-150	30	30			
Perfluorononanoic Acid (PFNA)	375-95-1	0.2	0.0784	ng/g	40-150	30	40-150	30	30			
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	1.6	0.728	ng/l	40-150	30	40-150	30	30			
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	0.2	0.0792	ng/g	40-150	30	40-150	30	30			
Perfluorodecanoic Acid (PFDA)	335-76-2	1.6	0.648	ng/l	40-150	30	40-150	30	30			
Perfluorodecanoic Acid (PFDA)	335-76-2	0.2	0.0752	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	0.8	0.3872	ng/g	40-150	30	40-150	30	30			
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	39108-34-4	6.4	2.488	ng/l	40-150	30	40-150	30	30			
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	0.2	0.0424	ng/g	40-150	30	40-150	30	30			
Perfluorononanesulfonic Acid (PFNS)	68259-12-1	1.6	0.496	ng/l	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSA	2355-31-9	0.2	0.1	ng/g	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSA	2355-31-9	1.6	0.872	ng/l	40-150	30	40-150	30	30			
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	1.6	0.696	ng/l	40-150	30	40-150	30	30			
Perfluoroundecanoic Acid (PFUnA)	2058-94-8	0.2	0.0512	ng/g	40-150	30	40-150	30	30			
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	1.6	0.368	ng/l	40-150	30	40-150	30	30			
Perfluorodecanesulfonic Acid (PFDS)	335-77-3	0.2	0.032	ng/g	40-150	30	40-150	30	30			
Perfluorooctanesulfonamide (FOSA)	754-91-6	1.6	0.432	ng/l	40-150	30	40-150	30	30			
Perfluorooctanesulfonamide (FOSA)	754-91-6	0.2	0.0432	ng/g	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	1.6	0.864	ng/l	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	2991-50-6	0.2	0.0824	ng/g	40-150	30	40-150	30	30			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 2

Table II. Minimum Reporting Limits PFAAs via EPA 1633 (WATER)

Holding Time: 28 days
Container/Sample Preservation: 3 - Plastic 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluorododecanoic Acid (PFDoA)	307-55-1	1.6	0.736	ng/l	40-150	30	40-150	30	30			
Perfluorododecanoic Acid (PFDoA)	307-55-1	0.2	0.0408	ng/g	40-150	30	40-150	30	30			
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	1.6	0.6	ng/l	40-150	30	40-150	30	30			
Perfluorotridecanoic Acid (PFTrDA)	72629-94-8	0.2	0.0528	ng/g	40-150	30	40-150	30	30			
Perfluorotetradecanoic Acid (PFTA)	376-06-7	0.2	0.1064	ng/g	40-150	30	40-150	30	30			
Perfluorotetradecanoic Acid (PFTA)	376-06-7	1.6	0.424	ng/l	40-150	30	40-150	30	30			
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Pr	13252-13-6	0.8	0.0984	ng/g	40-150	30	40-150	30	30			
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Pr	13252-13-6	6.4	0.896	ng/l	40-150	30	40-150	30	30			
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	919005-14-4	6.4	1.008	ng/l	40-150	30	40-150	30	30			
4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA)	919005-14-4	0.8	0.1464	ng/g	40-150	30	40-150	30	30			
Perfluorododecane Sulfonic Acid (PFDoDS)	79780-39-5	0.2	0.0384	ng/g	40-150	30	40-150	30	30			
Perfluorododecane Sulfonic Acid (PFDoDS)	79780-39-5	1.6	0.608	ng/l	40-150	30	40-150	30	30			
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF	756426-58-1	0.8	0.196	ng/g	40-150	30	40-150	30	30			
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF	756426-58-1	6.4	1.32	ng/l	40-150	30	40-150	30	30			
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl	763051-92-9	6.4	1.32	ng/l	40-150	30	40-150	30	30			
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl	763051-92-9	0.8	0.1672	ng/g	40-150	30	40-150	30	30			
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	31506-32-8	0.2	0.1	ng/g	40-150	30	40-150	30	30			
N-Methyl Perfluorooctane Sulfonamide (NMeFOSA)	31506-32-8	1.6	0.696	ng/l	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	4151-50-2	0.2	0.112	ng/g	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctane Sulfonamide (NEtFOSA)	4151-50-2	1.6	0.736	ng/l	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	24448-09-7	16	3.76	ng/l	40-150	30	40-150	30	30			
N-Methyl Perfluorooctanesulfonamido Ethanol (NMeFOSE)	24448-09-7	2	0.2504	ng/g	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	1691-99-2	16	1.96	ng/l	40-150	30	40-150	30	30			
N-Ethyl Perfluorooctanesulfonamido Ethanol (NEtFOSE)	1691-99-2	2	0.5104	ng/g	40-150	30	40-150	30	30			
Perfluoro-3-Methoxypropanoic Acid (PFMPA)	377-73-1	3.2	0.456	ng/l	40-150	30	40-150	30	30			
Perfluoro-3-Methoxypropanoic Acid (PFMPA)	377-73-1	0.4	0.0408	ng/g	40-150	30	40-150	30	30			
Perfluoro-4-Methoxybutanoic Acid (PFMBA)	863090-89-5	0.4	0.0312	ng/g	40-150	30	40-150	30	30			
Perfluoro-4-Methoxybutanoic Acid (PFMBA)	863090-89-5	3.2	0.424	ng/l	40-150	30	40-150	30	30			
Perfluoro(2-Ethoxyethane)Sulfonic Acid (PFEESA)	113507-82-7	0.4	0.0832	ng/g	40-150	30	40-150	30	30			
Perfluoro(2-Ethoxyethane)Sulfonic Acid (PFEESA)	113507-82-7	3.2	0.352	ng/l	40-150	30	40-150	30	30			
Nonafluoro-3,6-Dioxaheptanoic Acid (NFDHA)	151772-58-6	3.2	1.888	ng/l	40-150	30	40-150	30	30			
Nonafluoro-3,6-Dioxaheptanoic Acid (NFDHA)	151772-58-6	0.4	0.0952	ng/g	40-150	30	40-150	30	30			
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	1	0.144	ng/g	40-150	30	40-150	30	30			
3-Perfluoropropyl Propanoic Acid (3:3FTCA)	356-02-5	8	2.64	ng/l	40-150	30	40-150	30	30			
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	40	9.36	ng/l	40-150	30	40-150	30	30			
2H,2H,3H,3H-Perfluorooctanoic Acid (5:3FTCA)	914637-49-3	5	0.5048	ng/g	40-150	30	40-150	30	30			
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	40	6.312	ng/l	40-150	30	40-150	30	30			
3-Perfluoroheptyl Propanoic Acid (7:3FTCA)	812-70-4	5	1.76	ng/g	40-150	30	40-150	30	30			
Perfluoro[13C4]Butanoic Acid (MPFBA)	*NONE*									*20-150*		
Perfluoro[13C4]Butanoic Acid (MPFBA)	*NONE*									*20-150*		
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	*NONE*									*20-150*		
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	*NONE*									*20-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Table II. Minimum Reporting Limits PFAAs via EPA 1633 (WATER)

Holding Time: 28 days
Container/Sample Preservation: 3 - Plastic 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	*NONE*									*20-150*		
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-	*NONE*									*20-150*		
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	*NONE*									*20-150*		
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	*NONE*									*20-150*		
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	*NONE*									*20-150*		
Perfluoro[13C8]Octanoic Acid (M8PFOA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanoic Acid (M8PFOA)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-	*NONE*									*20-150*		
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	*NONE*									*20-150*		
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-	*NONE*									*20-150*		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-	*NONE*									*20-150*		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid	*NONE*									*20-150*		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	*NONE*									*20-150*		
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	*NONE*									*20-150*		
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	*NONE*									*20-150*		
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (	*NONE*									*20-150*		
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	*NONE*									*20-150*		
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	*NONE*									*20-150*		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-1	*NONE*									*20-150*		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-1	*NONE*									*20-150*		
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	*NONE*									*20-150*		
N-Methyl-d3-Perfluoro-1-Octanesulfonamide (d3-NMeFOSA)	*NONE*									*20-150*		
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	*NONE*									*20-150*		
N-Ethyl-d5-Perfluoro-1-Octanesulfonamide (d5-NEtFOSA)	*NONE*									*20-150*		
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-o	*1265205-95-5*									*20-150*		
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-o	*1265205-95-5*									*20-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 4

Table II. Minimum Reporting Limits PFAAs via EPA 1633 (WATER)

Holding Time: 28 days
Container/Sample Preservation: 3 - Plastic 500ml unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (	*NONE*									*20-150*		
2-(N-Ethyl-d5-Perfluoro-1-Octanesulfonamido)ethan-d4-ol (	*NONE*									*20-150*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 1

Table II. Minimum Reporting Limits
Volatile Organics in Air: TO-15 (AIR)

Holding Time: 30 days
Container/Sample Preservation: 1 - Canister - 2.7 Liter

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,1,1-Trichloroethane	71-55-6	0.2	0.0614	ppbV	70-130			25	25			
1,1,2,2-Tetrachloroethane	79-34-5	0.2	0.052	ppbV	70-130			25	25			
1,1,2-Trichloroethane	79-00-5	0.2	0.0582	ppbV	70-130			25	25			
1,1-Dichloroethane	75-34-3	0.2	0.0568	ppbV	70-130			25	25			
1,1-Dichloroethene	75-35-4	0.2	0.0568	ppbV	70-130			25	25			
1,2,3-Trimethylbenzene	526-73-8	0.2	0.0576	ppbV	70-130			25	25			
1,2,4-Trichlorobenzene	120-82-1	0.2	0.1	ppbV	70-130			25	25			
1,2,4-Trimethylbenzene	95-63-6	0.2	0.0577	ppbV	70-130			25	25			
1,2,4,5-Tetramethylbenzene	95-93-2	0.2	0.135	ppbV	70-130			25	25			
1,2-Dibromoethane	106-93-4	0.2	0.0544	ppbV	70-130			25	25			
1,2-Dichlorobenzene	95-50-1	0.2	0.0619	ppbV	70-130			25	25			
1,2-Dichloroethane	107-06-2	0.2	0.0787	ppbV	70-130			25	25			
1,2-Dichloropropane	78-87-5	0.2	0.0631	ppbV	70-130			25	25			
1,3,5-Trimethylbenzene	108-67-8	0.2	0.06	ppbV	70-130			25	25			
1,3-Butadiene	106-99-0	0.2	0.0619	ppbV	70-130			25	25			
1,3-Dichlorobenzene	541-73-1	0.2	0.0777	ppbV	70-130			25	25			
1,4-Dichlorobenzene	106-46-7	0.2	0.0826	ppbV	70-130			25	25			
1,4-Dioxane	123-91-1	0.2	0.0538	ppbV	70-130			25	25			
2,2,4-Trimethylpentane	540-84-1	0.2	0.0692	ppbV	70-130			25	25			
2-Butanone	78-93-3	0.5	0.099	ppbV	70-130			25	25			
2-Hexanone	591-78-6	0.2	0.0912	ppbV	70-130			25	25			
2-Methylthiophene	554-14-3	0.2	0.0622	ppbV	70-130			25	25			
3-Methylthiophene	616-44-4	0.2	0.0634	ppbV	70-130			25	25			
3-Chloropropene	107-05-1	0.2	0.086	ppbV	70-130			25	25			
2-Ethylthiophene	872-55-9	0.2	0.0612	ppbV	70-130			25	25			
4-Ethyltoluene	622-96-8	0.2	0.0554	ppbV	70-130			25	25			
Acetone	67-64-1	1	0.515	ppbV	40-160			25	25			
Benzene	71-43-2	0.2	0.0643	ppbV	70-130			25	25			
Benzyl chloride	100-44-7	0.2	0.0939	ppbV	70-130			25	25			
Benzothiophene	95-15-8	0.5	0.273	ppbV	70-130			25	25			
Bromodichloromethane	75-27-4	0.2	0.0689	ppbV	70-130			25	25			
Bromoform	75-25-2	0.2	0.0596	ppbV	70-130			25	25			
Bromomethane	74-83-9	0.2	0.0547	ppbV	70-130			25	25			
Carbon disulfide	75-15-0	0.2	0.0465	ppbV	70-130			25	25			
Carbon tetrachloride	56-23-5	0.2	0.0686	ppbV	70-130			25	25			
Chlorobenzene	108-90-7	0.2	0.0516	ppbV	70-130			25	25			
Chloroethane	75-00-3	0.2	0.0649	ppbV	70-130			25	25			
Chloroform	67-66-3	0.2	0.0552	ppbV	70-130			25	25			
Chloromethane	74-87-3	0.2	0.0576	ppbV	70-130			25	25			
cis-1,2-Dichloroethene	156-59-2	0.2	0.0595	ppbV	70-130			25	25			
cis-1,3-Dichloropropene	10061-01-5	0.2	0.0674	ppbV	70-130			25	25			
Cyclohexane	110-82-7	0.2	0.0728	ppbV	70-130			25	25			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Table II. Minimum Reporting Limits
Volatile Organics in Air: TO-15 (AIR)

Holding Time: 30 days
Container/Sample Preservation: 1 - Canister - 2.7 Liter

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Dibromochloromethane	124-48-1	0.2	0.0566	ppbV	70-130			25	25			
Dichlorodifluoromethane	75-71-8	0.2	0.0757	ppbV	70-130			25	25			
Ethyl Alcohol	GCDAI06	5	1.74	ppbV	40-160			25	25			
Ethyl Acetate	141-78-6	0.5	0.297	ppbV	70-130			25	25			
Ethylbenzene	100-41-4	0.2	0.0575	ppbV	70-130			25	25			
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	0.2	0.0506	ppbV	70-130			25	25			
1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	0.2	0.0504	ppbV	70-130			25	25			
Hexachlorobutadiene	87-68-3	0.2	0.0607	ppbV	70-130			25	25			
iso-Propyl Alcohol	67-63-0	0.5	0.272	ppbV	40-160			25	25			
Methylene chloride	75-09-2	0.5	0.125	ppbV	70-130			25	25			
4-Methyl-2-pentanone	108-10-1	0.5	0.19	ppbV	70-130			25	25			
Methyl tert butyl ether	1634-04-4	0.2	0.045	ppbV	70-130			25	25			
Methyl Methacrylate	80-62-6	0.5	0.226	ppbV	40-160			25	25			
p/m-Xylene	179601-23-1	0.4	0.125	ppbV	70-130			25	25			
o-Xylene	95-47-6	0.2	0.0621	ppbV	70-130			25	25			
Xylene (Total)	1330-20-7	0.2	0.0621	ppbV				25	25			
Heptane	142-82-5	0.2	0.0828	ppbV	70-130			25	25			
n-Heptane	142-82-5	0.2	0.0828	ppbV	70-130			25	25			
n-Hexane	110-54-3	0.2	0.0743	ppbV	70-130			25	25			
Propylene	115-07-1	0.5	0.135	ppbV	70-130			25	25			
Styrene	100-42-5	0.2	0.0596	ppbV	70-130			25	25			
Tetrachloroethene	127-18-4	0.2	0.0627	ppbV	70-130			25	25			
Thiophene	110-02-1	0.2	0.052	ppbV	70-130			25	25			
Tetrahydrofuran	109-99-9	0.5	0.117	ppbV	70-130			25	25			
Toluene	108-88-3	0.2	0.0867	ppbV	70-130			25	25			
trans-1,2-Dichloroethene	156-60-5	0.2	0.0755	ppbV	70-130			25	25			
1,2-Dichloroethene (total)	540-59-0	0.2	0.0595	ppbV				25	25			
trans-1,3-Dichloropropene	10061-02-6	0.2	0.0783	ppbV	70-130			25	25			
1,3-Dichloropropene, Total	542-75-6	0.2	0.0674	ppbV				25	25			
Trichloroethene	79-01-6	0.2	0.0548	ppbV	70-130			25	25			
Trichlorofluoromethane	75-69-4	0.2	0.0787	ppbV	70-130			25	25			
Vinyl acetate	108-05-4	1	0.323	ppbV	70-130			25	25			
Vinyl bromide	593-60-2	0.2	0.0722	ppbV	70-130			25	25			
Vinyl chloride	75-01-4	0.2	0.0582	ppbV	70-130			25	25			
Naphthalene	91-20-3	0.2	0.078	ppbV	70-130			25	25			
Total HC As Hexane	NONE	10	0.0743	ppbV	70-130			25	25			
Total VOCs As Toluene	NONE	10	0.0867	ppbV	70-130			25	25			
Propane	74-98-6	0.5	0.152	ppbV	70-130			25	25			
Acrylonitrile	107-13-1	0.5	0.0894	ppbV	70-130			25	25			
Acrolein	107-02-8	0.5	0.149	ppbV	60-113			25	25			
1,1,1,2-Tetrachloroethane	630-20-6	0.2	0.0508	ppbV	70-130			25	25			
Isopropylbenzene	98-82-8	0.2	0.0621	ppbV	70-130			25	25			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

Date Created: 08/01/23
Created By: Mitch Ostrowski
File: PM14940-1
Page: 3

Table II. Minimum Reporting Limits
Volatile Organics in Air: TO-15 (AIR)

Holding Time: 30 days
Container/Sample Preservation: 1 - Canister - 2.7 Liter

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
1,2,3-Trichloropropane	96-18-4	0.2	0.0575	ppbV	70-130			25	25			
Acetonitrile	75-05-8	0.2	0.101	ppbV	70-130			25	25			
Bromobenzene	108-86-1	0.2	0.0579	ppbV	70-130			25	25			
Chlorodifluoromethane	75-45-6	0.2	0.0463	ppbV	70-130			25	25			
Dichlorofluoromethane	75-43-4	0.2	0.112	ppbV	70-130			25	25			
Dibromomethane	74-95-3	0.2	0.0598	ppbV	70-130			25	25			
Pentane	109-66-0	0.2	0.113	ppbV	70-130			25	25			
Octane	111-65-9	0.2	0.0676	ppbV	70-130			25	25			
Tertiary-Amyl Methyl Ether	994-05-8	0.2	0.0672	ppbV	70-130			25	25			
o-Chlorotoluene	95-49-8	0.2	0.0761	ppbV	70-130			25	25			
p-Chlorotoluene	106-43-4	0.2	0.0765	ppbV	70-130			25	25			
2,2-Dichloropropane	594-20-7	0.2	0.0429	ppbV	70-130			25	25			
1,1-Dichloropropene	563-58-6	0.2	0.0593	ppbV	70-130			25	25			
Isopropyl Ether	108-20-3	0.2	0.0631	ppbV	70-130			25	25			
Ethyl-Tert-Butyl-Ether	637-92-3	0.2	0.0731	ppbV	70-130			25	25			
1,2,3-Trichlorobenzene	87-61-6	0.2	0.0738	ppbV	70-130			25	25			
Ethyl ether	60-29-7	0.2	0.0853	ppbV	70-130			25	25			
n-Butylbenzene	104-51-8	0.2	0.0536	ppbV	70-130			25	25			
sec-Butylbenzene	135-98-8	0.2	0.0547	ppbV	70-130			25	25			
tert-Butylbenzene	98-06-6	0.2	0.0551	ppbV	70-130			25	25			
1,2-Dibromo-3-chloropropane	96-12-8	0.2	0.0624	ppbV	70-130			25	25			
p-Isopropyltoluene	99-87-6	0.2	0.0567	ppbV	70-130			25	25			
n-Propylbenzene	103-65-1	0.2	0.0633	ppbV	70-130			25	25			
1,3-Dichloropropane	142-28-9	0.2	0.0536	ppbV	70-130			25	25			
Methanol	67-56-1	5	3.029	ppbV	70-130			25	25			
Acetaldehyde	75-07-0	2.5	1.73	ppbV	70-130			25	25			
Butane	106-97-8	0.2	0.08	ppbV	70-130			25	25			
Nonane (C9)	111-84-2	0.2	0.0737	ppbV	70-130			25	25			
Decane (C10)	124-18-5	0.2	0.0697	ppbV	70-130			25	25			
Undecane	1120-21-4	0.2	0.0709	ppbV	70-130			25	25			
Indane	496-11-7	0.2	0.0591	ppbV	70-130			25	25			
Indene	95-13-6	0.2	0.0711	ppbV	70-130			25	25			
1-Methylnaphthalene	90-12-0	1	0.264	ppbV	70-130			25	25			
Dodecane (C12)	112-40-3	0.2	0.0891	ppbV	70-130			25	25			
Butyl Acetate	123-86-4	0.5	0.208	ppbV	70-130			25	25			
tert-Butyl Alcohol	75-65-0	0.5	0.132	ppbV	70-130			25	25			
2-Methylnaphthalene	91-57-6	1	0.259	ppbV	70-130			25	25			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
Toluene-d8	*2037-26-5*									*70-130*		
Bromofluorobenzene	*460-00-4*									*70-130*		

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)

Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, Inc

APPENDIX E
NYSDEC Emerging Contaminant Field Sampling Guidance

NEW YORK STATE OF OPPORTUNITY. | Department of Environmental Conservation

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

Under NYSDEC's Part 375 Remedial Programs

April 2023

www.dec.ny.gov

Table of Contents

Objective 1

Applicability 1

Field Sampling Procedures 1

Analysis and Reporting 2

  Routine Analysis 2

  Additional Analysis 2

Data Assessment and Application to Site Cleanup 3

  Water Sample Results 3

  Soil Sample Results 3

Testing for Imported Soil 4

Appendix A - Quality Assurance Project Plan (QAPP) Guidelines for PFAS 5

Appendix B - Sampling Protocols for PFAS in Soils, Sediments and Solids 6

Appendix C - Sampling Protocols for PFAS in Monitoring Wells 8

Appendix D - Sampling Protocols for PFAS in Surface Water 10

Appendix E - Sampling Protocols for PFAS in Private Water Supply Wells 12

Appendix F - Sampling Protocols for PFAS in Fish 14

Appendix G - PFAS Analyte List 22

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids 24

April 2023

NEW YORK STATE OF OPPORTUNITY | 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	

April 2023

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

---

Objective

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

Applicability

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

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

Field Sampling Procedures

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

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

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

Analysis and Reporting

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

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

Routine Analysis

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

Additional Analysis

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

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

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

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

---

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

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

Data Assessment and Application to Site Cleanup

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

Water Sample Results

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

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

Soil Sample Results

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

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

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

---

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

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

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

Testing for Imported Soil

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

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

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

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

General Guidelines in Accordance with DER-10

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

Specific Guidelines for PFAS

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

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

General

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

Laboratory Analysis and Containers

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

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

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

Laboratory Analysis and Container

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

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix D - Sampling Protocols for PFAS in Surface Water

General

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

Laboratory Analysis and Container

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

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

Equipment

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

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

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

- stainless steel cup

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

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

General

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

Laboratory Analysis and Container

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

Equipment

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the current SOP developed by the Division of Fish and Wildlife (DFW) entitled “General Fish Handling Procedures for Contaminant Analysis” (Ver. 8). This SOP should be followed when collecting fish for contaminant analysis. Note, however, that the Bureau of Ecosystem Health will not be supplying bags or tags. All supplies are the responsibility of the collector

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

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

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

Version: 8

Previous Version Date: 21 March 2018

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

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

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

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

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

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

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

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

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

   1. Project and Site Name.

   2. DEC Region.

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

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

   5. Preservation Method.

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

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

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

   3. Date collected.

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

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

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

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

D. General data collection recommendations:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

page ______ of ______

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

Project and Site Name ____ DEC Region ____________

Collections made by (include all crew) ____

Sampling Method: ☐Electrofishing ☐Gill netting ☐Trap netting ☐Trawling ☐Seining ☐Angling ☐Other ______________________________

Preservation Method: ☐Freezing ☐Other ________________________ Notes (SWFDB survey number): ______________________________

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

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

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

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

following on ____________________, 20____ from ______________________________
(Date) (Water Body)

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

Town of ______________________________, in ______________________________ County.

Item(s) ______________________________

____

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

______________________________ ____________________
Signature Date

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

______________________________ ____________________
Signature Date

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

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

NOTICE OF WARRANTY

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

HANDLING INSTRUCTIONS

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

Retain organisms in manila tagged plastic bags to avoid mixing capture locations. Note appropriate information on each bag tag.

Keep samples as cool as possible. Put on ice if fish cannot be frozen within 12 hours. If fish are held more than 24 hours without freezing, they will not be retained or analyzed.

Initial recipient (either DEC or designated agent) of samples from collector(s) is responsible for obtaining and recording information on the collection record forms which will accompany the chain of custody. This person will seal the container using packing tape and writing his signature, the time and the date across the tape onto the container with indelible marker. Any time a seal is broken, for whatever purpose, the incident must be recorded on the Chain of Custody (reason, time, and date) in the purpose of transfer block. Container then is resealed using new tape and rewriting signature, with time and date.

EQUIPMENT LIST

Scale or balance of appropriate capacity for the fish to be collected.

Fish measuring board.

Plastic bags of an appropriate size for the fish to be collected and for site bags.

Individually numbered metal tags for fish.

Manila tags to label bags.

Small envelops, approximately 2” x 3.5”, if fish scales are to be collected.

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonic acids	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorononanesulfonic acid	PFNS	68259-12-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
	Perfluorododecanesulfonic acid	PFDoS	79780-39-5
Perfluoroalkyl carboxylic acids	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUnA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTeDA	376-06-7
Per- and Polyfluoroether carboxylic acids	Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6
	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4
	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
	Perfluoro-4-methoxybutanoic acid	PFMBA	863090-89-5
	Nonafluoro-3,6-dioxaheptanoic acid	NFDHA	151772-58-6
Fluorotelomer sulfonic acids	4:2 Fluorotelomer sulfonic acid	4:2-FTS	757124-72-4
	6:2 Fluorotelomer sulfonic acid	6:2-FTS	27619-97-2
	8:2 Fluorotelomer sulfonic acid	8:2-FTS	39108-34-4
Fluorotelomer carboxylic acids	3:3 Fluorotelomer carboxylic acid	3:3 FTCA	356-02-5
	5:3 Fluorotelomer carboxylic acid	5:3 FTCA	914637-49-3
	7:3 Fluorotelomer carboxylic acid	7:3 FTCA	812-70-4
Perfluorooctane sulfonamides	Perfluorooctane sulfonamide	PFOSA	754-91-6
	N-methylperfluorooctane sulfonamide	NMeFOSA	31506-32-8
	N-ethylperfluorooctane sulfonamide	NEtFOSA	4151-50-2
Perfluorooctane sulfonamidoacetic acids	N-methylperfluorooctane sulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethylperfluorooctane sulfonamidoacetic acid	N-EtFOSAA	2991-50-6
Perfluorooctane sulfonamide ethanols	N-methylperfluorooctane sulfonamidoethanol	MeFOSE	24448-09-7
	N-ethylperfluorooctane sulfonamidoethanol	EtFOSE	1691-99-2

Group	Chemical Name	Abbreviation	CAS Number
Ether sulfonic acids	9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (F-53B Major)	9Cl-PF3ONS	756426-58-1
	11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (F-53B Minor)	11Cl-PF3OUdS	763051-92-9
	Perfluoro(2-ethoxyethane) sulfonic acid	PFEESA	113507-82-7

Appendix H - Data Review Guidelines for Analysis of PFAS in Non-Potable Water and Solids

General

These guidelines are intended to be used for the validation of PFAS using EPA Method 1633 for projects within the Division of Environmental Remediation (DER). Data reviewers should understand the methodology and techniques utilized in the analysis. Consultation with the end user of the data may be necessary to assist in determining data usability based on the data quality objectives in the Quality Assurance Project Plan. A familiarity with the laboratory's Standard Operating Procedure may also be needed to fully evaluate the data. If you have any questions, please contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov.

Preservation and Holding Time

Samples should be preserved with ice to a temperature of less than 6°C upon arrival at the lab. The holding time is 28 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

Temperature greatly exceeds 6ºC upon arrival at the lab*	Use professional judgement to qualify detects and non-detects as estimated or rejected
Holding time exceeding 28 days to extraction	Use professional judgement to qualify detects and non-detects as estimated or rejected if holding time is grossly exceeded

*Samples that are delivered to the lab immediately after sampling may not meet the thermal preservation guidelines. Samples are considered acceptable if they arrive on ice or an attempt to chill the samples is observed.

Initial Calibration

The initial calibration should contain a minimum of six standards for linear fit and six standards for a quadratic fit. The relative standard deviation (RSD) for a quadratic fit calibration should be less than 20%.

The low-level calibration standard should be within 50% - 150% of the true value, and the mid-level calibration standard within 70% - 130% of the true value.

%RSD >20%	J flag detects and UJ non detects

Continuing Calibration Verification

Continuing calibration verification (CCV) checks should be analyzed at a frequency of one per ten field samples. If CCV recovery is very low, where detection of the analyte could be in question, ensure a low level CCV was analyzed and use to determine data quality.

CCV recovery <70 or >130%	J flag results

Blanks

There should be no detections in the method blanks above the reporting limits. Equipment blanks, field blanks, rinse blanks etc. should be evaluated in the same manner as method blanks. Use the most contaminated blank to evaluate the sample results.

Blank Result	Sample Result	Qualification
Any detection	<Reporting limit	Qualify as ND at reporting limit
Any detection	>Reporting Limit and >10x the blank result	No qualification
>Reporting limit	>Reporting limit and <10x blank result	J+ biased high

Field Duplicates

A blind field duplicate should be collected at rate of one per twenty samples. The relative percent difference (RPD) should be less than 30% for analyte concentrations greater than two times the reporting limit. Use the higher result for final reporting.

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

Lab control spikes should be analyzed with each extraction batch or one for every twenty samples. In the absence of lab derived criteria, use 70% - 130% recovery criteria to evaluate the data.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects

Matrix Spike/Matrix Spike Duplicate

One matrix spike and matrix spike duplicate should be collected at a rate of one per twenty samples. Use professional judgement to reject results based on out of control MS/MSD recoveries.

Recovery <70% or >130% (lab derived criteria can also be used)	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only
RPD >30%	Apply J qualifier to detects and UJ qualifier to non detects of parent sample only

Extracted Internal Standards (Isotope Dilution Analytes)

Problematic analytes (e.g. PFBA, PFPeA, fluorotelomer sulfonates) can have wider recoveries without qualification. Qualify corresponding native compounds with a J flag if outside of the range.

Recovery <50% or >150%	Apply J qualifier
Recovery <25% or >150% for poor responding analytes	Apply J qualifier
Isotope Dilution Analyte (IDA) Recovery <10%	Reject results

Signal to Noise Ratio

The signal to noise ratio for the quantifier ion should be at least 3:1. If the ratio is less than 3:1, the peak is discernable from the baseline noise and symmetrical, the result can be reported. If the peak appears to be baseline noise and/or the shape is irregular, qualify the result as tentatively identified.

Reporting Limits

If project-specific reporting limits were not met, please indicate that in the report along with the reason (e.g. over dilution, dilution for non-target analytes, high sediment in aqueous samples).

Peak Integrations

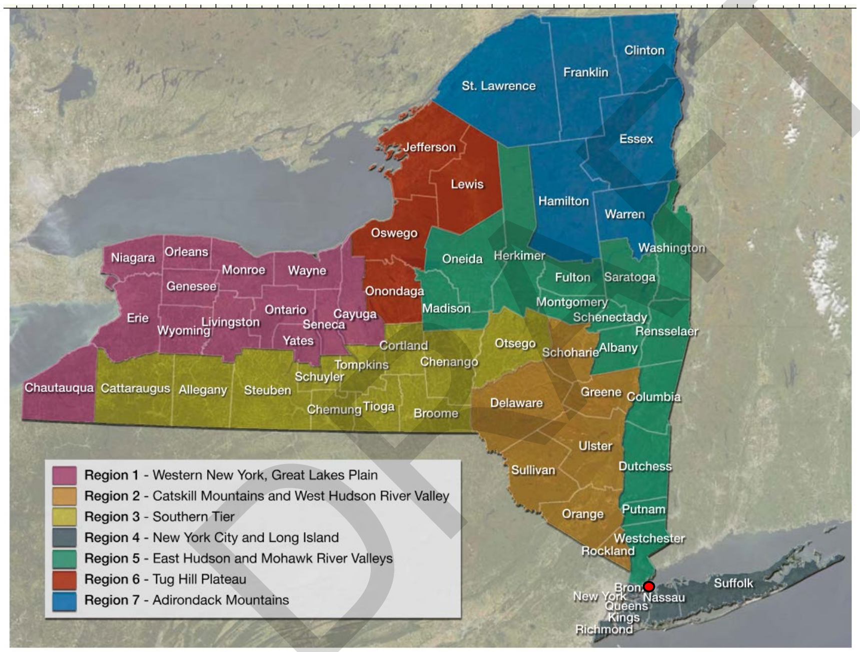
Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

APPENDIX F
Climate Screening Checklist

Climate Screening Checklist

BACKGROUND INFORMATION

- Project Manager: Elizabeth Fitzgerald
- Site Name: 98-114 Berriman Street Development Site
- Site Number: PENDING
- Site Location: 98-114 Berriman Street, Brooklyn, New York
- Site Elevation (average above sea level): Approximately xx feet above sea level (Google Earth)
- ClimAID Region ([Responding Climate Change in New York State (ClimAID) - NYSERDA]()): Region 4 – New York City and Long Island

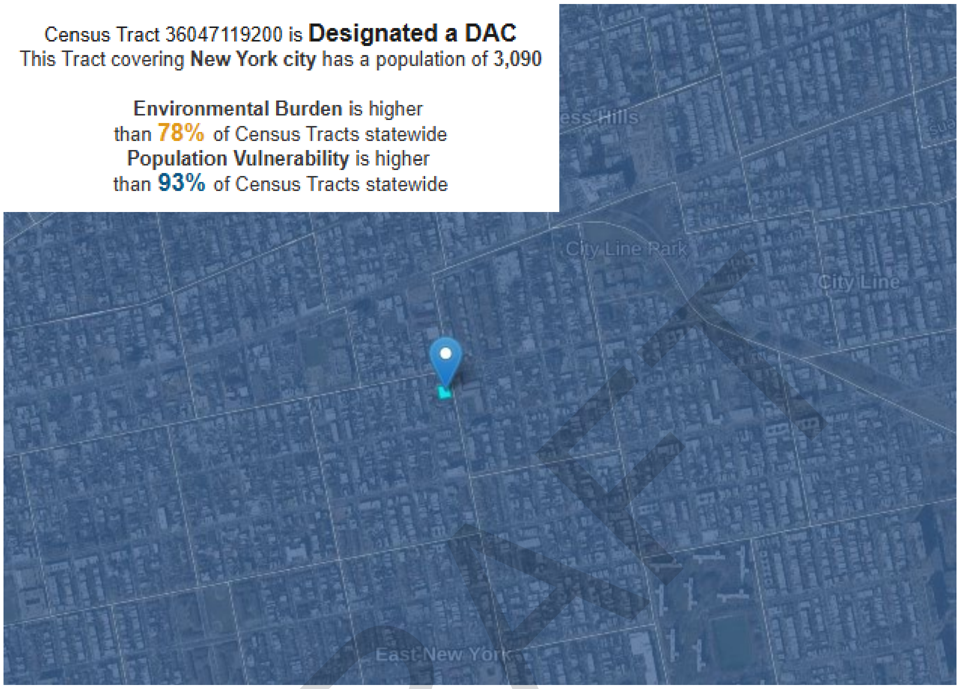


- Remedial Stage/Site Classification: Investigation.
- Contamination - Media Impacted/ Contaminants of Concern: Primary contaminants of concern at the Site include semi-volatile organic compounds (SVOCs), specifically polycyclic aromatic hydrocarbons (PAHs), and heavy metals in shallow soils up to 4 ft bgs and volatile organic compounds (VOCs), specifically chlorinated volatile organic compounds (CVOCs), including tetrachloroethene (PCE), and petroleum-related compounds (benzene, toluene, ethylbenzene, and xylenes [BTEX]) in sub-slab soil vapor.
- Proposed/Current Remedy: The remedy will be proposed upon the completion of the pending Remedial Investigation (RI), when the extent of environmental impacts at the Site is determined.
- What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years? The predicted timeframe is unknown as environmental impacts at the Site are undetermined.
- Is the site in proximity to any sensitive receptors? (e.g., wetlands, waterbodies, residential properties, hospitals, schools, drinking water supplies, etc.): Patrolman Robert Bolden Public

School 345 (school), two playgrounds and Cypress Hills Local Development (childcare facility) located at 111 Berriman Street, Brooklyn New York

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

X Yes ☐ No



Census Tract 36047119200 is **Designated a DAC**
This Tract covering **New York city** has a population of 3,090

Environmental Burden is higher
than **78%** of Census Tracts statewide
Population Vulnerability is higher
than **93%** of Census Tracts statewide

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

☐ Yes X 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 X No

CLIMATE SCREENING TABLE*

Potential Climate Hazards	**Relevant to the Site Location** (Y/N/NA)[1]	**Projected Change** (Resilience Analysis and Planning Tool (RAPT)/arcgis.com[3]	**Potential to Impact Remedy** (Y/N)	**Is remedy/site already resilient?** (Y/N)[4]
Precipitation	N	N/A	N/A	N/A
Temperature[2] (Extreme Heat or Cold Weather Impacts)	N	N/A	N/A	N/A
Sea Level Rise	N	N/A	N/A	N/A
Flooding	N	N/A	N/A	N/A
Storm Surge	N	N/A	N/A	N/A
Wildfire	N	N/A	N/A	N/A
Drought	N	N/A	N/A	N/A
Storm Severity	N	N/A	N/A	N/A
Landslides	N	N/A	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 rainfall, 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):

Conduct severe weather storm inspections during the active remedy. Inspect dewatering systems prior to anticipated storm events that could result in a power outage, and after storm events.

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 Preparedness 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 Coastal 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 G

Health and Safety Plan and Job Hazard Analysis

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

TABLE OF CONTENTS

Page

1. PURPOSE 1
2. EXPECTATIONS 1
   - 2.1 FOUNDATIONAL SAFETY BEHAVIORS 1
   - 2.2 STOP WORK AUTHORITY 1
   - 2.3 HEALTH AND SAFETY REPORTING 2
3. ISSUANCE AND COMPLIANCE 2
4. ROLES AND RESPONSIBILITIES 3
   - 4.1 PROJECT STAFF ROLES AND RESPONSIBILITIES 3
     - 4.1.1 Haley & Aldrich Project Manager (PM) 4
     - 4.1.2 Haley & Aldrich Site Safety Officer (SSO) 4
     - 4.1.3 Haley & Aldrich Regional Safety Manager (RSM) 4
     - 4.1.4 Haley & Aldrich Health & Safety Team 4
     - 4.1.5 Haley & Aldrich Subcontractors 4
5. SCOPE OF WORK (SOW) 5
   - 5.1 GENERAL AND PROJECT TASKS 5
6. SITE OVERVIEW 5
   - 6.1 SITE CHARACTERIZATION AND ANALYSIS 5
     - 6.1.1 Preliminary Evaluation 5
   - 6.2 SITE DESCRIPTION AND WORK AREAS 6
   - 6.3 REQUIRED INFORMATION 6
7. HAZARD ASSESSMENT 6
   - 7.1 HAZARD ASSESSMENT 6
   - 7.2 CHEMICAL HAZARDS 7
   - 7.3 PHYSICAL HAZARDS 7
   - 7.4 WEATHER HAZARDS 7
   - 7.5 BIOLOGICAL HAZARDS 7
8. PROTECTIVE MEASURES 8
   - 8.1 IMPLEMENTING CONTROLS 8
   - 8.2 FIT FOR DUTY 8
   - 8.3 PERSONAL PROTECTIVE EQUIPMENT (PPE) 8
   - 8.4 LEVELS OF PERSONAL PROTECTIVE EQUIPMENT 9
     - 8.4.1 Level D Protection 9
     - 8.4.2 Level C Protection 10
     - 8.4.3 Level B Protection 10
     - 8.4.4 Level A Protection 11
   - 8.5 INSPECTION, CLEANING, MAINTENANCE, AND STORAGE 12
   - 8.6 TRAINING AND PROPER FITTING 12

TABLE OF CONTENTS

Page

8.7 DONNING AND DOFFING 12
8.8 EVALUATION OF EFFECTIVENESS 12
8.9 LIMITATIONS 13
8.10 RESPIRATORY PROTECTION 13
8.11 HEARING CONSERVATION 13

9. TRAINING REQUIREMENTS 13

9.1 HEALTH AND SAFETY TRAINING REQUIREMENTS 13
9.2 40-HOUR HAZWOPER 14
9.3 8-HOUR ANNUAL REFRESHER 14
9.4 8-HOUR SUPERVISOR 14
9.5 ADDITIONAL TRAINING FOR SPECIFIC PROJECTS 14

10. MEDICAL SURVEILLANCE 14

10.1 MEDICAL SURVEILLANCE 14

11. AIR MONITORING PLANS AND EQUIPMENT 15

11.1 INITIAL ENTRY AND BACKGROUND MONITORING 15
11.2 PERIODIC MONITORING 16
11.3 AIR MONITORING EQUIPMENT 16
  11.3.1 Calibration, Functionality Tests, and Use of Air Monitoring Equipment 16

12. SITE CONTROL 17

12.1 GENERAL SITE CONTROL INFORMATION 17
12.2 SITE MAP WITH DESIGNATED WORK ZONES 17
12.3 SITE COMMUNICATIONS 18
12.4 LOCATION OF MEDICAL ASSISTANCE 18

13. EMERGENCY RESPONSE PLAN 18

13.1 EMERGENCY RESPONSE PLANS 18
13.2 HALEY & ALDRICH AS THE CONTROLLING EMPLOYER 18
  13.2.1 Pre-Emergency Planning 18
  13.2.2 Personnel, Roles, Lines of Authority, and Communication 19
  13.2.3 Safe Distances and Places of Refuge 19
  13.2.4 Site Security and Control 19
  13.2.5 Evacuation Routes and Procedures 19
  13.2.6 Emergency Medical Treatment and First Aid 20
  13.2.7 Emergency Alerting and Response Procedures 20
  13.2.8 PPE and Emergency Equipment 20
  13.2.9 Critiques of Response and Follow-Up 20
13.3 MULTI-EMPLOYER PROJECT SITES 20
  13.3.1 Procedures for Reporting a Fire or Other Emergency 21
  13.3.2 Procedures for Emergency Evacuation 21
  13.3.3 Procedures to Account for All Staff After an Evacuation 21

TABLE OF CONTENTS

Page

13.3.4 Procedures for Staff Performing Rescue or Medical Duties 21
13.3.5 Name or Title of Who is Responsible for the Plan 21

14. DECONTAMINATION AND DISPOSAL METHODS 21

14.1 GENERAL DECONTAMINATION AND DISPOSAL INFORMATION 21
14.1.1 Required Information for Projects 22
14.1.2 Personal Protective Equipment and Clothing 23
14.2 STANDARD PERSONAL DECONTAMINATION PROCEDURES 23
14.3 SMALL EQUIPMENT DECONTAMINATION 24
14.4 MONITORING THE EFFECTIVENESS OF DECONTAMINATION PROCEDURES 24

15. PERMIT-REQUIRED CONFINED SPACE ENTRY 24

15.1 GENERAL CONFINED SPACE INFORMATION 24
15.2 PERMIT-REQUIRED CONFINED SPACE INFORMATION 25
15.2.1 Hazardous Atmosphere Permit-Required Confined Spaces 25
15.2.2 Permit-Required Confined Space Hazards Additional to Atmosphere 26
15.3 WHEN HALEY & ALDRICH IS NOT THE CONTROLLING EMPLOYER ON SITE 26
15.4 CONFINED SPACE TRAINING 26

16. SPILL CONTAINMENT PROGRAM 26

16.1 POTENTIAL SOURCES 26
16.1.1 Handling Drums 26
16.1.2 Opening Drums and Containers 27
16.1.3 Radioactive Wastes 28
16.1.4 Shock-Sensitive Wastes 28
16.1.5 Laboratory Waste Packs 28
16.1.6 Sampling of Drum and Container Contents 28
16.1.7 Shipping and Contents 28
16.1.8 Tank and Vault Procedures 29
16.2 SITE EVALUATION 29
16.3 POTENTIAL SPILLS AND AVAILABLE CONTROLS 29
16.4 INITIAL SPILL NOTIFICATION AND RESPONSE 30
16.5 SPILL EVALUATION AND RESPONSE 30
16.6 POST SPILL EVALUATION 31

APPENDIX A – CHEMICAL HAZARDS

APPENDIX B – PHYSICAL HAZARDS

APPENDIX C – WEATHER-RELATED HAZARDS

APPENDIX D – BIOLOGICAL HAZARDS

APPENDIX E – EMERGENCY RECOGNITION AND PREVENTION

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.

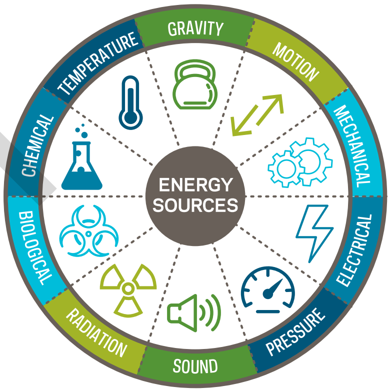
2.3 HEALTH AND SAFETY REPORTING

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.

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).

Poison Ivy

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

PROJECT-SPECIFIC PLAN

1.0 GENERAL INFORMATION

Project name: 98-114 Berriman Street Development	Client: Berriman Residents LLC
Site name and location: 98-114 Berriman Street	Project #: 0214078
Field work start date: 4/30/2026	Anticipated field work end date: 5/30/2026
Reviewed and approved by Project Manager: Elizabeth R. Fitzgerald	Date: 12/4/2025
Reviewed and approved by H&S: Brian Ferguson	Date: Click here to enter date approved.

2.0 PROJECT TEAM

	Office Phone #	Cell Phone #
Client/Site Contact: David Goldberger	(347) 861-4556	Click here to enter text.
H&A Project Manager: Elizabeth R. Fitzgerald	(646) 277-5685	(609) 488-0175
Alternate Project Contact: Mari Conlon	(646) 277-5685	(347) 271-1521
H&A Regional Safety Manager: Brian Ferguson	(617) 886-7439	(617) 908-2761
H&A Site Safety Officer: Luke McCartney	(551) 655-7720	(646) 568-9357
Subcontractor Information: Click here to enter text.	Click here to enter text.	Click here to enter text.
Other: Click here to enter text.	Click here to enter text.	Click here to enter text.

3.0 EMERGENCY ACTION PLAN

Emergency Contact List

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

Contact	Name	Location	Phone
Hospital	Brookdale University Hospital Medical Center	1 Brookdale Plaza, Brooklyn NY	(718) 240-5000
Police	NYPD 75th Precinct	1000 Sutter Ave, Brooklyn NY	(718) 827-3511 / 911
Fire	FDNY Engine 236	998 Liberty Ave, Brooklyn NY	911
Enter client specific information.	Enter client specific information.	Enter client specific information.	Enter client specific information.

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

3.0 EMERGENCY ACTION PLAN

Required Site Maps

Complete and add site map(s) as an individual file 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

Use this space to provide a description of the work being performed. If work is in a high crime area, remote location, or will include night work or extended shifts, you will need to attach applicable JHAs.

☒ **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 completing a GPR survey followed by drilling to collect soil, groundwater, and soil vapor samples.

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

The approximately 0.402-acre Site (Block 3989, Lots 20, 24, and 25) is located in the East New York neighborhood of Brooklyn, Kings County, New York. The property is partially developed with an industrial building used for metal-slitting operations on Lot 20 and an auto towing/parking lot on Lots 24 and 25. The planned redevelopment includes demolition of existing structures and construction of a multi-story residential building with a cellar extending to approximately 14 feet bgs.

Previous investigations identified SVOCs (PAHs) and heavy metals in shallow soils (0–4 ft bgs) and VOCs, including PCE and BTEX compounds, in sub-slab vapor. Additional investigation is required to delineate impacts and support remedial planning.

The Site is in a mixed-use area with nearby residential and commercial buildings. Sensitive receptors within 500 feet include Patrolman Robert Bolden Public School 345, two playgrounds, and the Cypress Hills Local Development childcare facility.

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

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.

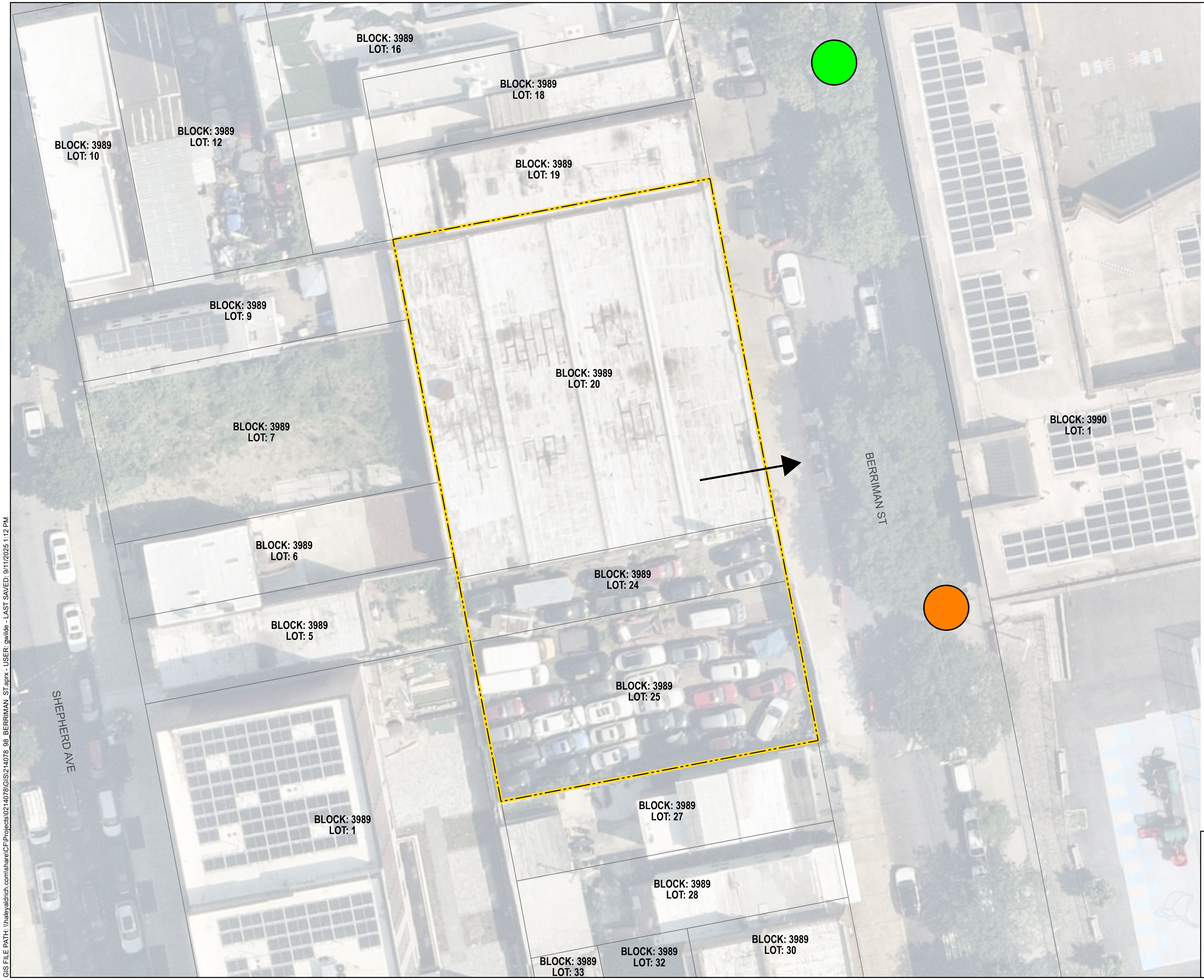
SITE HAZARDS – note that this is not a comprehensive list of hazards that may be on your site. For a full list of hazards, see the appendices of the Company HASP. All boxes checked must be present in either task or site JHA attachments.

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 ☒ Buried Utilities	☐ 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) ☐ Needles ☐ Bacteria ☐ Contaminated water ☐ Disease (e.g., BBP, hepatitis, legionnaires) ☐ Other	☒ Chemicals ☒ Hazardous materials ☒ Wastes ☒ Dusts ☒ Flammable and combustible vapors ☐ Toxic compounds ☐ Other	☒ Cold stress ☐ Extreme weather (tornado, tsunami, lightning, high winds, blizzard, hurricane) ☐ Wildfire and air quality ☐ Fire ☐ Hot surfaces ☐ Other

ACKNOWLEDGEMENT PAGE

NOTE – by signing this document, I acknowledge that I have reviewed all JHA materials, including the cover page, site hazard sheets, task pages, and any other applicable forms.

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



LEGEND

▭ SITE BOUNDARY

□ PARCEL BOUNDARY

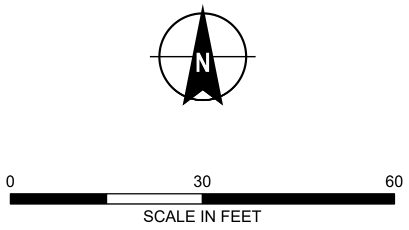
→ EVACUATION ROUTE

● PRIMARY MUSTER POINT

● SECONDARY MUSTER POINT

NOTES

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



HALEY ALDRICH

98 BERRIMAN STREET
BROOKLYN, NEW YORK

SITE PLAN

SEPTEMBER 2025

FIGURE 2

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0214078\GIS\214078_98_BERRIMAN_ST.aprx - USER: gwilde - LAST SAVED: 9/11/2025 1:12 PM

APPENDIX H
NYSDOH Generic Community Air Monitoring Plan

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.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/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.

December 2009

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.

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

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

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