

REMEDIAL INVESTIGATION WORK PLAN
374 WALLABOUT STREET REDEVELOPMENT
NYSDEC BCP SITE NO. C224383
374 WALLABOUT STREET
BROOKLYN, NEW YORK

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

for
Joel Fried
374 Wallabout Street
Brooklyn, New York 11206

File No. 0205892
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15 January 2025
File No. 0205892-001

New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233

Attention: Mr. Sadique Ahmed

Subject: Remedial Investigation Work Plan
374 Wallabout Street Redevelopment (Site No. C224383)
374 Wallabout Street
Brooklyn, New York (Site)

Dear Mr. Ahmed,

H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York), on behalf of Joel Fried, is submitting for the review and approval of the New York State Department of Environmental Conservation (NYSDEC) this revised Remedial Investigation Work Plan (RIWP) for the 374 Wallabout Street Redevelopment Site (C224383) located at 374 Wallabout Street in Brooklyn, New York ("Site"). This RIWP has been developed based on NYSDEC's "Technical Guidance for Site Investigation and Remediation" (DER-10 dated May 2010) and in response to comments received from NYSDEC and New York State Department of Health (NYSDOH) on 3 May 2023 and 10 December 2024.

NYSDEC comments were addressed as follows:

1. Update the NYSDEC Project Manager to Sadique Ahmed (email sadique.ahmed@dec.ny.gov) and NYSDOH Project Manager to Stephanie Selmer (stephanie.selmer@health.ny.gov) wherever it is appropriate.

Response: NYSDEC and NYSDOH Project Managers updated throughout.

2. Section 3.2: Please clarify the extent of the demolition prior to commencing the remedial investigation (i.e., complete demolition of all above grade structures or partial demolition).

Response: Revised to indicate complete demolition prior to commencement of the remedial investigation.

3. Section 3.3/3.4: Soil and groundwater collection and analysis must be updated to the latest guidelines listed in the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs" dated April 2023. Please revise section 3.3 and section 3.4 to reference this guidance.
 - Soil boring Comments: Six soil borings, depth 15 feet bgs, sampling 0-2 ft bgs, 3-5 ft bgs, 7-9 feet bgs and above groundwater interface.

Response: Revised text in Sections 3.3 and 3.4, tables and figures to include six soil borings with samples collected from the following depth intervals: 0-2 ft bgs, 3-5 ft bgs, 7-9 feet bgs and above groundwater interface.

4. Section 3.3/3.4: For soil and groundwater samples, please include appropriate analytical methods for mercury, cyanide, and hexavalent chromium. Update all applicable tables in the text and appendices accordingly (e.g., Table 1, Appendix C).

- Monitoring well Comments: Four monitoring wells, screen should be 10-feet into the groundwater tables, samples should be collected around 5-feet below groundwater table.

Response: Revised text Sections 3.3 and 3.4, tables and figures to indicate installation of four monitoring wells screened 10-feet into the groundwater table and sampled around 5-feet below groundwater table.

5. Section 3.4: Groundwater samples must be sampled and analyzed for 1,4-Dioxane using EPA Method 8270 SIM

Response: Updated text in Section 3.4 and Table 1 to include 1,4-dioxane analysis (EPA Method 8270 SIM) for groundwater samples.

6. Section 3.6: It is unclear between Section 3.6 and Table 1, whether soil vapor samples or sub-slab soil vapor samples are planned. Indoor air and sub-slab soil vapor samples should only be collected if the on-site building will be occupied and not demolished (see Comment 2). Sub-slab vapor samples must be collected from the soil or aggregate immediately below the basement slab or slab-on-grade. It is unclear from the work plan, if this will be the case when collecting sub-slab vapor samples. Please revise as appropriate.

- Soil Vapor Comments: No sub-slab vapor, Five soil vapor points should be collected 7 to 8 feet bgs; however, must be at least 2-feet above the groundwater interface.

Response: Revised text in Section 3.6, tables and figures to indicate installation of five soil vapor soil samples and sample collection 7 to 8 feet bgs, or at least 2-feet above groundwater interface.

7. Section 7.2: According to the given description, a photoionization detector (PID) will be used to monitor the work zone. This is not a Community Air Monitoring Plan (CAMP); please revise in reference to the NYSDOH generic CAMP, which includes continuous monitoring for volatile organic compounds and particulates both upwind and downwind of the work zone during ground intrusive work for protection of the surrounding community.

Response: Revised text in Section 7.2 to indicate that CAMP will be conducted in accordance with NYSDOH generic CAMP guidance.

8. Section 8.2: The RIR and RAWP must be submitted as separate documents. Please revise the last paragraph

Response: Revised text in Section 8.2 to indicate the RIR and RAWP would be submitted as separate documents.

9. Section 9: Update the schedule in this section with appropriate dates.

Response: Updated schedule to reflect accurate dates.

10. Table 1: Revise the table heading for the PFAS analyses to reflect EPA Method 1633.

Response: Revised Table to include EPA Method 1633 for PFAS analysis.

11. Table 1: Surface soil samples are considered 0 to 2 inches for the purposes of exposure assessment. 0 to 0.5 feet should be labeled as shallow soil samples. Please do not hesitate to contact us if there are any questions regarding this submittal or any other aspects of the project.

Response: Disregarded based on phone conversation with NYSDEC Project Manager, Sadique Ahmed, on 10 December 2024.

12. Table 1: Sub-slab soil vapor points should be collected from immediately below the slab, please revise.

Response: Disregarded based on phone conversation with NYSDEC Project Manager, Sadique Ahmed, on 10 December 2024.

13. Table 1: Soil vapor/sub-slab soil vapor sample IDs do not match between Table 1 and Figure 2, please rectify.

Response: Revised Table 1 and Figure 2 so Sample IDs are consistent.

14. Figure 2: The location of soil vapor sampling point SS-4 appears to be on the edge of the building. It should be corrected to a location further within the building.

Response: Shifted soil vapor sample location away from building edge and further within Site building.

15. Figure 2: The outline of the site boundary does not align with the northern and western edges of the building, please confirm if this is correct.

Response: Updated Figures so parcels are better aligned with aerial imagery.

16. Appendix A: Please include the previously mentioned reports, the August 2022 Phase I ESA and August 2022 Limited Phase II Environmental Site Investigation Report.

Response: Included August 2022 Phase I ESA and August 2022 Limited Phase II Environmental Site Investigation Report in Appendix A.

17. Appendix B Section 6.2: Further details on the methodology involved in “Typical Sampling Methods” for groundwater sample collection are needed.

Response: Revised text in Appendix B Section 6.2 to include additional detail on the methodology involved in “Typical Sampling Methods”.

18. Appendix B Section 6.1.4/6.2.4: PFAS sampling guidelines for soil and groundwater must be updated to the NYSDEC “Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC Part 375 Remedial Programs” dated April 2023.

Response: Revised text in Appendix B Section 6.1.4 /6.2.4 to reference April 2023 PFAS guidance.

19. Appendix C, Section 1.3: Pesticides must be analyzed in both soil and groundwater using an appropriate method (i.e. EPA Method 8081B).

Response: Revised text in Appendix C, Section 1.3 to indicate pesticide analysis for both soil and groundwater via EPA Method 8081B.

20. Appendix C, Table 1: Analysis/Method for pesticides must be added to Table 1 in Appendix C. PFAS compounds must be analyzed using EPA Method 1633.

Response: Revised Appendix C, Table 1 to include pesticide analysis for both soil and groundwater samples via EPA Method 8081B and PFAS analysis via EPA Method 1633.

21. Appendix C, Table 1: Please list the following information in the notes for Table 1: number of field and trip blanks per matrix, number and type of matrix spike and matrix spike duplicate samples, and number and type of duplicate samples to be collected. Additionally, please list minimum reporting limits for all analytical methods in separate table(s).

Response: Revised Appendix C, Table 1 to include detail in Notes section. Added Table 2 - Minimum Reporting Limits to Appendix C and added text to Section 4.1.1 referencing this table. (please note that this table is also included as Table 2 of the RIWP).

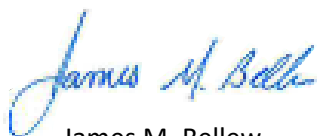
22. Appendices: Update the references of each Appendix to include the latest guidance found under NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs" dated April 2023.

Response: Updated references to indicate April 2023 PFAS guidance.

23. A Citizen Participation Plan is required before beginning any investigative or remedial work, please include this as an appendix in the RIWP or as a separate document.

Response: A Citizen Participation Plan is being submitted with this revised RIWP.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK



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Principal



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Project Manager

Cc:

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Certification

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



James M. Bellew, Principal

23 December 2024

Date

Table of Contents

Certification	1
List of Tables	iv
List of Figures	iv
1. Introduction	1
1.1 PURPOSE	1
2. Background	3
2.1 CURRENT LAND USE	3
2.2 SITE HISTORY	3
2.3 SURROUNDING LAND USE	3
2.4 SURROUNDING LAND USE HISTORY	3
2.5 PREVIOUS REPORTS	3
3. Remedial Investigation	6
3.1 UTILITY MARKOUT	6
3.2 SELECTIVE DEMOLITION	6
3.3 SOIL SAMPLING	6
3.4 GROUNDWATER SAMPLING	7
3.5 INVESTIGATION DERIVED WASTE	8
3.6 SOIL VAPOR SAMPLING	8
3.7 PROPOSED SAMPLING RATIONALE	9
4. Quality Assurance and Quality Control	10
5. Data Use	11
5.1 DATA SUBMITTAL	11
5.2 DATA VALIDATION	11
6. Project Organization	12
7. Health and Safety	13
7.1 HEALTH AND SAFETY PLAN	13
7.2 COMMUNITY AIR MONITORING PLAN	13
8. Reporting	14
8.1 DAILY REPORTING	14
8.2 REMEDIAL INVESTIGATION REPORT	14

Table of Contents

9. Schedule	15
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References	16
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List of Appendices

Appendix A – Previous Reports

Appendix B – Field Sampling Plan

Appendix C – Quality Assurance Project Plan

Appendix D – NYSDEC Emerging Contaminant Field Sampling Guidance

Appendix E – Health and Safety Plan

Appendix F – NYSDOH CAMP Guidance Document

Table of Contents

List of Tables

Table No.	Title
1	Sampling and Analysis Plan
2	Minimum Reporting Limits for Analytical Methods

List of Figures

Figure No.	Title
1	Project Locus
2	Proposed Sample Location Plan
3	Summary of Historical Soil Analytical Data
4	Summary of Historical Groundwater Analytical Data
5	Summary of Historical Soil Vapor Analytical Data
6	Surrounding Sensitive Receptor Map

1. Introduction

On behalf of the Applicant, Joel Fried, H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York) has prepared this Remedial Investigation Work Plan (RIWP) for the 374 Wallabout Street Redevelopment Brownfield Cleanup Program (BCP) Site C224383, located at 374 Wallabout Street (see Figure 1) in Brooklyn, New York (Site). This RIWP was prepared in accordance with the regulations and guidance applicable to the BCP.

The Site, identified as Block 2266 Lot 13 on the New York City tax map, is approximately 2,500-square feet and is bound to the north by Wallabout Street followed by an industrial-use garage and multi-story residential building, to the east by a multi-story residential building, to the south by a parking lot, and to the west by a multi-story residential building. Portions of the surrounding area, including an adjacently south property previously operated by Pfizer, known as Pfizer Sites B & D, were formerly subject to investigation and remediation within the BCP.

The Site is currently located within a residential zoning district (R7A). The Site is located within an urban area characterized by multi-story commercial and residential buildings.

A Site location map is provided as Figure 1 and a Site plan showing the property boundaries and adjacent properties is provided as Figure 2.

The Site is a rectangular-shaped lot and is improved with a three-story residential building with a cellar level and a rear yard in the southern region of the lot.

While the development plans are conceptual at this time, the planned project will consist of constructing a new four-story residential building in the northern region of the lot near Wallabout Street and will include one cellar level. The paved rear yard located in the southern region of the Site will remain undeveloped. The new development is anticipated to extend approximately 14 ft below ground surface (bgs).

1.1 PURPOSE

Based on a Limited Phase II Environmental Site Investigation (ESI), performed at the Site in August 2022 by Haley & Aldrich of New York, the primary contaminants of concern for the Site are heavy metals and semivolatile organic compounds (SVOCs) (specifically polycyclic aromatic hydrocarbons [PAHs]) in soil, chlorinated volatile organic compounds (CVOCs) in groundwater, and CVOCs in soil vapor. One CVOC, cis-1,2-dichloroethene, was also detected in soil above the laboratory detection limit in the southern portion of the Site. Additional investigation is necessary to determine if an on-Site source of contamination exists. The presence of CVOC contamination in groundwater, coupled with the presence of CVOCs in soil and soil vapor, indicates that a on-Site source may exist.

The previous investigation did not comprehensively delineate the extent of soil, groundwater, and soil vapor contamination at the Site. Summaries of the historical soil, groundwater, and soil vapor data collected at the Site to date are displayed in Figures 3 through 5. 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 a rectangular-shaped lot and is improved with a three-story residential building that includes a cellar level and a rear yard in the southern region of the lot. The Site building is currently vacant. The entire Site is paved and capped, including the rear yard and the front areas near the building entrance on Wallabout Street. The Site is secured and fenced along the perimeter.

2.2 SITE HISTORY

Haley & Aldrich of New York prepared a Phase I Environmental Site Assessment (ESA) in August 2022 for the Site. As identified in the Phase I ESA, historical Sanborn Maps from the late 1880's – mid-1940s identify two residential structures on the property: the existing residential building on the western region of the property (consistent with today); and, a two-story residential building on the eastern region of the property (currently the rear yard). In the mid-1940s, the two-story dwelling was razed, and this portion of the property has remained undeveloped and utilized as a rear yard since that time. The Site building was vacated in 2018, and since that time, the Site has remained unoccupied.

Other findings are summarized in the August 2022 Phase I ESA prepared by Haley & Aldrich of New York. Copies of previous reports are included in Appendix A.

2.3 SURROUNDING LAND USE

The Site is located on Wallabout Street between Harrison Avenue and Throop Avenue within an urban area identified as the Broadway Triangle neighborhood of the Borough of Brooklyn. There are two sensitive receptors within a 500 ft radius of the Site listed below and shown in Figure 6:

1. IS 318 Eugenio Maria De Hostos, 101 Walton Street, Brooklyn, NY 11206 (school).
2. Beginning With Children Charter School 2, 11 Bartlett Street, Brooklyn, NY 11206 (school).

2.4 SURROUNDING LAND USE HISTORY

Historical use of the surrounding properties up- and cross-gradient to the Site were for industrial and manufacturing purposes. Historical use of adjoining and up-gradient properties included auto body, manufacturing, low rise dwellings, and a garage. Auto body and manufacturing facilities may have included the use and disposal of hazardous materials and petroleum. The former Pfizer Sites B & D, located upgradient and south adjacent to the Site, were formerly subject to investigation and remediation within the BCP.

2.5 PREVIOUS REPORTS

To date the following reports have been completed for the Site:

1. August 2022 Phase I Environmental Site Assessment Prepared by Haley & Aldrich of New York and
2. August 2022 Limited Phase II Environmental Site Investigation Report Prepared by Haley & Aldrich of New York.

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

***August 2022 Phase I Environmental Site Assessment
Prepared by Haley & Aldrich of New York***

Haley & Aldrich of New York prepared a Phase I ESA for the Site for the purpose of identifying RECs in connection with the Site.

The Phase I identified the following REC at the Site:

The property located adjacently south to the Site, known as Pfizer Sites B & D, was formerly subject to investigation and remediation within the BCP. The primary contaminants of concern included CVOCs in soil, groundwater, and soil vapor. Furthermore, the most recent groundwater sampling event (conducted in April 2021) indicated concentrations of CVOCs above regulatory criteria in groundwater samples collected from monitoring wells located both north and south of the Site. While this property has been remediated under the BCP and implemented engineering controls to address the residual contamination, due to the proximity of the Pfizer Sites B&D located hydraulically upgradient to the Site, impacted soil vapor and/or groundwater may have migrated and be present at the Site. Based on this, the former BCP Site (Pfizer Sites B & D) was considered to represent a REC to the Site.

***August 2022 Limited Phase II Environmental Site Investigation
Prepared by Haley & Aldrich of New York***

Haley & Aldrich of New York completed a limited sampling event at the Site to investigate soil, groundwater, and soil vapor quality at the Site.

Urban fill generally consisting of brown to gray, coarse to medium sand with silt and varying amounts of asphalt, brick, plastic was observed from surface grade to approximately 6 ft bgs in each soil boring. The urban fill layer was underlain by a potential native layer consisting of light brown to orange-brown coarse to medium sand with varying amounts of silt, gravel and clay. Soil cores 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). Petroleum-like odors and staining were observed in three soil borings: B-1 and B-2 between 7-8 ft bgs; and B-4 between 5-8 ft bgs. PID readings of non-detect at 0.0 parts per million (ppm) to 0.1 ppm were recorded in Site-wide soils.

During the investigation, groundwater was encountered at a depth of approximately 11.15 ft bgs at TW-1 and 12.10 ft bgs at TW-2.

Field observations and analytical results identified urban fill contaminated with heavy metals and SVOCs (specifically PAHs) at concentrations consistent with characteristics of urban fill found throughout the New York City area. SVOCs and total metals exceeding Restricted-Residential Use Soil Cleanup Objectives (RRSCOs) were observed widely distributed throughout the Site in urban fill at the surface to depths of about 6 feet bgs. Additionally, CVOC contamination was identified in groundwater in the

southern/eastern region of Site, specifically, cis-1,2-dichloroethene and vinyl chloride at concentrations exceeding Ambient Water Quality Standards (AWQSs). CVOCs are also present at the Site in soil and soil vapor located above the groundwater table. Tetrachloroethene (PCE) and 1,1,1-trichloroethane were identified in sub-slab soil vapor, with PCE detected above the Air Guidance Value (AGV) in the northern region of the Site. Cis-1,2-dichloroethene was detected above the laboratory detection limit in soil between 4-8 ft bgs in the southern region of the Site. The presence of CVOC contamination in groundwater, coupled with the presence of CVOCs in soil and soil vapor indicates that an on-Site source may exist.

Haley & Aldrich of New York concluded that further delineation may be required to determine the extent of on-Site sources of CVOCs in soil, groundwater and soil vapor and of hazardous lead in soils in the north-central region of the Site.

3. Remedial Investigation

This section describes the field activities to be conducted during the RI and provides the sampling scope, objectives, methods, anticipated number of samples, and sample locations. A summary of the sampling and analysis plan is provided in Table 1 and Figure 2. 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 GPR scan will be performed prior to commencement of any intrusive activities. The GPR scan will potentially identify any underground structures including, but not limited to, utilities and underground storage tanks. It is noted that borings may be adjusted based on the results of the GPR scan and any adjustments to the locations presented below will be communicated with the NYSDEC. The findings report will be provided in the Remedial Investigation Report (RIR).

3.2 SELECTIVE DEMOLITION

The existing structures prohibit the implementation of a comprehensive remedial investigation due to configuration of the interior structural walls, ceilings, and layout of the existing structure on the Site. Prior to commencing the remedial investigation, a complete demolition of above grade structures will be completed as needed to facilitate the implementation of the remedial investigation. Existing foundation slabs will remain in place serving as an engineering control until a remedial action plan is approved and implemented.

3.3 SOIL SAMPLING

To further characterize subsurface soil conditions, additional on-Site soil samples will be collected to meet NYSDEC DER-10 requirements for remedial investigations. The sampling and analysis plan is summarized in Table 1.

A total of six soil borings will be installed to 15 ft bgs by 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.

Soils will be logged continuously by a geologist or engineer using the Modified Burmister Soil Classification System. The presence of staining, odors, and PID response will be noted. Samples will be collected using laboratory-provided clean bottle ware. Volatile organic compound (VOC) grab samples will be collected using terra cores. Sampling methods are described in the Field Sampling Plan (FSP) provided as Appendix B. A Quality Assurance Project Plan (QAPP) is provided as Appendix C. Laboratory data will be reported in Analytical Service Protocol (ASP) Category B deliverable format.

Soil samples representative of Site conditions will be collected at six locations widely distributed across the Site, as shown in the Proposed Sampling Plan provided as Figure 2. Samples will be collected from the shallow soil interval (0 to 2 ft bgs), from the urban fill layer (3 to 5 ft bgs), from the base of the urban fill layer or where fill transitions to native soils, estimated to be approximately (7 to 9 ft bgs), and from

the two-foot interval directly above the groundwater interface. Additional samples will be collected from any interval exhibiting elevated PID readings or where visual and olfactory evidence of impacts are observed. Soil samples will be analyzed for:

- Target Compound List (TCL) VOCs using EPA method 8260B;
- TCL SVOCs using EPA method 8270C;
- Total Analyte List (TAL) Metals using EPA method 6010;
- TCL Pesticides using EPA method 8081B ;
- PCBs using EPA method 8082;
- Mercury using EPA method 7471;
- Total Cyanide using EPA method 9010C/9012B;
- Hexavalent Chromium using EPA method 7196A;
- Per- and polyfluoroalkyl substances (PFAS) using EPA method 1633 and,
- 1,4-dioxane using EPA method 8270 SIM.

Samples to be analyzed for PFAS and 1,4-dioxane will be collected and analyzed in accordance with the “NYSDEC Sampling, Analysis, and Assessment of PFAS Under NYSDEC’s Part 375 Remedial Programs” dated April 2023 and the June 2019 Sampling for “1,4-dioxane and PFAS Under DEC’s Part 375 Remedial Programs,” respectively.

3.4 GROUNDWATER SAMPLING

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

Four two-inch permanent monitoring wells will be installed to approximately 21 ft bgs or to at least 10 feet into the groundwater table. Groundwater was encountered between 11 and 12 ft bgs during the Limited Phase II ESI completed in August 2022. Wells will be installed with 10-feet of screen into the groundwater table (approximately 11 to 21 ft bgs) and groundwater samples will be collected from around 5 feet below groundwater interface (approximately 16 ft bgs). Monitoring wells will have a 2-inch annular space and be installed using either #0 or #00 certified clean sand fill. Monitoring wells will be developed after installation by surging a pump in the well several times to pull fine-grained material from the well. Development will be completed until the water turbidity is 50 nephelometric turbidity units (NTU) or less or ten well volumes are 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. Proposed monitoring well locations are provided in Figure 2.

Monitoring wells will be sampled and analyzed for:

- TCL VOCs using EPA method 8260B;
- TCL SVOCs using EPA method 8270C;
- Total Metals using EPA methods 6010/7471;
- Dissolved Metals using EPA methods 6010/7471;
- TCL Pesticides using EPA method 8081B;
- PCBs using EPA method 8082
- Mercury using EPA method 7470A
- Total Cyanide using EPA method 9010C/9012B
- Hexavalent Chromium using EPA method 7196A
- PFAS using EPA method 1633; and
- 1,4-Dioxane using EPA method 8270 SIM.

Samples to be analyzed for PFAS and 1,4-dioxane will be collected and analyzed in accordance with the “NYSDEC Sampling, Analysis, and Assessment of Per- and PFAS Under NYSDEC’s Part 375 Remedial Programs” dated April 2023 and the June 2019 Sampling for “1,4-dioxane and PFAS Under DEC’s Part 375 Remedial Programs,” respectively.

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.

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

3.5 INVESTIGATION DERIVED WASTE

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

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). Five soil vapor probes will be installed approximately 7 to 8 ft bgs, or at least 2 feet above the groundwater interface. The vapor implants will be installed with a direct-push drilling rig (e.g., Geoprobe®) to advance a stainless-steel probe to the desired sample depth. Sampling will occur for the duration of two hours.

Samples will be collected in appropriately sized Summa® canisters that have been certified clean by the laboratory, and samples will be analyzed by using USEPA Method TO-15. Flow rate for both purging and sampling will not exceed 0.2 L/min. Sampling methods are described in the FSP provided as Appendix B.

3.7 PROPOSED SAMPLING RATIONALE

Haley & Aldrich of New York has proposed the sample plan described herein and as shown in Figure 2, in consideration of the data generated during the previous investigations conducted at the Site. A Limited Phase II ESI completed in August 2022 detected elevated PAH and metals concentrations in soil samples collected throughout the Site as well as elevated CVOC concentrations in groundwater and soil vapor. The sampling map from this Limited Phase II ESA (included in Appendix A) shows data gaps throughout the Site, including a lack of analytical data for potentially high-risk areas that may have been impacted by historical Site operations. In order to properly characterize the Site and identify potential source areas, all phases of media will be comprehensively investigated as part of this RI and data gaps will be evaluated.

In addition, the Limited Phase II ESI detected CVOCs in soil vapor at concentrations indicating a potential on-Site source which has not been identified to date. These findings require additional investigation to ascertain and delineate on-Site source(s).

The Proposed Sample Location Map (included as Figure 2) 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. Quality Assurance and Quality Control

Quality Assurance/Quality Control (QA/QC) procedures will be used to provide performance information with regard to 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) 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 C. Minimum reporting limits for analytical methods are provided in Table 2.

5. Data Use

5.1 DATA SUBMITTAL

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

5.2 DATA VALIDATION

Data packages will be sent to a qualified data validation specialist for evaluation of 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 Analytical Service Protocol (ASP). DUSRs will summarize and confirm usability of the data for project-related decisions. Data validation will be completed in accordance with the DUSR guidelines from the NYSDEC Division of Environmental Remediation. DUSRs will be included with the submittal of a RIR, further discussed in Section 8.

6. Project Organization

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

The NYSDEC Case Manager, Sadique Ahmed, will be responsible for confirming the work is completed in accordance with 6 NYCRR Part 375 and DER-10 on behalf of NYSDEC.

The NYSDOH Case Manager, Megan Rivera, will be responsible for confirming the work is completed in accordance with 6 NYCRR Part 375 and DER-10 on behalf of NYSDOH.

James Bellew will be the Principal in Charge for this work. In this role, Mr. Bellew 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.

James Bellew will be the Qualified Environmental Professional (QEP) for this work. In this role, Mr. Bellew 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.

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

PJ DiNardo will be the field personnel responsible for implementing the field effort for this work. Mr. DiNardo'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, Corp. and will provide environmental drilling and geophysical services to implement the scope of work outlined in this RIWP.

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

7. Health and Safety

7.1 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 E. The HASP includes a description of health and safety protocols to be followed by Haley & Aldrich of New York field staff during implementation of the RIWP, including monitoring within the work area, along with response actions should impacts be observed. The HASP has been developed in accordance with Occupational Health and Safety Administration (OSHA) 40 CFR Part 1910.120 regulatory requirements for use by Haley & Aldrich of New York field staff that will work at the Site during planned activities. Contractors or other personnel who perform work at the Site are required to develop their own health and safety plan 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 general industry as applicable based on the nature of work being performed.

7.2 COMMUNITY AIR MONITORING PLAN

The proposed investigation work will be completed both indoors and outdoors at the Site. Where intrusive drilling operations are planned, community air monitoring will be implemented to protect the downwind receptors. A Haley & Aldrich of New York representative will conduct continuous monitoring for volatile organic compounds and particulates both upwind and downwind of the work zone during ground intrusive work for protection of the surrounding community. The air in the work zone also will be monitored for visible dust generation.

If VOC measurements above 5 ppm or dust measurements above 0.15 mg/m^3 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 Community Air Monitoring Plan (CAMP). CAMP data will be provided to NYSDEC in the daily reports, further detailed in Section 8. The NYSDOH CAMP guidance document is included as Appendix F.

8. Reporting

8.1 DAILY REPORTING

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

8.2 REMEDIAL INVESTIGATION REPORT

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

- Summary of the RI activities;
- Figure showing sampling locations;
- Tables summarizing laboratory analytical results;
- Laboratory analytical data reports;
- Field sampling data sheets;
- Community Air Monitoring data;
- Findings regarding the nature and extent of contamination at the Site;
- Qualitative exposure assessment of any contamination from an on-Site source that has migrated offsite; and
- Conclusions and recommendations.

The RIR and the Remedial Action Work Plan (RAWP) will be submitted as separate documents. The RIR and RAWP will include all data collected during the RI and adhere to technical requirements of DER-10.

9. Schedule

The Site owner plans to implement this RIWP promptly upon execution of a Brownfield Cleanup Agreement and after approval of the RIWP.

Anticipated RI Schedule	
BCP Application & RIWP and 30-Day Public Comment Period (concurrent with BCP application)	8 February 2023 – 10 March 2023
Executed Brownfield Cleanup Agreement	29 July 2024
NYSDEC Approval of RIWP	January 2025
RI Implementation	January 2025 – February 2025
RIR/RAWP Submittal and 45-Day Public Comment Period	March 2025 / April 2025
NYSDEC Approval of RIR/RAWP	June 2025 / July 2025

References

1. Brownfield Cleanup Program Application. 374 Wallabout Street, Brooklyn, New York. Prepared for Joel Fried by Haley & Aldrich of New York for submission to the New York State Department of Environmental Conservation. Submitted in September 2022.
2. Phase I Environmental Site Assessment – 374 Wallabout Street, Brooklyn, New York. Prepared by Haley & Aldrich of New York. August 2022.
3. Limited Phase II Environmental Site Investigation Report. 374 Wallabout Street, Brooklyn, New York. Prepared by Haley & Aldrich of New York. August 2022.
4. Program Policy DER-10, “Technical Guidance for Site Investigation and Remediation,” New York State Department of Environmental Conservation. May 2010.
5. New York State Department of Environmental Conservation, Division of Environmental Remediation, Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC’s Part 375 Remedial Programs. April 2023.

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TABLES

Table 1. Sample and Analysis Plan
374 Wallabout 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)	Mercury (7471/7470A)	Total Cyanide (9010C/9012B)	Hexavalent Chromium (7196A)	PFAS (1633)	1,4-Dioxane (8270 SIM)	VOCs (TO-15)
SOIL													
SB01	Shallow Urban Fill	0'-2'	X	X	X	X	X	X	X	X	X	X	
	Urban Fill	3'-5'	X	X	X	X	X	X	X	X	X	X	
	Bottom of Urbal Fill	7'-9'	X	X	X	X	X	X	X	X	X	X	
	2' interval above groundwater interface	TBD	X	X	X	X	X	X	X	X	X	X	
SB02	Shallow Urban Fill	0'-2'	X	X	X	X	X	X	X	X	X	X	
	Urban Fill	3'-5'	X	X	X	X	X	X	X	X	X	X	
	Bottom of Urbal Fill	7'-9'	X	X	X	X	X	X	X	X	X	X	
	2' interval above groundwater interface	TBD	X	X	X	X	X	X	X	X	X	X	
SB03	Shallow Urban Fill	0'-2'	X	X	X	X	X	X	X	X	X	X	
	Urban Fill	3'-5'	X	X	X	X	X	X	X	X	X	X	
	Bottom of Urbal Fill	7'-9'	X	X	X	X	X	X	X	X	X	X	
	2' interval above groundwater interface	TBD	X	X	X	X	X	X	X	X	X	X	
SB04	Shallow Urban Fill	0'-2'	X	X	X	X	X	X	X	X	X	X	
	Urban Fill	3'-5'	X	X	X	X	X	X	X	X	X	X	
	Bottom of Urbal Fill	7'-9'	X	X	X	X	X	X	X	X	X	X	
	2' interval above groundwater interface	TBD	X	X	X	X	X	X	X	X	X	X	
SB05	Shallow Urban Fill	0'-2'	X	X	X	X	X	X	X	X	X	X	
	Urban Fill	3'-5'	X	X	X	X	X	X	X	X	X	X	
	Bottom of Urbal Fill	7'-9'	X	X	X	X	X	X	X	X	X	X	
	2' interval above groundwater interface	TBD	X	X	X	X	X	X	X	X	X	X	
SB06	Shallow Urban Fill	0'-2'	X	X	X	X	X	X	X	X	X	X	
	Urban Fill	3'-5'	X	X	X	X	X	X	X	X	X	X	
	Bottom of Urbal Fill	7'-9'	X	X	X	X	X	X	X	X	X	X	
	2' interval above groundwater interface	TBD	X	X	X	X	X	X	X	X	X	X	
GROUNDWATER													
MW01	Groundwater	5' below groundwater interface	X	X	X	X	X	X	X	X	X	X	
MW02			X	X	X	X	X	X	X	X	X		
MW03			X	X	X	X	X	X	X	X	X		
MW04			X	X	X	X	X	X	X	X	X		
SOIL VAPOR													
SV01	Soil Vapor	7'-8' (and atleast 2' above groundwater interface)											X
SV02													X
SV03													X
SV04													X
SV05													X
QA/QC SAMPLES													
DUP01_DATE	Duplicate Soil (1)	--	X	X	X	X	X	X	X	X	X	X	
DUP02_DATE	Duplicate Soil (2)	--	X	X	X	X	X	X	X	X	X	X	
DUP01_DATE	Duplicate Groundwater (1)	--	X	X	X	X	X	X	X	X	X	X	
MSMSD01_DATE	MS/MSD Soil (1)	--	X	X	X	X	X	X	X	X	X	X	
MSMSD02_DATE	MS/MSD Soil (2)	--	X	X	X	X	X	X	X	X	X	X	
MSMSD01_DATE	MS/MSD Groundwater (1)	--	X	X	X	X	X	X	X	X	X	X	
FB_DATE	Field Blank	--	X	X	X	X	X	X	X	X	X	X	
TB_DATE	Trip Blank	--	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



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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.



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Page: 2

**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.



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Page: 1

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			

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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	

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 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			

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

[illegible]

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 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	2.002	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			

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

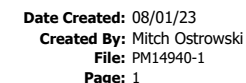
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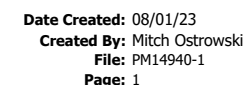
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Holding Time: 365 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

[illegible]

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

[illegible]

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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			

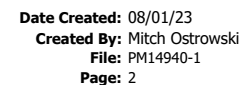
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Holding Time: 7 days
Container/Sample Preservation: 2 - Amber 120ml unpreserved
vvvvvvv

[illegible]

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File: PM14940-1
Page: 1

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

[illegible]

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File: PM14940-1
Page: 1

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

[illegible]

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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

[illegible]

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
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Page: 1

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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			

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Page: 2

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 (PFTriDA)	72629-94-8	1.6	0.6	ng/l	40-150	30	40-150	30	30			
Perfluorotridecanoic Acid (PFTriDA)	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]-P-	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]-P-	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 (11C-	763051-92-9	6.4	1.32	ng/l	40-150	30	40-150	30	30			
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11C-	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 (MSPFPEA)	NONE										20-150	
Perfluoro[13C5]Pentanoic Acid (MSPFPEA)	NONE										20-150	

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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 (M2-13C2)	NONE									20-150		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-13C2)	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 (M2-13C2)	NONE									20-150		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-13C2)	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 (M2-13C2)	NONE									20-150		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-13C2)	NONE									20-150		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSA)	NONE									20-150		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSA)	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 (d3-NMeFOSA)	NONE									20-150		
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSA)	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-propanesulfonic Acid (M7-PFOSA)	NONE									20-150		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-1-propanesulfonic Acid (M7-PFOSA)	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-octanoic Acid (M7-PFOSA)	1265205-95-5									20-150		
2-(N-Methyl-d3-Perfluoro-1-Octanesulfonamido)ethan-d4-octanoic Acid (M7-PFOSA)	1265205-95-5									20-150		

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Page: 4

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

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

[illegible]

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
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 Page: 1

**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		
1,1,1-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			
Benzoethiophene	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			

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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	GCDAl06	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			

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Page: 3

**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	

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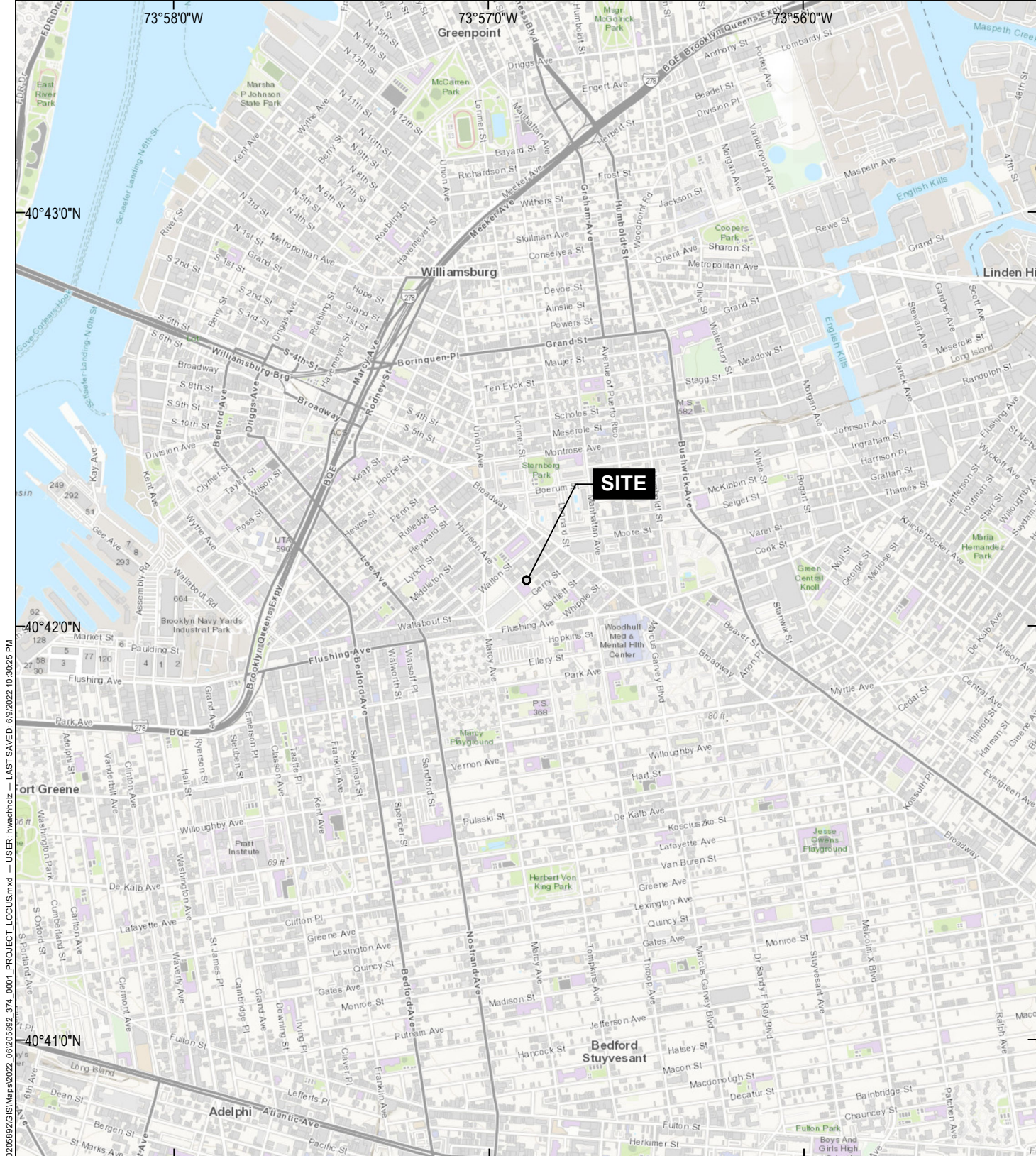


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FIGURES



GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0205692\GIS\Maps\022_06\0205692_374_0001_PROJECT_LOCUS.mxd — USER: hwaldrich — LAST SAVED: 6/9/2022 10:30:25 PM



MAP SOURCE: ESRI
SITE COORDINATES: 73°56'52\"/>

**HALEY
ALDRICH**

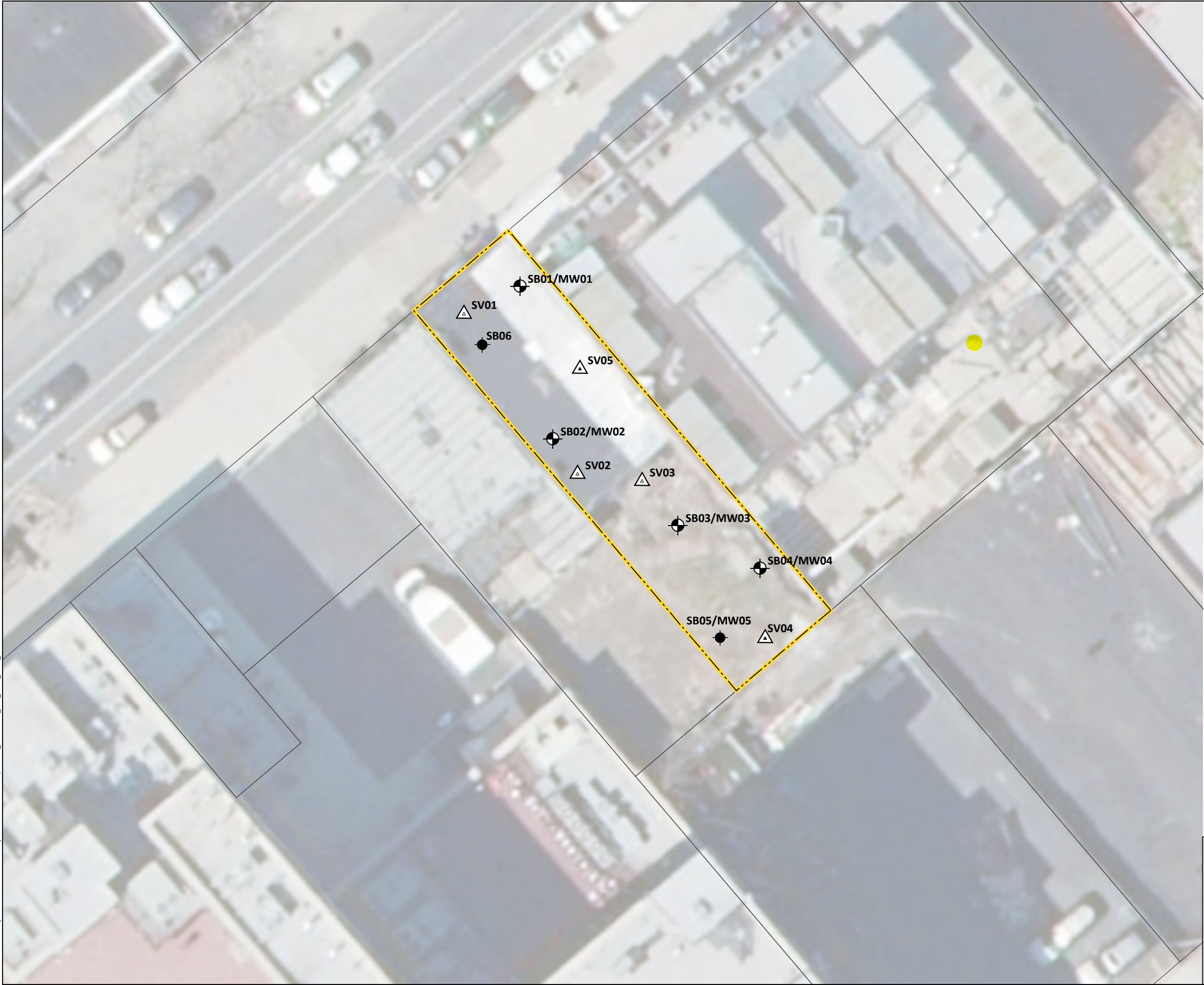
374 WALLABOUT STREET
BROOKLYN, NEW YORK

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 F
OCTOBER 2022

FIGURE 1

FILE PATH: \\haleyaldrich.com\share\CF\Project\0205892\GIS\Maps\2022_06\205892_374_0002_SITE_PLAN.mxd — USER: hwacholz — LAST SAVED: 9/13/2022 12:31:11 PM



LEGEND

-  SITE BOUNDARY
-  PARCEL BOUNDARY
-  PROPOSED SOIL BORING
-  PROPOSED SOIL BORING / MONITORING WELL
-  PROPOSED SOIL VAPOR POINT

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ASSESSOR PARCEL DATA SOURCE: NYC DEPARTMENT OF CITY PLANNING
3. AERIAL IMAGERY SOURCE: ESRI



0 20 40
SCALE IN FEET

HALEY
ALDRICH

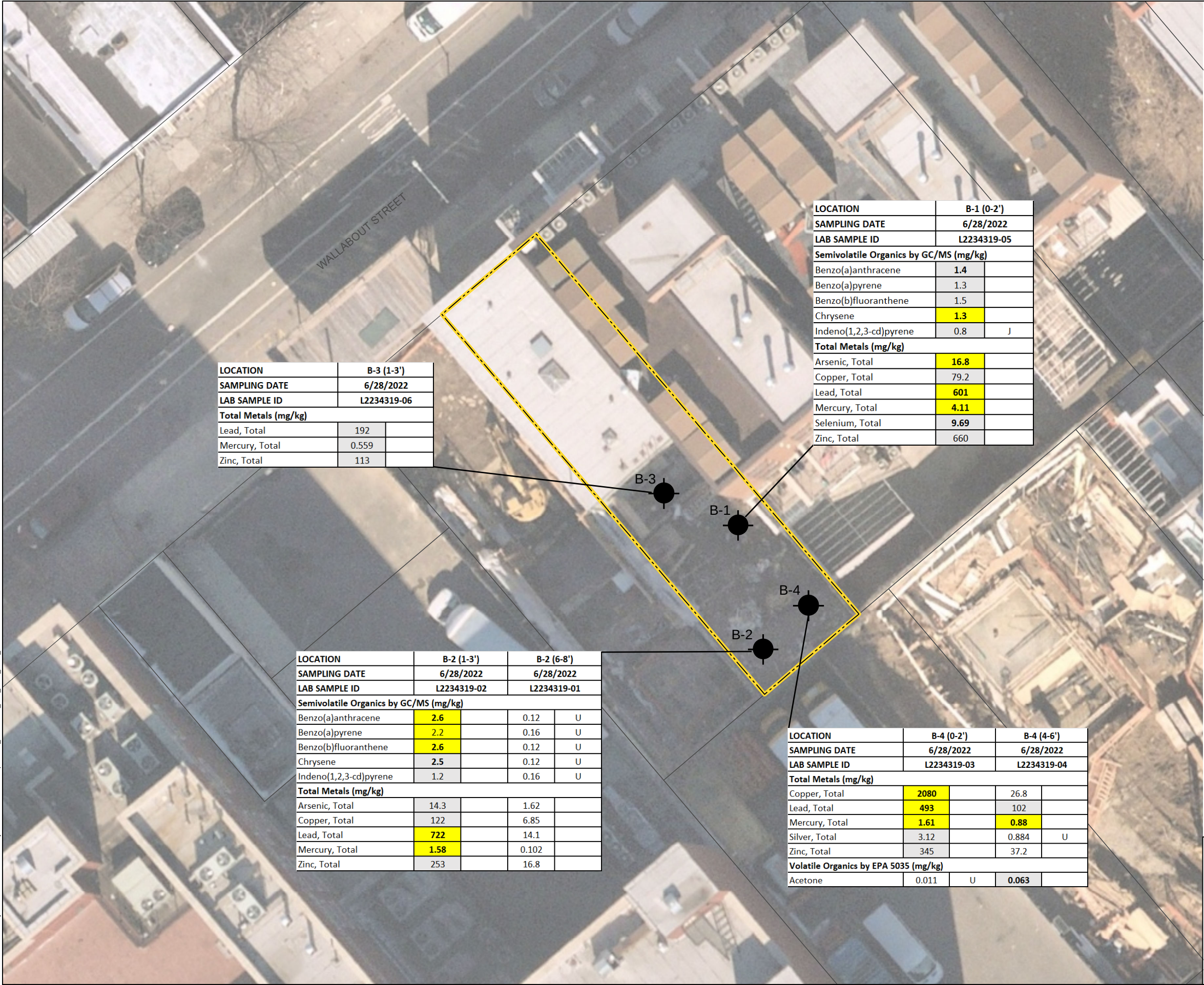
374 WALLABOUT STREET
BROOKLYN, NEW YORK

PROPOSED SAMPLE LOCATION PLAN

DECEMBER 2024

FIGURE 2

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0205592\GIS\Maps\2022_06\205592_374_0002_SITE_PLAN.mxd — USER: hwachholz — LAST SAVED: 6/9/2022 10:50:56 PM



LEGEND

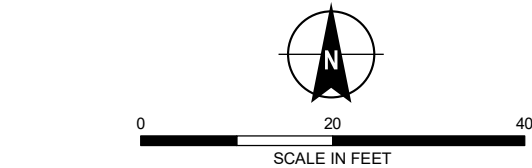
SITE BOUNDARY

PARCEL BOUNDARY

SOIL BORING LOCATION

New York NYCRR Part 375 New York Restricted and Unrestricted Use Criteria Criteria per 6 NYCRR Part 375 Environmental Remediation Programs, effective December 14, 2006.				
Analyte	NY-RESGW	NY-RESRR	NY-UNRES	Units
Semivolatile Organics by GC/MS				
Benzo(a)anthracene	1	1	1	mg/kg
Benzo(a)pyrene	22	1	1	mg/kg
Benzo(b)fluoranthene	1.7	1	1	mg/kg
Chrysene	1	3.9	1	mg/kg
Indeno(1,2,3-cd)pyrene	8.2	0.5	0.5	mg/kg
Total Metals				
Arsenic, Total	16	16	13	mg/kg
Copper, Total	1720	270	50	mg/kg
Lead, Total	450	400	63	mg/kg
Mercury, Total	0.73	0.81	0.18	mg/kg
Selenium, Total	4	180	3.9	mg/kg
Silver, Total	8.3	180	2	mg/kg
Zinc, Total	2480	10000	109	mg/kg
Volatile Organics by EPA 5035				
Acetone	0.05	100	0.05	mg/kg

- NOTES**
1. ALL LOCATIONS ARE APPROXIMATE AND BASED ON FIELD MEASUREMENTS.
 2. ASSESSOR PARCEL DATA SOURCE: NYC DEPARTMENT OF CITY PLANNING.
 3. AERIAL IMAGERY SOURCE: NEARMAP, 27 FEBRUARY 2022
 4. 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 (SCO) (NY-UNRES), THE RESTRICTED-USE RESIDENTIAL SCO, PROTECTION OF GROUNDWATER SCOS AND 40 CFR 261 SUBPART C AND TABLE 1 OF 40 CFR 261.24.
 5. NY-PGW = NYSDEC PART 375 PROTECTION OF GROUNDWATER SCO
 6. NY-RESRR = NYSDEC PART 375 RESTRICTED-USE RESIDENTIAL SCO
 7. NY-UNRES = NYSDEC PART 375 UNRESTRICTED USE SCO
 8. EXCEEDANCES OF THE NY-UNRES SCOS ARE SHADED GRAY
 9. EXCEEDANCES OF THE NY-UNRES AND NY-RESRR ARE SHADED YELLOW
 10. EXCEEDANCES OF THE NY-RESGW ARE BOLD
 11. RESULTS ARE DISPLAYED IN MILLIGRAMS PER KILOGRAM (mg/kg)



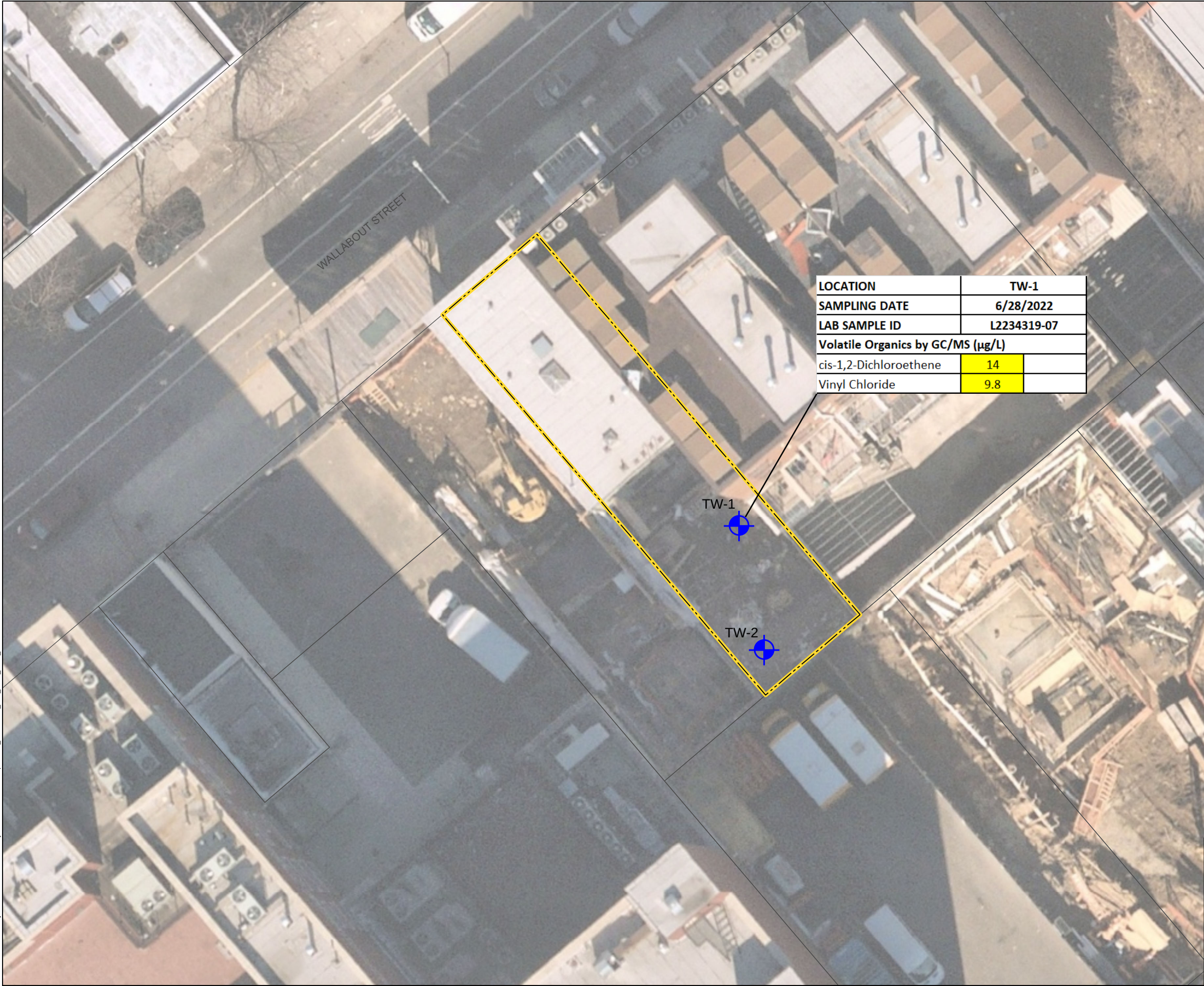
HALEY ALDRICH 374 WALLABOUT STREET
BROOKLYN, NEW YORK

SUMMARY OF HISTORICAL
SOIL ANALYTICAL DATA

OCTOBER 2022

FIGURE 3

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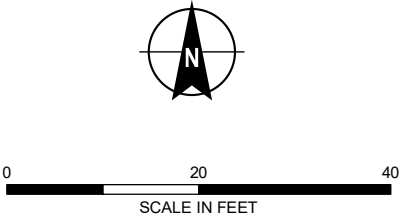


LOCATION	TW-1	
SAMPLING DATE	6/28/2022	
LAB SAMPLE ID	L2234319-07	
Volatile Organics by GC/MS (µg/L)		
cis-1,2-Dichloroethene	14	
Vinyl Chloride	9.8	

- LEGEND**
- SITE BOUNDARY
 - PARCEL BOUNDARY
 - TEMPORARY WELL POINT LOCATION

Ambient Water Quality Standards (New York State Groundwater Effluent Limitations for Class GA Groundwater)		
Analytes	AWQS	Unit
cis-1,2-Dichloroethene	5	µg/L
Vinyl Chloride	2	µg/L

- NOTES**
- ALL LOCATIONS ARE APPROXIMATE AND BASED ON FIELD MEASUREMENTS.
 - ASSESSOR PARCEL DATA SOURCE: NYC DEPARTMENT OF CITY PLANNING.
 - AERIAL IMAGERY SOURCE: NEARMAP, 27 FEBRUARY 2022
 - GROUNDWATER ANALYTICAL RESULTS COMPARED TO NYSDEC TECHNICAL AND OPERATIONAL GUIDANCE SERIES (TOGS) 1.1.1 AMBIENT WATER QUALITY STANDARDS (AWQS).
 - EXCEEDANCES OF NYSDEC AWQS ARE SHADED YELLOW.
 - RESULTS ARE DISPLAYED IN MICROGRAMS PER LITER (µg/L).



**HALEY
ALDRICH**

374 WALLABOUT STREET
BROOKLYN, NEW YORK

SUMMARY OF HISTORICAL
GROUNDWATER ANALYTICAL DATA

OCTOBER 2022

FIGURE 4

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LOCATION	SS-1	
SAMPLING DATE	6/28/2022	
LAB SAMPLE ID	L2234400-01	
Volatile Organics in Air (µg/m³)		
1,1,1,-Trichloroethane	6.93	
Tetrachloroethene	33.3	
Total VOCs	113.95	
Total BTEX	14.23	
Total CVOCs	40.23	

SS-1

SS-2

LOCATION	SS-2	
SAMPLING DATE	6/28/2022	
LAB SAMPLE ID	L2234400-02	
Volatile Organics in Air (µg/m³)		
Tetrachloroethene	2.39	
Total VOCs	122.735	
Total BTEX	29.298	
Total CVOCs	2.39	

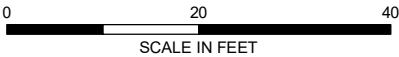
LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- SUB SLAB SOIL VAPOR (SS) SAMPLE LOCATION

New York DOH Air Guidance Values Concentrations Criteria per Guidance for Evaluating Soil Vapor Intrusion, October 2006, and updated May 2017.		
Volatile Organics in Air	NYSDOH AGVs	Units
1,1,1-Trichloroethane	~	~
Tetrachloroethene	2	µg/m³

NOTES

1. ALL LOCATIONS ARE APPROXIMATE AND BASED ON FIELD MEASUREMENTS.
2. ASSESSOR PARCEL DATA SOURCE: NYC DEPARTMENT OF CITY PLANNING.
3. AERIAL IMAGERY SOURCE: NEARMAP, 27 FEBRUARY 2022
4. RESULTS ARE DISPLAYED IN MICROGRAMS PER CUBIC METER (µg/m3)
5. NYSDOH AGV: NEW YORK DOH AIR GUIDANCE VALUES CONCENTRATIONS CRITERIA PER GUIDANCE FOR EVALUATING SOIL VAPOR INTRUSION, OCTOBER 2006, AND UPDATED MAY 2017. EXCEEDANCES OF AGVS ARE BOLDED AND UNDERLINED.
6. EXCEEDANCES OF NYSDOH AGVS ARE SHADED YELLOW



HALEY
ALDRICH

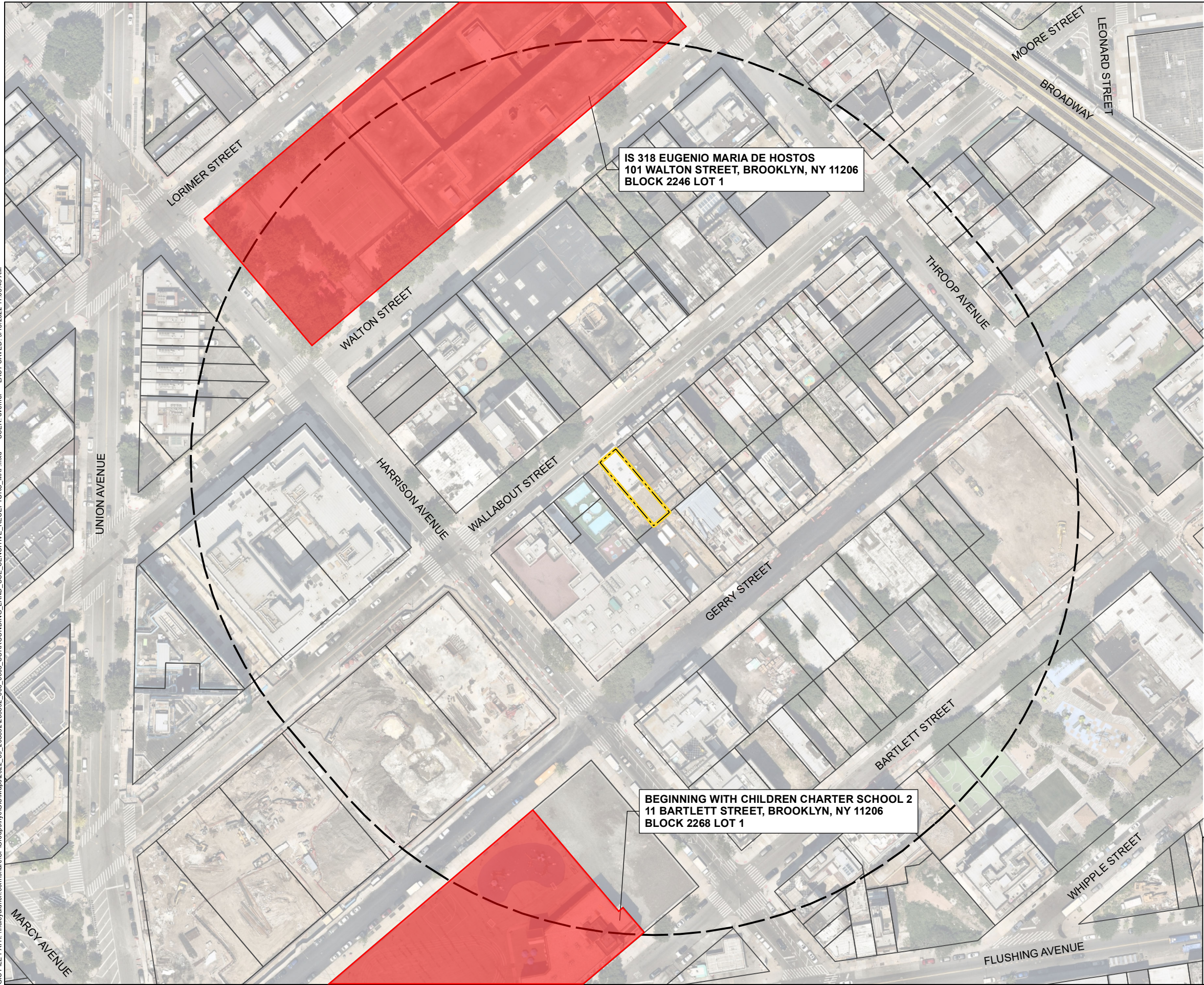
374 WALLABOUT STREET
BROOKLYN, NEW YORK

SUMMARY OF HISTORICAL SOIL
VAPOR ANALYTICAL DATA

OCTOBER 2022

FIGURE 5

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LEGEND

- 500-FT SITE BOUNDARY BUFFER
- PARCEL BOUNDARY
- SITE BOUNDARY
- SENSITIVE RECEPTOR

NOTES

- ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
- FT = FEET
- ASSESSOR PARCEL DATA SOURCE: NYC DEPARTMENT OF CITY PLANNING
- AERIAL IMAGERY SOURCE: NEARMAP, 19 JULY 2022



0 120 240
SCALE IN FEET

HALEY
ALDRICH

374 WALLABOUT STREET
BROOKLYN, NEW YORK

SURROUNDING SENSITIVE
RECEPTOR MAP

OCTOBER 2022

FIGURE 6

APPENDIX A
Previous Reports
(provided as separate files)

APPENDIX B

Field Sampling Plan

FIELD SAMPLING PLAN
374 WALLABOUT STREET
BROOKLYN, NEW YORK

by
Haley & Aldrich of New York
New York, New York

for
Joel Fried
374 Wallabout Street
Brooklyn, New York 11206

File No. 0205892
December 2024

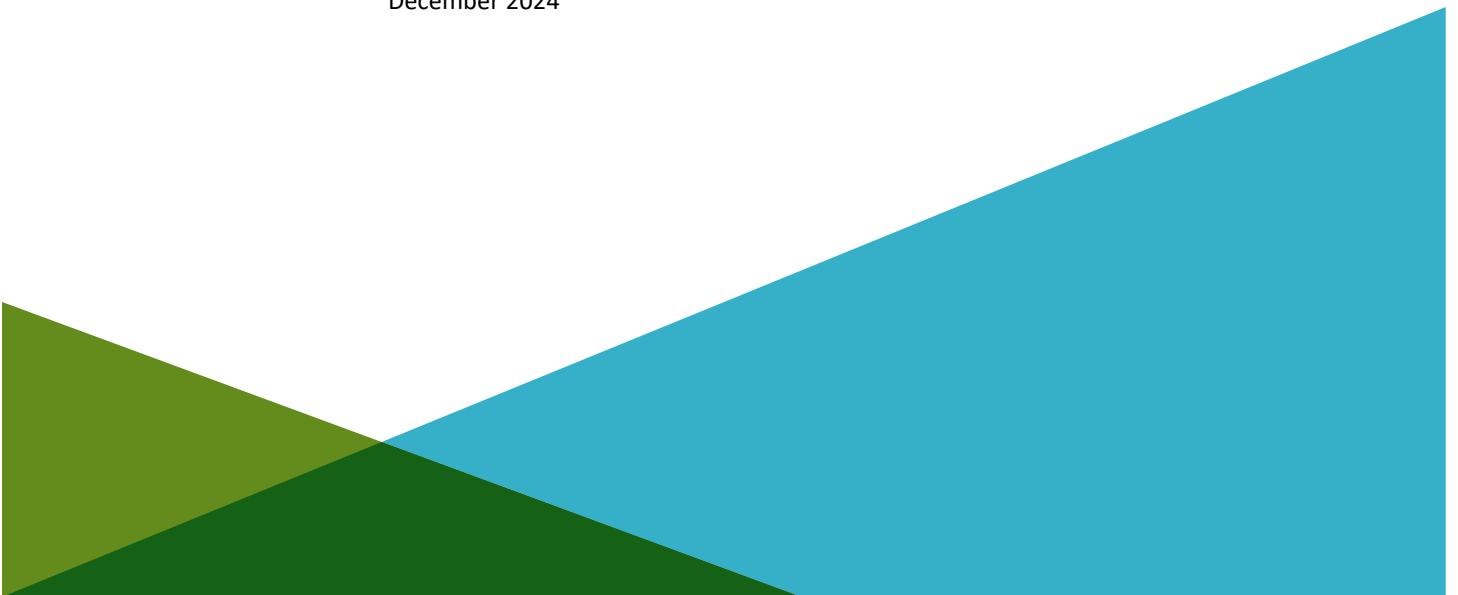


Table of Contents	Page
1. Introduction	1
2. Field Program	2
3. Utility Clearance	3
4. Field Data Recording	6
4.1 WRITTEN FIELD DATA	6
4.2 ELECTRONIC DATA	7
5. Aquifer Characterization	9
5.1 PROCEDURE	9
6. Sample Collection for Laboratory Analysis	10
6.1 SOIL SAMPLE COLLECTION FOR LABORATORY ANALYSIS	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	17
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	19
6.4.5 Chain-of-Custody Records	20
6.4.6 Shipment	20
7. Field Instruments – Use and Calibration	21
7.1 GENERAL PROCEDURE DISCUSSION	21
7.2 DECONTAMINATION OF MONITORING EQUIPMENT	22
7.3 DISPOSAL OF WASH SOLUTIONS AND CONTAMINATED EQUIPMENT	22
8. Investigation Derived Waste Disposal	23

Table of Contents	Page
8.1 RATIONALE/ASSUMPTIONS	23
8.2 PROCEDURE	23
References	xxvi

APPENDIX 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 subject Site located at 374 Wallabout Street in Brooklyn, New York. This document was prepared to establish field procedures for field data collection to be performed in support of the RIWP for the Site.

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

The standard operating procedures (SOP) included as components of this plan will provide the procedures necessary to meet the project objectives. The SOPs will be used as reference for the methods to be employed for field sample collection and handling and the management of field data collected in the execution of the approved RIWP. The SOPs include numerous methods to execute the tasks of the RIWP. The Project Manager will select the appropriate method as required by field conditions and/or the objective 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's Part 375 Remedial Programs" dated April 2023.

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 and indoor air/ ambient air sampling; and,
- Sampling of investigation of derived wastes (IDW) as needed for disposal.

A Limited Phase II Environmental Site Investigation (ESI) was performed at the Site in August 2022 to investigate the anticipated contaminants of concern identified based on the Site's current and former uses. The Limited Phase II ESI partially determined the nature and extent of semi-volatile organic compounds (SVOCs) and metals in soil and chlorinated volatile organic compounds (CVOCs) in groundwater; the investigation also identified the presence of CVOCs in soil vapor. The site characterization did not identify a source of contamination on the Site, therefore additional targeted soil, groundwater, and soil vapor sampling is proposed.

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

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

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

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

Using the information obtained, the site should be viewed in detail for physical evidence of buried lines or structures, including pavement cuts and patches, variation in or lack of vegetation, variations in grading, etc. Care must also be taken to avoid overhead utilities 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 ft of clearance between equipment and energized wires. Such separation requirements may also be voltage-based and may vary depending on state or municipality regulations. In evaluating clearance from overhead lines, the same restrictions may apply to “drops”, or wires on a utility pole connecting overhead and underground lines.

Using the information obtained and observations made, proposed exploration or construction locations should be marked in the field. Marking locations can be accomplished using spray paint on the ground, stakes, or other means. All markings of proposed locations should be made in white, in accordance with the generally accepted universal color code for facilities identification (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

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

Obtaining the utility clearance generally involves the designated “One-Call” underground facilities protection organization for the area and the landowner and one or both following 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 judgement when faced with uncertainty.

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

Most utility stakeouts have a limited time period for which they remain valid, typically two to three weeks. It is critical that this time period be considered to prevent expiration of clearance prior to completion of the invasive activities, and the need to repeat the 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 four to five feet in the event the clearance has failed to identify an existing facility. This may necessitate hand-excavation or probing to confirm 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 four 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 four to five 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% 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 (DMP), 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 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. In order to minimize the potential for loss of data, access and downloading of data should be performed frequently enough to ensure the data storage capacity of the remote equipment is not exceeded.

Equipment/Materials:

- Appropriate field log forms, or iPad® or equivalent with preformatted log forms.
- Indelible ball point pen (do not use “rollerball” or felt-tip style pens);
- Straight edge;

- Pocket calculator; 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

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

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

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 ft. 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% (0.01 feet for a 100-foot cable). See also the Field Instruments – Use and Calibration Procedure.
- Groundwater Level Monitoring Report form.

6. Sample Collection for Laboratory Analysis

6.1 SOIL SAMPLE COLLECTION FOR LABORATORY ANALYSIS

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

6.1.1 Preparatory Requirements

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

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 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 head space 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 PFAS, acceptable materials for sampling include stainless steel, high density polyethylene (HDPE), 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 "Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC Part 375 Remedial Programs" dated April 2023 and the June 2019 Sampling for "1,4-dioxane and PFAS Under DEC's Part 375 Remedial Programs," respectively.

6.1.4.1 Grab Versus Composite Samples

A grab sample is collected to identify and quantify conditions at a specific location or interval. The sample is comprised of the minimum amount of soil necessary to make up the volume of 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 for collection of groundwater samples.

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 PPE accordingly.
- Prior to commencing the groundwater purging/sampling, a water level must be obtained to determine the well volume for hydraulic purposes. In some settings, it may be necessary to allow the water level time to equilibrate. This condition exists if a watertight seal exists at the well cap and the water level has fluctuated above the top of screen; creating a vacuum or pressurized area in this air space. Three water level checks will verify 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 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 (NTU) or when 10 well volumes have been removed.
- All water generated during cleaning and development procedures will be collected and contained on site in 55-gallon drums for future analysis and appropriate disposal.

Equipment:

- Appropriate health and safety equipment
- Knife

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

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

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

- Slowly lower the pump, safety cable, tubing and electrical lines into the well to the depth specified by the project requirements. The pump intake must be at the midpoint of the well screen to prevent disturbance and resuspension of any sediment in the screen base.
- Before starting the pump, measure the water level again with the pump in the well leaving the water level measuring device in the well when completed.
- Purge the well at 100 to a maximum of 500 milliliters per minute (mL/min). During purging, the water level should be monitored approximately every 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) reaction potential (ORP), dissolved oxygen (DO), and turbidity) approximately every five minutes. Stabilization is considered to be achieved when the final groundwater flow rate is achieved, and three consecutive readings for each parameter are within the following limits:
 - pH: 0.1 pH units of the average value of the three readings;
 - Temperature: 3 percent of the average value of the three readings;
 - Conductivity: 0.005 milliSiemen per centimeter (mS/cm) of the average value of the three readings for conductivity <1 mS/cm and 0.01 mS/cm of the average value of the three readings for conductivity >1 mS/cm;
 - ORP: 10 millivolts (mV) 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 nephelometric turbidity units (NTU).
- The pump must not be removed from the well between purging and sampling.

6.2.4 Sampling Techniques

- If an alternate pump is utilized, the first pump discharge volumes should be discarded to allow the equipment a period of acclimation to the groundwater.
- Samples are collected directly from the pump with the groundwater being discharged directly into the appropriate sample container. Avoid handling the interior of the bottle or bottle cap and don new gloves for each well sampled to avoid contamination of the sample.
- Order of sample collection:
 - Polyfluoroalkyl substances (PFAS)
 - Volatile organic compounds (VOC)
 - 1,4-Dioxane
 - Semi-volatile organic compounds (SVOC)
 - Total Analyte List (TAL) metals
 - PCBs, pesticides, and herbicides
- No sampling equipment components or sample containers should come in contact with aluminum foil, low density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including 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 the final container 40 mL glass vials completely full and topped with a Teflon cap. Once capped the vial must be inverted and tapped to check for headspace/air presence (bubbles). If air is present, the sample will be discarded, and recollected until free of air.

- Groundwater sampling for PFAS will be performed in accordance with NYSDEC “Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC Part 375 Remedial Programs” dated April 2023 and the June 2019 Sampling for “1,4-dioxane and PFAS Under DEC’s Part 375 Remedial Programs,” respectively.
- All samples must be labeled with:
 - A unique sample number
 - Date and time
 - Parameters to be analyzed
 - Project Reference ID
 - Samplers initials
- Labels should be written in indelible ink and secured to the bottle with clear tape.

Equipment/Materials:

- pH meter, conductivity meter, DO meter, ORP meter, nephelometer, temperature gauge

- Field filtration units (if required)
- Purging/sampling equipment
 - Peristaltic Pump
- Water level probe
- Sampling materials (containers, log book/forms, coolers, chain of custody)
- Work Plan
- Health and Safety Plan
- 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 D 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 ball or bladder pump (identified as PFAS-free) with HDPE tubing.

Field Notes:

- Field notes must document all the events, equipment used, and measurements collected during the sampling activities. Section 2.0 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 Facility operated facilities
 - Direct discharge to the surrounding ground surface, allowing groundwater infiltration to the underlying subsurface regime
- Decontamination fluids should be segregated and collected separately from wash waters/groundwater containers.

6.3 SOIL VAPOR SAMPLING

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

6.3.1 Preparatory Requirements

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

6.3.2 Sampling Techniques

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

6.4 SAMPLE HANDLING AND SHIPPING

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

All sample submissions must be accompanied with a chain of custody (COC) document to record sample collection and submission. Personnel performing sampling tasks must check the sample preparation and preservation requirements to ensure compliance with the Quality Assurance Project Plan.

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°C, 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 "zip lock" bag which can then be labeled.

All sample names will be as follows:

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

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

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

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

6.4.3 Field Code

The field code will be written in the 'Comments' field on the chain of custody for EVERY sample but will not be a part of the actual sample name. Enter the one/two-character code for 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 "Zip Lock" bags.
- Double check to ensure trip and temperature blanks have been included for all shipments containing VOCs, or where otherwise specified in the QAPP.
- Enclose the Chain of Custody form in a "Zip Lock" bag.
- Ensure custody seals (two, minimum) are placed on each cooler. Coolers with hinged lids should have both seals placed on the opening edge of the lid. Coolers with "free" lids should have seals placed on opposite diagonal corners of the lid. Place clear tape over custody seals.

- Containers should be wiped clean of all debris/water using paper towels (paper towels must be disposed of with other contaminated materials).
- Clear, wide packing tape should be placed over the sample label for protection.
- Do not bulk pack. Each sample must be individually padded.
- Large glass containers (1 liter and up) require much more space between containers.
- Ice is not a packing material due to the reduction in volume when it melts.

Note: Never store sterile sample containers in enclosures containing equipment 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 (COC) forms will be completed for all samples collected. The form documents the transfer of sample containers. The COC 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 COC document will be signed and dated by the sampler when transferring the samples.

Each sample cooler being shipped to the laboratory will contain a COC 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 COCs:

- COCs used should be a Haley & Aldrich standard form or supplied by the analytical laboratory.
- COCs must be completed in black ball point ink only.
- COCs 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 COC in the Comment Section. Do not enclose separate instructions.
- Include a contact name and phone number on the COC in case there is a problem with the shipment.
- Before using an acronym on a COC, define clearly the full interpretation of your designation [i.e., polychlorinated biphenyls (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 (XRF) 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 DOT-approved plastic or metal drums, appropriate for offsite 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 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, test pit soils), rock core or rock flour (from coring, reaming operations), groundwater (from well development, purging and sampling activities), decontamination fluids, personal protective equipment (PPE), and disposal equipment (DE).

8.2 PROCEDURE

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

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

label: date of filling/generation, Site name, source of soils (i.e., borehole or well), and contact.

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

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

- Containment may be performed in 55-gallon drums, tanks suitable for temporary storage (i.e., Nalgene tanks 500 to 1,000 gallons) or if large volumes of groundwater are anticipated, tanker trailer (5,000 to 10,000 gallons $\pm$), or drilling "Frac" tanks may be utilized (20,000 gallons $\pm$). 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 accordingly.

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

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

- Immediately disposed of within on-Site dumpster/municipal trash; or
- If known to be contaminated with RCRA hazardous waste, dispose off-Site at 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/DE – 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.

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7. ASTM D5979: Guide for Conceptualization and Characterization of Groundwater Systems
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24. USEPA (1988), Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER-9950.1.
25. USEPA RCRA - Guidance and Policies: Management of Remediation Waste Under RCRA (October 1998).
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29. USEPA: RCRA Groundwater Monitoring: Draft Technical guidance (EPA/530 R 93 001)
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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.

[illegible]**Other Comments:**

Location:

Well ID: _____

Date: _____

Start Time: _____

Finished Time: _____

Initial Depth to Water: _____ Purging Device: _____

Well Depth: _____ Tubing present in well? _____

Depth to top of screen: _____ Tubing type: _____

Depth to bottom of screen: _____

Depth of Pump Intake: _____

[illegible]

Comments:



Page of

H&A FILE NO. _____
PROJECT MGR. _____

[illegible]

Notes:

Common Sample Type Codes:

N Normal Environmental Sample	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 Matrix Spike	MSD Matrix Spike Duplicate

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

DAILY FIELD REPORT

Page of

Project

Report No.

Location

Date

Client

Page

of

Contractor

File No.

Weather

Temperature

Field Representative(s)

Time on site

Report/Travel/OtherTotal hours

Distribution:

Haley & Aldrich, Inc.

BORING NO.

Page 1 of

DATE FINISHED

[illegible]

Summary

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

BORING NO.

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

APPENDIX C

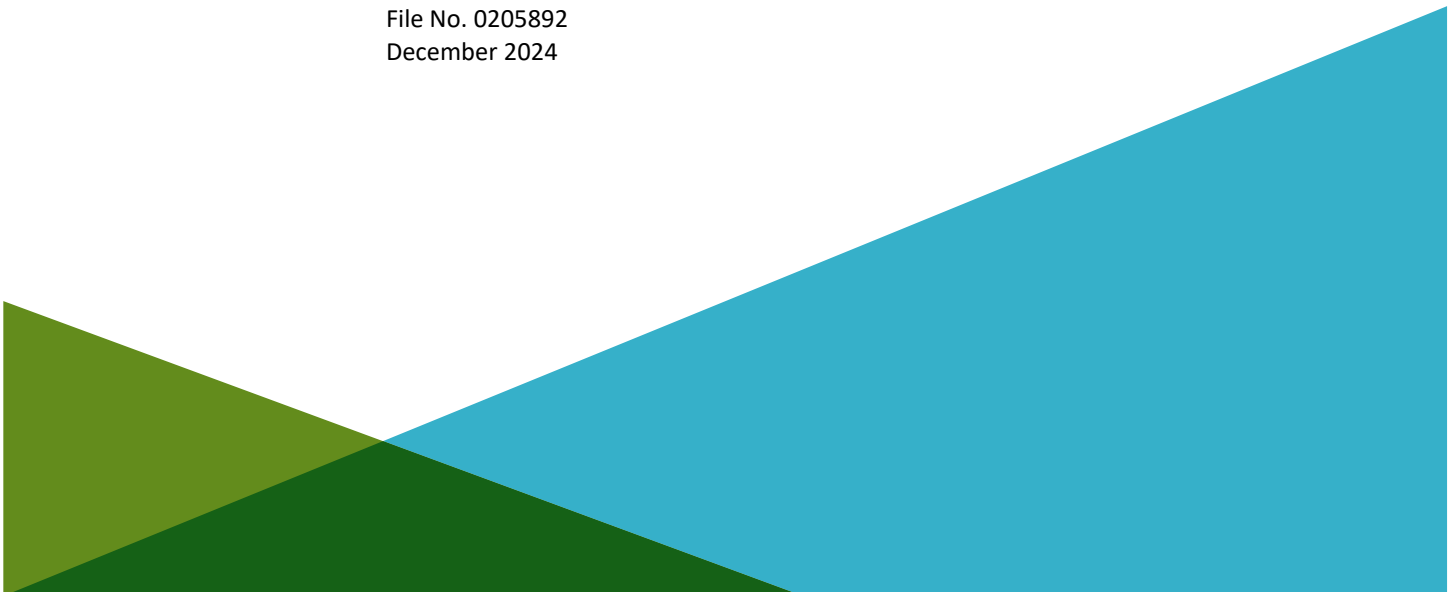
Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN
374 WALLABOUT STREET REDEVELOPMENT
374 WALLABOUT STREET
BROOKLYN, NEW YORK

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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 and Interim Remedial Measure Work Plan for 374 Wallabout 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 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
Tables	

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 for Analytical Methods

1. Project Description

This Quality Assurance Project Plan (QAPP) has been prepared as a component of the Remedial Investigation Work Plan (RIWP) and Interim Remedial Measure Work Plan (IRMWP) for 374 Wallabout 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 volatile organic compounds (VOCs) using EPA method 8260B
- Target Compound List semi-volatile organic compounds (SVOCs) using EPA method 8270C
- TCL Pesticides using EPA method 8081B
- Total Analyte List (TAL) Metals using EPA method 6010
- Mercury using EPA method 7471
- Total Cyanide using EPA method 9010C/9012B
- Hexavalent chromium using EPA method 7196A
- Polychlorinated biphenyls (PCBs) using EPA method 8082
- Per- and polyfluoroalkyl substances (PFAS) using EPA method 1633
- 1,4-Dioxane using EPA method 8270SIM

The laboratory parameters for groundwater include:

- Target Compound List VOCs using EPA method 8260C
- Target Compound List SVOCs using EPA method 8270C
- TCL Pesticides using EPA method 8081B
- TAL Metals using EPA method 6010
- Mercury using EPA method 7470A
- Total Cyanide using EPA method 9010C/9012B
- Hexavalent chromium using EPA method 7196A
- PFAS using EPA method 1633
- 1,4-Dioxane using EPA method 8270SIM

Note: PFAS sampling techniques will be conducted following the 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/IRMWP 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/IRMWP monitoring activities. A 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/IRMWP 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/IRMWP monitoring activities; and,
- Assure compliance with Site health and safety plan.

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 in support of the RIWP/IRMWP 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 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 chain-of-custody and its correctness;
- Notify the Project Manager and Operations Manager of sample receipt and inspection;
- Assign a unique identification number and enter each into the sample receiving log;
- Initiate transfer of samples to laboratory analytical sections; and,
- Control and monitor access/storage of samples and extracts.

2.3.5 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 (SOP).

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 Health & Safety Plan (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/IRMWP 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 Per- and Polyfluoroalkyl Substances (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 USEPA, "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. Chain-of-custody documents are executed.
4. The samples will be handled as specified in Table I.

3.3.1.2 *Soil Samples*

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

1. Soils will be 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 chain-of-custody (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 chain-of-custody will be prepared and marked to indicate with whom the samples are shared. The person relinquishing the samples will require the representative's signature acknowledging sample receipt.
- If samples are sent by a commercial carrier, a bill of lading will be used. A copy of the bill of lading will be retained as part of the permanent record. Commercial carriers will not sign the custody record as long as the custody record is sealed inside the sample cooler and the custody tape remains intact.

- Samples will be picked up by a laboratory courier or transported to the laboratory the same day they are collected unless collected on a weekend or holiday. In these cases, the samples will be stored in a secure location until delivery to the laboratory. Additional ice will be added to the cooler as needed to maintain proper preservation temperatures.

4.2 LABORATORY CHAIN-OF-CUSTODY PROCEDURES

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

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

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

4.3 STORAGE OF SAMPLES

Empty sample bottles will be returned to secure and limited access storage after the available volume has been consumed by the analysis. Upon completion of the entire analytical work effort, samples will be disposed of by the sample custodian. The length of time that samples are held will be at least thirty (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 chain-of-custody documentation;
- Correspondence;
- References, literature;
- Laboratory data deliverables;
- Data validation and assessment reports;

- Progress reports, QA reports; and,
- A final report.

The laboratory will be responsible for maintaining analytical logbooks, laboratory data and sample chain of custody documents. Raw laboratory data files and copies of hard copy reports will be inventoried and maintained by the laboratory for a period of six years at which time the laboratory will contact the Haley & Aldrich 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 Photo-ionization Detector (PID).

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

5.2 LABORATORY INSTRUMENT CALIBRATION PROCEDURES

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

All solid chemicals and acids/bases used by the laboratory will be rated as "reagent grade" or better. All gases will be "high" purity or better. All Standard Reference Materials (SRMs) or Performance Evaluation (PE) materials will be obtained from approved vendors of the National Institute of Standards and Technology (formerly National Bureau of Standards), the U.S. 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 USEPA 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 VOC during the collection of soil samples.

6.2 LABORATORY ANALYTICAL PROCEDURES

Laboratory analyses will be based on the USEPA 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 1 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.

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

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

7.2.3 Laboratory Control Sample Analyses

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

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

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

Corrective actions will be initiated by the Haley & Aldrich 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 sample delivery group (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 standard operating procedures. The data validator will provide recommendations for corrective actions including but not limited to additional data qualification.

8. Data Quality Objectives

Sampling that will be performed as described in the RIWP/IRMWP 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 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 1 duplicate per 20 investigative samples. The RPD criteria for the project field duplicate samples will be +/- 100% for soil, +/- 35 % for groundwater for parameters of analysis detected at concentrations greater than 5 times (5X) the laboratory RL.

8.1.3 Laboratory Precision Sample Objectives

Laboratory precision will be assessed through the analysis of LCS and laboratory control duplicate samples (LCS/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 VOC. Trip blank samples will be analyzed for each VOC for which groundwater samples have been collected for analysis.

8.3 LABORATORY ACCURACY OBJECTIVES

Analytical bias will be assessed through the use of laboratory control samples (LCS) and Site-specific matrix spike (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.

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

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 data set. The completeness goal will be >90%.

8.6 COMPARABILITY

8.6.1 Definition

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

8.6.2 Measures to Ensure Comparability of Laboratory Data

Comparability of laboratory data will be measured from the analysis of SRM obtained from either EPA Cooperative Research and Development Agreement (CRADA) suppliers or the National Institute of Standards and Technology (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 – ug/kg for PFAS analyses, mg/kg of media (Dry Weight).
- Aqueous Matrices – ng/L for PFAS analyses, ug/L of media for organic analyses, and 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 VOC. 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 VOC.

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 USEPA, "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, matrix spikes, and matrix spike duplicates) 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:

- "U.S. EPA National Functional Guidelines for Organic Data Review", "Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15", "Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances Under NYSDEC's Part 375 Remedial Programs", and the "U.S. EPA National Functional Guidelines for Inorganic Data Review".
- The specific data qualifiers used will be applied to the reported results as presented and defined in the EPA National Functional Guidelines. Validation will be performed by qualified personnel

at the direction of the Haley & Aldrich QAO. Tier 1 data validation (the equivalent of USEPA'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 data usability summary report (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,
- Chain-of-custody reports.

10.1.2 External Field Audit Responsibilities

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

- Sampling equipment decontamination procedures;
- Sample bottle preparation procedures;
- Sampling procedures;
- Examination of 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, chain-of-custody procedures, sample preparation and analysis and instrument operating records.

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

10.2.2 External Laboratory Audit Responsibilities

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

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

Failure of any of the above audit procedures can lead to laboratory 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:

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

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, 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.

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

TABLE I
SUMMARY OF ANALYSIS METHOD, PRESERVATION METHOD, HOLDING TIME, SAMPLE SIZE REQUIREMENTS AND SAMPLE CONTAINERS
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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
TCL Pesticides/8081B	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	120 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
Mercury/7471	Soil	Cool, 4 ± 2 °C	28 days	120 ml	1 - 4 oz Glass
Total Cyanide/9010C/9012B	Soil	Cool, 4 ± 2 °C	14 days	120 ml	1 - 4 oz Glass
Hexavalent Chromium/7196A	Soil	Cool, 4 ± 2 °C	30 days	120 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 - 40ml glass vials
Semivolatile Organic Compounds/8270D	Groundwater	Cool, 4 ± 2 °C	7 days extraction / 40 days analysis	500 mL	2 - 250 mL amber glass
TCL Pesticides/8081B	Groundwater	Cool, 4 ± 2 °C	7 days	1000 mL	2 - 500 mL amber glass
TAL Metals 6020	Groundwater	HNO ₃ , Cool, 4 ± 2 °C	180 days	500 mL	1 - 500 mL plastic bottle
Mercury/7470A	Groundwater	HNO ₃ , Cool, 4 ± 2 °C	28 days	500 mL	1 - 500 mL plastic bottle
Total Cyanide/9010C/9012B	Groundwater	NaOH, Cool, 4 ± 2 °C	14 days	250 mL	1 - 250 mL plastic bottle
Hexavalent Chromium/7196A	Groundwater	Cool, 4 ± 2 °C	1 day	500 mL	1 - 500 mL plastic bottle
PFAS 1633	Groundwater	H ₂ O Cool, 4 ± 2 °C	28 days extraction / 28 days analysis	To be determined by laboratory	2 - HDPE container
1,4-Dioxane 8270 SIM	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 or 6 L Summa Canister

Notes:

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

QA/QC samples include:

MS/MSD - 1 for every 20 samples
Field Duplicate - 1 for every 20 samples
Trip Blanks - 1 per cooler of samples to be analyzed for VOCs
Field Blanks - 1 for every 20 samples



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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.



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File: PM14945-1
Page: 2

**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	

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Page: 1

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			

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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	

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 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			

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

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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	2.002	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			

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

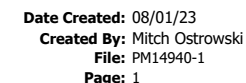
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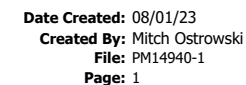
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Holding Time: 365 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

[illegible]

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

[illegible]

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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			

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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

[illegible]

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File: PM14940-1
Page: 1

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

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File: PM14940-1
Page: 1

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

[illegible]

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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

[illegible]

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Page: 1

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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			

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File: PM14940-1
Page: 2

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]-P-	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]-P-	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 (11C-	763051-92-9	6.4	1.32	ng/l	40-150	30	40-150	30	30			
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11C-	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 (MSPFPEA)	NONE										20-150	
Perfluoro[13C5]Pentanoic Acid (MSPFPEA)	NONE										20-150	

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

[illegible]

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



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Page: 4

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

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

[illegible]

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 Page: 1

**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		
1,1,1-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			
Benzoethiophene	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			

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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	GCDAl06	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			

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Page: 3

**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	

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APPENDIX D
NYSDEC Emerging Contaminant Field Sampling
Guidance



Department of
Environmental
Conservation

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

Under NYSDEC's Part 375 Remedial Programs

April 2023



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

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 textEPA Method 1633"	
Appendix A	"Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101"	Deleted	
Appendix B	"Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1"	"Samples collected using this protocol are intended to be analyzed for PFAS using EPA Method 1633"	

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

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

Objective

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

Applicability

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

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

Field Sampling Procedures

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

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

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

Analysis and Reporting

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

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

Routine Analysis

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

Additional Analysis

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

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

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

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

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

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

Data Assessment and Application to Site Cleanup

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

Water Sample Results

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

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

Soil Sample Results

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

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

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

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

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

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

<https://www.nj.gov/dep/srp/guidance/rs/daf.pdf>.

Testing for Imported Soil

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

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

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

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

General Guidelines in Accordance with DER-10

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

Specific Guidelines for PFAS

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

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

General

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

Laboratory Analysis and Containers

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

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

Appendix F - Sampling Protocols for PFAS in Fish

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

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

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

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

Version: 8

Previous Version Date: 21 March 2018

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

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

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

**NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

- A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. All necessary forms will be supplied by the Bureau of Ecosystem Health. Because some samples may be used in legal cases, it is critical that each section is filled out completely. Each Chain of Custody form has three main sections:
1. The top box is to be filled out **and signed** by the person responsible for the fish collection (e.g., crew leader, field biologist, researcher). This person is responsible for delivery of the samples to DEC facilities or personnel (e.g., regional office or biologist).
 2. The second section is to be filled out **and signed** by the person responsible for the collections while being stored at DEC, before delivery to the analytical lab. This may be the same person as in (1), but it is still required that they complete the section. Also important is the **range of identification numbers** (i.e., tag numbers) included in the sample batch.
 3. Finally, the bottom box is to record any transfers between DEC personnel and facilities. Each subsequent transfer should be **identified, signed, and dated**, until laboratory personnel take possession of the fish.
- B. The following data are required on each **Fish Collection Record** form:
1. Project and Site Name.
 2. DEC Region.
 3. All personnel (and affiliation) involved in the collection.
 4. Method of collection (gill net, hook and line, etc.)
 5. Preservation Method.
- C. The following data are to be taken on each fish collected and recorded on the **Fish Collection Record** form:
1. Tag number - Each specimen is to be individually jaw tagged at time of collection with a unique number. Make sure the tag is turned out so that the number can be read without opening the bag. Use tags in sequential order. For small fish or composite samples place the tag inside the bag with the samples. The Bureau of Ecosystem Health can supply the tags.
 2. Species identification (please be explicit enough to enable assigning genus and species). Group fish by species when processing.
 3. Date collected.
 4. Sample location (waterway and nearest prominent identifiable landmark).
 5. Total length (nearest mm or smallest sub-unit on measuring instrument) and weight (nearest g or

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

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

D. General data collection recommendations:

1. It is helpful to use an ID or tag number that will be unique. It is best to use metal striped bass or other uniquely numbered metal tags. If uniquely numbered tags are unavailable, values based on the region, water body and year are likely to be unique: for example, R7CAY11001 for Region 7, Cayuga Lake, 2011, fish 1. If the fish are just numbered 1 through 20, we have to give them new numbers for our database, making it more difficult to trace your fish to their analytical results and creating an additional possibility for errors.
 2. Process and record fish of the same species sequentially. Recording mistakes are less likely when all fish from a species are processed together. Starting with the bigger fish species helps avoid missing an individual.
 3. If using Bureau of Ecosystem Health supplied tags or other numbered tags, use tags in sequence so that fish are recorded with sequential Tag Numbers. This makes data entry and login at the lab and use of the data in the future easier and reduces keypunch errors.
 4. Record length and weight as soon as possible after collection and before freezing. Other data are recorded in the field upon collection. An age determination of each fish is optional, but if done, it is recorded in the appropriate "Age" column.
 5. For composite samples of small fish, record the number of fish in the composite in the Remarks column. Record the length and weight of each individual in a composite. All fish in a composite sample should be of the same species and members of a composite should be visually matched for size.
 6. Please submit photocopies of topographic maps or good quality navigation charts indicating sampling locations. GPS coordinates can be entered in the Location column of the collection record form in addition to or instead for providing a map. These records are of immense help to us (and hopefully you) in providing documented location records which are not dependent on memory and/or the same collection crew. In addition, they may be helpful for contaminant source trackdown and remediation/control efforts of the Department.
 7. When recording data on fish measurements, it will help to ensure correct data recording for the data recorder to call back the numbers to the person making the measurements.
- E. Each fish is to be placed in its own individual plastic bag. For small fish to be analyzed as a composite, put all of the fish for one composite in the same bag but use a separate bag for each composite. It is important to individually bag the fish to avoid difficulties or cross contamination when processing the fish for chemical analysis. Be sure to include the fish's tag number inside the bag, preferably attached to the fish with the tag number turned out so it can be read. Tie or otherwise secure the bag closed. **The Bureau of Ecosystem Health will supply the bags.** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with

the same information.

- F. Groups of fish, by species, are to be placed in one large plastic bag per sampling location. **The Bureau of Ecosystem Health will supply the larger bags.** Tie or otherwise secure the bag closed. Label the site bag with a manila tag tied between the knot and the body of the bag. The tag should contain: project, collection location, collection date, species and **tag number ranges**. Having this information on the manila tag enables lab staff to know what is in the bag without opening it.
- G. Do not eviscerate, fillet or otherwise dissect the fish unless specifically asked to. If evisceration or dissection is specified, the fish must be cut along the exact midline or on the right side so that the left side fillet can be removed intact at the laboratory. If filleting is specified, the procedure for taking a standard fillet (SOP PREPLAB 4) must be followed, including removing scales.
- H. Special procedures for PFAS: Unlike legacy contaminants such as PCBs, which are rarely found in day to day life, PFAS are widely used and frequently encountered. Practices that avoid sample contamination are therefore necessary. While no standard practices have been established for fish, procedures for water quality sampling can provide guidance. The following practices should be used for collections when fish are to be analyzed for PFAS:
 - No materials containing Teflon.
 - No Post-it notes.
 - No ice packs; only water ice or dry ice.
 - Any gloves worn must be powder free nitrile.
 - No Gore-Tex or similar materials (Gore-Tex is a PFC with PFOA used in its manufacture).
 - No stain repellent or waterproof treated clothing; these are likely to contain PFCs.
 - Avoid plastic materials, other than HDPE, including clipboards and waterproof notebooks.
 - Wash hands after handling any food containers or packages as these may contain PFCs.
 - Keep pre-wrapped food containers and wrappers isolated from fish handling.
 - Wear clothing washed at least six times since purchase.
 - Wear clothing washed without fabric softener.
 - Staff should avoid cosmetics, moisturizers, hand creams and similar products on the day of sampling as many of these products contain PFCs (Fujii et al. 2013). Sunscreen or insect repellent should not contain ingredients with “fluor” in their name. Apply any sunscreen or insect repellent well downwind from all materials. Hands must be washed after touching any of these products.
- I. All fish must be kept at a temperature <45° F (<8° C) immediately following data processing. As soon as possible, freeze at -20° C ± 5° C. Due to occasional freezer failures, daily freezer temperature logs are required. The freezer should be locked or otherwise secured to maintain chain of custody.
- J. In most cases, samples should be delivered to the Analytical Services Unit at the Hale Creek field station. Coordinate delivery with field station staff and send copies of the collection records, continuity of evidence forms and freezer temperature logs to the field station. For samples to be analyzed elsewhere, non-routine collections or other questions, contact Wayne Richter, Bureau of Ecosystem Health, NYSDEC, 625 Broadway, Albany, New York 12233-4756, 518-402-8974, or the project leader about sample transfer. Samples will then be directed to the analytical facility and personnel noted on specific project descriptions.
- K. A recommended equipment list is at the end of this document.

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

page _____ of _____

Project and Site Name _____ DEC Region _____

Collections made by (include all crew) _____

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

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

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

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	

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 envelopes, 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	PFTTrDA	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 ethanol	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 6°C 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
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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
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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 E

Health and Safety Plan



**HALEY & ALDRICH, INC.
SITE-SPECIFIC SAFETY PLAN**

FOR

374 Wallabout Street

374 Wallabout Street, Brooklyn, New York

Project/File No. 0205892-000

Gensuite EZ Scan®



BI - Developers

Prepared By: Xavier Richards

Date: 12/23/2024

Approvals: The following signatures constitute approval of this Health & Safety Plan.

A handwritten signature in blue ink, appearing to read 'Luke J. McCartney'.

Field Safety Manager: Luke J. McCartney

Date: 12/23/2024

A handwritten signature in black ink, appearing to read 'Elizabeth Scheuerman'.

Project Manager: Elizabeth Scheuerman

Date: 12/23/2024

HASP Valid Through: 12/31/2024

Table of Contents

	Page
STOP WORK AUTHORITY	I
ISSUANCE AND COMPLIANCE	II
EMERGENCY EVENT PROCEDURES	III
PROJECT INFORMATION AND CONTACTS	IV
DIRECTIONS TO THE NEAREST HOSPITAL	V
DIRECTIONS TO THE NEAREST URGENT CARE	VI
1. WORK SCOPE	7
Project Task Breakdown	7
Subcontractor(s) Tasks	7
2. SITE OVERVIEW / DESCRIPTION	8
Site Classification	8
Site Description	8
Background and Historic Site Usage	8
Site Status	8
Site Plan	8
Work Areas	8
3. HAZARD ASSESSMENT	10
Site Chemical Hazards	10
Site Hazards Checklist	10
Weather	10
High Winds	10
Biological	11
Location/Terrain	13
Miscellaneous	14
Task Hazard Summary	16
Task Physical Hazards Checklist	18
Summary of Physical Hazards & Controls	19
4. PROTECTIVE MEASURES	27
Required Safety & Personal Protective Equipment	27
5. TRAINING REQUIREMENTS	28
Site Specific Training Requirements	28
Task Specific Training Requirements	28
6. AIR MONITORING PLAN AND EQUIPMENT	29
Air Monitoring/Screening Equipment Requirements	29
Monitoring Plans	29
7. DECONTAMINATION & DISPOSAL METHODS	30
Personal Hygiene Safeguards	30

	Decontamination Supplies	30
	Location of Decontamination Station	30
	Standard Personal Decontamination Procedures	31
	Disposal Methods	32
	Disposal of Single Use Personal Protective Equipment	32
8.	SITE CONTROL	33
	Communication	33
	Visitors	33
	Zoning	33
9.	SITE SPECIFIC EMERGENCY RESPONSE PLAN	34
	Pre-Emergency Planning	34
	Onsite Emergency Response Equipment	34
	EVACUATION ALARM	35
	EVACUATION ROUTES	35
	EVACUATION MUSTER POINT(S)/ SHELTER AREA(S)	35
	EVACUTION RESPONSE DRILLS	35
	Emergency Type	36
	Notification	36
	Response Action	36
	Evacuation Plan/Route	36
10.	HASP ACKNOWLEDGEMENT FORM	37

Attachments

Attachment A	HASP Amendment Form
Attachment B	Training Requirements
Attachment C	Roles and Responsibilities
Attachment D	Job Safety Analyses
Attachment E	Project Site Forms
Attachment F	Site-Specific Operating Procedures

STOP WORK AUTHORITY

In accordance with Haley & Aldrich (Haley & Aldrich) Stop Work Authority Operating Procedure (OP1035), any individual has the right to refuse to perform work that he or she believes to be unsafe without fear of retaliation. He or she also has the authority, obligation, and responsibility to stop others from working in an unsafe manner.

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 Health & Safety Officer [SHSO], etc.) and the Haley & Aldrich Senior Project Manager (SPM) 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.
- An 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 an acceptable degree. Stop work orders will be documented as part of an on-site stop work log, on daily field reports to include the activity/activities stopped, the duration, person stopping work, person in-charge of stopped activity/activities, and the corrective action agreed to and/or taken. Once work has been stopped, only the Haley & Aldrich SPM or SHSO can give the order to resume work. Haley & Aldrich senior management is committed to support anyone who exercises his or her "Stop Work" authority.

ISSUANCE AND COMPLIANCE

This HASP has been prepared in accordance with Occupational Safety and Health Administration (OSHA) regulations (CFR 29, Parts 1904, 1910, and 1926) if such are applicable.

The specific requirements of this HASP include precautions for hazards that exist during this project and may be revised as new information is received or as site conditions change.

- This HASP must be signed by all Haley & Aldrich personnel involved in implementation of the SOW (Section 2 of this HASP).
- This HASP, or a current signed copy, must be retained at all times when Haley & Aldrich staff are present.
- Revisions to this HASP must be outlined within the contents of the HASP. If immediate or minor changes are necessary, the Field Safety Manager (FSM), Haley & Aldrich, SSO and/or Project Manager (PM) may use Attachment 1 (HASP Amendment Form), presented at the end of this HASP. Any revision to the HASP requires employees and subcontractors to be informed of the changes so that they understand the requirements of the change.
- Deviations from this HASP are permitted with approval from the Haley & Aldrich FSM, PM, or Senior Health & Safety Manager (SHSM). Unauthorized deviations may constitute a violation of Haley & Aldrich company procedures/policies and may result in disciplinary action.
- This HASP will be relied upon by Haley & Aldrich's subcontractors and visitors to the site. Haley & Aldrich's subcontractors must have their own HASP which will address hazards specific to their trade that is not included in this HASP. This HASP will be made available for review to Haley & Aldrich's subcontractors and other interested parties (e.g. Facility personnel and regulatory agencies) 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.

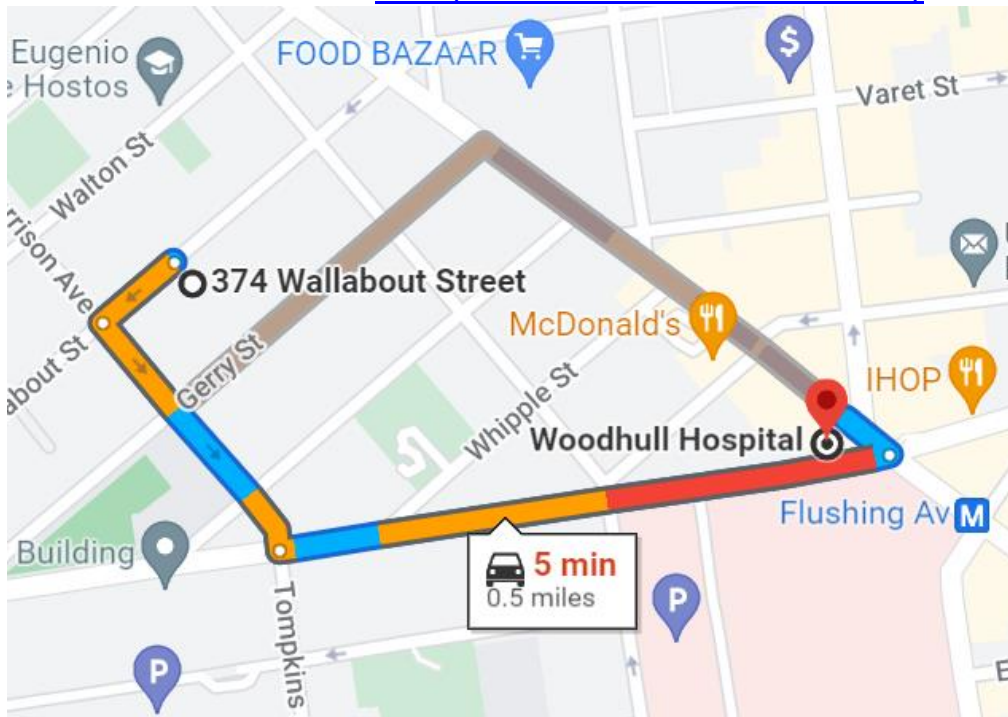
This site-specific HASP provides only site-specific descriptions and work procedures. General safety and health compliance programs in support of this HASP (e.g., injury reporting, medical surveillance, personal protective equipment (PPE) selection, etc.) are described in detail in the Haley & Aldrich Corporate Health and Safety Program Manual and within Haley & Aldrich's Standard Operating Procedures. Both the manual and SOPs can be located on the Haley & Aldrich's Company Intranet. When appropriate, users of this HASP should always refer to these resources and incorporate to the extent possible. The manual and SOPs are available to clients and regulators upon request.

EMERGENCY EVENT PROCEDURES	
1 - ASSESS THE SCENE	
• STOP WORK • Review the situation and ascertain if it's safe to enter the area. • Evacuate the site if the conditions are unsafe.	
2 - EVALUATE THE EMERGENCY	
• Call 911, or designated emergency number, if required. • Provide first aid for the victim if qualified and safe to do so. ○ First aid will be addressed using the onsite first aid kit. * ▪ If providing first aid, remember to use proper first aid universal precautions if blood or bodily fluids are present. • If exposure to hazardous substance is suspected, immediately vacate the contaminated area. ○ Remove any contaminated clothing and/or equipment. ○ Wash any affected dermal/ocular area(s) with water for at least 15 minutes. ○ Seek immediate medical assistance if any exposure symptoms are present. <i>* Note: Haley & Aldrich employees are not required or expected to administer first aid / CPR to any Haley & Aldrich staff member, Contractor, or Civilian personnel at any time; it is Haley & Aldrich's position that those who do are doing so on their own behalf and not as a function of their job.</i>	
3 - SECURE THE AREA	
• Cordon off the incident area, if possible. ○ Notify any security personnel, if required. ○ Escort all non-essential personnel out of the area, if able.	
4 - REPORT ON-SITE ACCIDENTS / INCIDENTS TO PM / SSO	
• Notify the PM and SSO as soon as it is safe to do so. ○ Assist PM and SSO in completing any additional tasks, as required.	
5 - INVESTIGATE / REPORT THE INCIDENT	
• Record details of the incident for input to the Gensuite. ○ Complete any additional forms as requested by the PM and SSO.	
6 - TAKE CORRECTIVE ACTION	
• Implement corrective actions per the PM following root cause analysis. ○ Complete Lessons Learned form.	

PROJECT INFORMATION AND CONTACTS	
Project Name: 374 Wallabout Street	Haley & Aldrich File No.: 0205892-000
Location:	
Client/Site Contact: Phone Number:	Joel Fried 718.288.4695
Haley & Aldrich Field Representative: Phone Number: Emergency Phone Number:	Zavier Richards 929.696.2279 347.353.7989
Haley & Aldrich Project Manager: Phone Number: Emergency Phone Number:	Elizabeth Scheuerman 646.277.5692 201.978.7871
Field Safety Manager: Phone Number: Emergency Phone Number:	Ferguson, Brian 617.886.7439 617.908.2761
Subcontractor Project Manager: Phone Number:	Lakewood Environmental Services Corp. 631.257.5321
Nearest Hospital: Address: (see map on next page) Phone Number:	Woodhull Hospital 760 Broadway Brooklyn, NY 11206 718.963.8000
Nearest Occ. Health Clinic: http://www.talispoint.com/liberty/ext/ Address: (see map on next page) Phone Number:	CityMD Broadway Triangle Urgent Care - Brooklyn 21 Graham Avenue Brooklyn, NY 11206 718.571.9280
Liberty Mutual Claim Policy	WC6Z11254100033
Work Care Injury and Illness HOTLINE	1-888-449-7787
Emergency Response Number:	911
Other Local Emergency Response Number:	N/A
Other Ambulance, Fire, Police, or Environmental Emergency Resources:	FDNY Engine 230 701 Park Avenue, Brooklyn NY 11206

DIRECTIONS TO THE NEAREST HOSPITAL

[Liberty Mutual Medical Location Directory](#)



Directions to the Nearest Hospital:

374 Wallabout St

Brooklyn, NY 11206

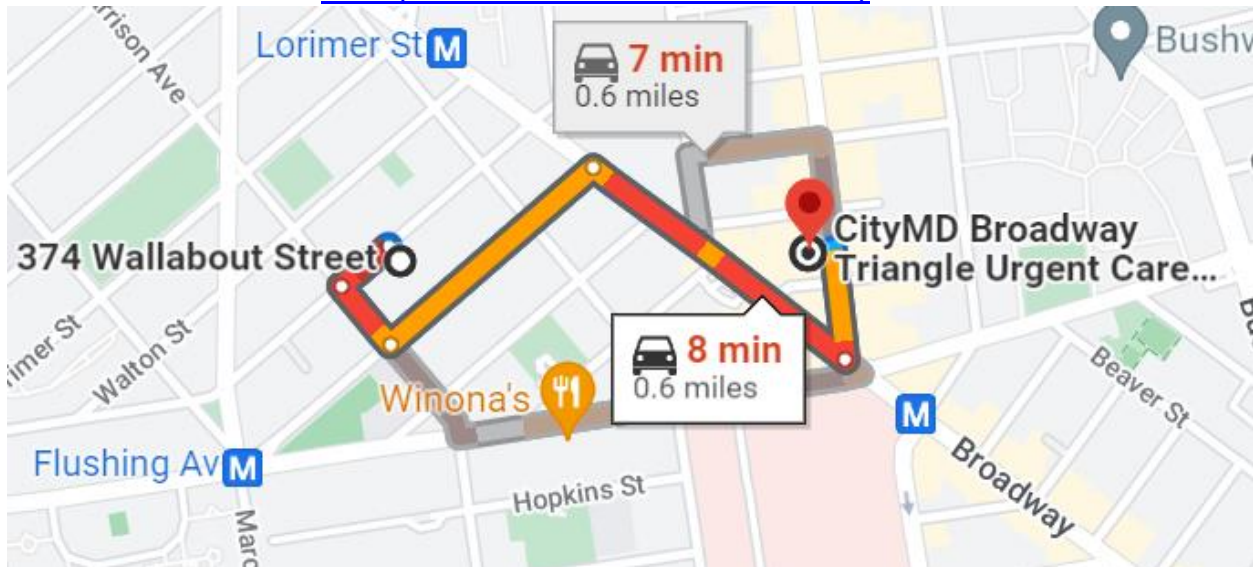
- ↑ Head southwest on Wallabout St toward Harrison Ave
223 ft
- ↩ Turn left at the 1st cross street onto Harrison Ave
0.1 mi
- ↩ Turn left onto Flushing Ave
0.3 mi
- ↩ Turn left onto Broadway
Destination will be on the left
135 ft

Woodhull Hospital

760 Broadway, Brooklyn, NY 11206

DIRECTIONS TO THE NEAREST URGENT CARE

[Liberty Mutual Medical Location Directory](#)



Directions to the Nearest Occupational Clinic:

374 Wallabout St

Brooklyn, NY 11206

- ↑ Head southwest on Wallabout St toward Harrison Ave
223 ft
- ↩ Turn left at the 1st cross street onto Harrison Ave
276 ft
- ↩ Turn left at the 1st cross street onto Gerry St
0.2 mi
- ↪ Turn right onto Broadway
 - 📍 Pass by McDonald's (on the right)
0.2 mi
- ↩ Turn left onto Graham Ave/Ave of Puerto Rico
 - 📍 Destination will be on the left
400 ft

CityMD Broadway Triangle Urgent Care -

Brooklyn

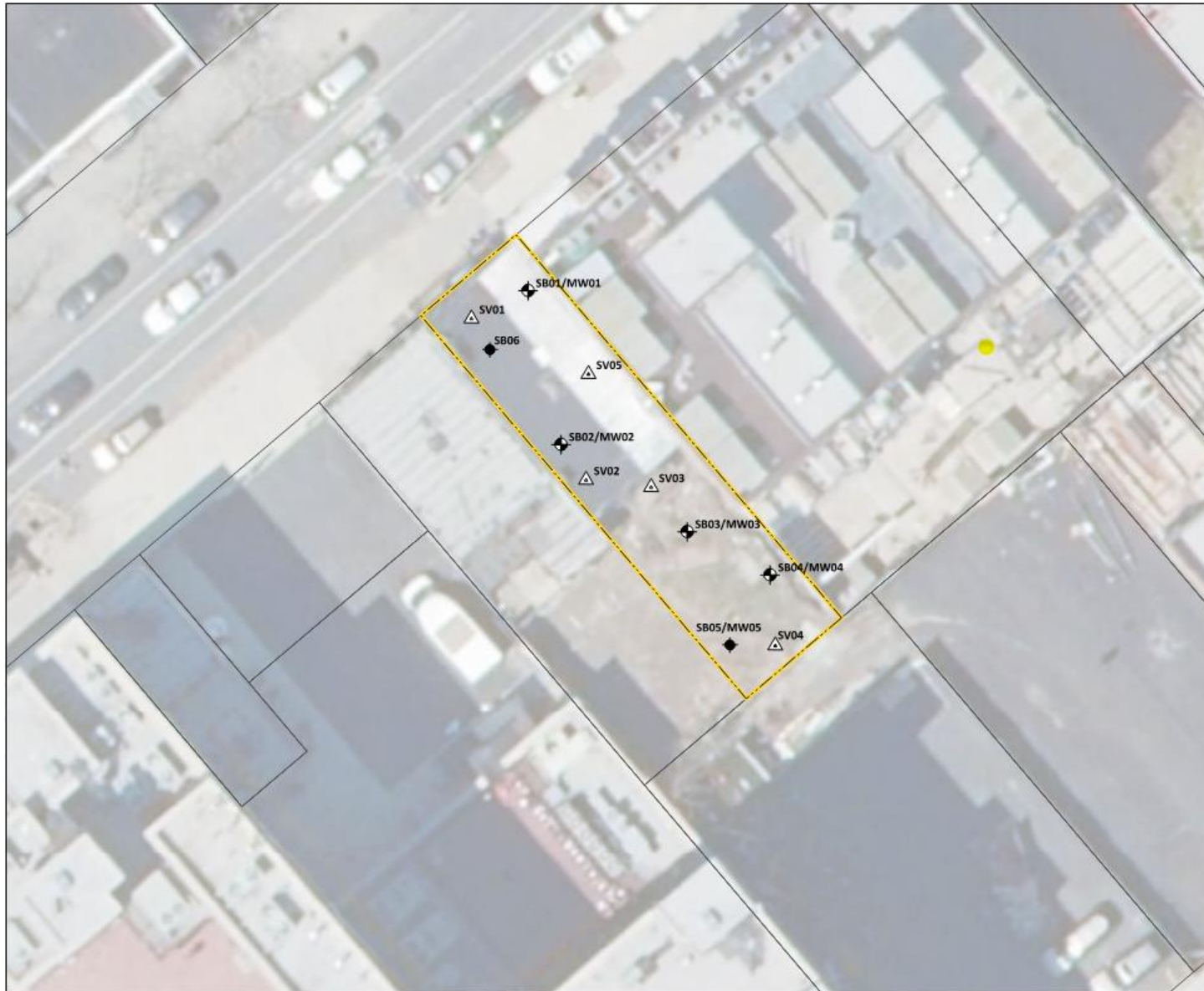
21 Graham Ave, Brooklyn, NY 11206

1. WORK SCOPE			
This Site-Specific Health and Safety Plan addresses the health and safety practices and procedures that will be exercised by all Haley & Aldrich employees participating in all work on the Project Site. This plan is based on an assessment of the site-specific health and safety risks available to Haley & Aldrich and Haley & Aldrich's experience with other similar project sites. The scope of work includes the following: Enter a complete description of the project work scope and breakdown the types of activities involved. For construction monitoring projects, specify the types of field control activities to be performed. Summarize general work activities and testing, sampling and handling requirements and intensity of contact with site media.)			
Project Task Breakdown			
Task No.	Task Description	Employee(s) Assigned	Work Date(s) or Duration
1	GPR Survey	Zavier Richards	1 Day
2	Drilling	Zavier Richards	1 Week
3	Soil, Soil Vapor & Groundwater Sampling	Zavier Richards	1 Week
Subcontractor(s) Tasks			
Firm Name	Work Activity	Work Date(s) or Duration	
NOVA	GPR Survey	1 Day	
Lakewood Environmental Services Corp.	Drilling	1 Week	
Projected Start Date: 1/1/2024 January 2025			
Projected Completion Date: 1/31/2025			

1/1/2024

2. SITE OVERVIEW / DESCRIPTION
Site Classification
Commercial
Site Description
Currently, the Site is improved with a three-story residential building that includes a cellar level and an open courtyard in the southern region. The Site is located within an urban area characterized by multi-story commercial and residential buildings. The Site is currently owned by Joel Fried. Mr. Fried plans to redevelop the Site with a 4-story residential building with a cellar, consistent with current zoning.
Background and Historic Site Usage
Based on a Phase I Environmental Site Assessment prepared by Haley & Aldrich of New York in August 2022, the Site was developed as early as the late 1880s. In the late 1880s, the Site was improved with a three-story residential building in the northern region of the Site along Wallabout Street, and a two-story dwelling in the southern region. By 1935, the dwelling in the southern region of the Site is no longer identified in historical records. The three-story residential building has remained until the present. The plan for redevelopment includes a 4-story residential building which will extend approximately 14 feet to the southeast of the current building footprint. The plans include a one level cellar requiring remedial excavations extending to up to approximately 12 feet below ground surface (ft bgs).
Site Status
Indicate current activity status and describe operations at the site: Active Describe Current Operations
Site Plan
Is a site plan or sketch available? Yes
Work Areas
List and identify each specific work areas(s) on the job site and indicate its location(s) on the site plan: Enter work area description

Site Plan



3. HAZARD ASSESSMENT

Indicate all hazards that may be present at the site and for each task. If any of these potential hazards are checked, it is the Project Manager's responsibility to determine how to eliminate / minimize the hazard to protect onsite personnel.

Site Chemical Hazards

Is this Site impacted with chemical contamination? Yes

Source of information about contaminants: Previous Investigation

Contaminant of Concern	Location/Media	Concentration	Units
Volatile Organic Compounds (VOCs)	Soil	Unknown	mg/kg
Metals	Soil	Unknown	mg/kg
SVOCs	Soil	Unknown	mg/kg
CVOCs	Groundwater	Unknown	mg/L

VOCs: include all organic compounds (substances made up of predominantly carbon and hydrogen) with boiling temperatures in the range of 50-260 degrees C, excluding pesticides. This means that they are likely to be present as a vapor or gas in normal ambient temperatures. Substances which are included in the VOC category include aliphatic hydrocarbons (such as hexane), aldehydes, aromatic hydrocarbons (such as benzene, toluene, and the xylenes or BTEX), and oxygenated compounds (such as acetone and similar ketones). The term VOC often is used in a legal or regulatory context and in such cases the precise definition is a matter of law.

VOCs are released from oil and gasoline refining, storage and combustion as well as from a wide range of industrial processes. Processes involving fuels, solvents, paints or the use of chemicals are the most significant sources. VOCs may also be emitted from cleaning products, degreasing products, fabrics, carpets, plastic products, glues, printed material, varnishes, wax, disinfectants, and cosmetics.

Typically, VOCs are present in gas or vapor and will enter the body by breathing contaminated air. Higher concentrations of VOCs may occur in areas of poor ventilation.

Site Hazards Checklist**Weather**

High Winds	Cold Temperatures	Select Hazard	Select Hazard
------------	-------------------	---------------	---------------

High Winds

While high winds are commonly associated with severe thunderstorms and hurricanes they may also

occur as a result of differences in air pressures, such as when a cold front passes across the area. They can cause downed trees and power lines, and flying debris (such as dust or larger debris), which adds additional risks and could lead to power outages, transportation disruptions, damage to buildings and vehicles, and serious injury.

Wind Advisory are issued for sustained winds 25 to 39 mph and/or gusts to 57 mph. High Wind warnings are issued by the National Weather Service when high wind speeds may pose a hazard or is life threatening. The criteria for this warning will varies by state. The Beaufort Wind Scale is a helpful tool to when dealing with high winds.

Cold Temperatures

Cold stress may occur at any time work is being performed at low ambient temperatures and high velocity winds. Because cold stress is common and has potentially serious illnesses associated with outdoor work during cold seasons, regular monitoring and other preventative measures are vital.

Refer to OP1003-Cold Stress for additional information and mitigation controls.

Biological

Mosquitoes	Stinging Insects	Small Mammals	Choose an item.
------------	------------------	---------------	-----------------

Mosquitos

Work outdoors with temperatures above freezing will likely bring staff into contact with mosquitos. There are a variety of mosquito species that can transmit a range of diseases. Birds act as reservoirs for the viruses that can be collected by the mosquito and transmitted to a person. Majority of mosquitos are mainly a nuisance but staff need to take appropriate precautions to minimize the potential transmission of a virus that can result in one of the following diseases: West Nile, Eastern Equine Encephalitis and Western Encephalitis. Knowing some key steps that can minimize the risk of mosquito bites is, therefore, important in reducing the risks. Workers working outdoors should be aware that the use of PPE techniques is essential to preventing 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.

Stinging Insects

Stinging Insects fall into two major groups: Apidae (honeybees and bumblebees) and vespids (wasps, yellow jackets, and hornets). Apidae are docile and usually do not sting unless provoked. The stinger of the honeybee has multiple barbs, which usually detach after a sting. Vespids have few barbs and can inflict multiple stings.

There are several kinds of stinging insects that might be encountered on the project site. Most stings will only result in a temporary injury. However, sometimes the effects can be more severe, even life-threatening depending on where you are stung and what allergies you have. Being stung in the throat area of the neck may cause edema (swelling caused by fluid build-up in the tissues) around the throat and may make breathing difficult.

In rare cases, a severe allergic reaction can occur. This can cause "anaphylaxis" or anaphylactic shock with symptoms appearing immediately or up to 30 minutes later. Symptoms include; Hives, itching and swelling in areas other than the sting site, swollen eyes/eyelids, wheezing, chest tightness, difficulty breathing, hoarse voice, swelling of the tongue, dizziness or sharp drop in blood pressure, shock, unconsciousness or cardiac arrest. Reactions can occur the first time you are stung or with subsequent stings. If you see any signs of reaction, or are unsure, call or have a co-worker call emergency medical services (e.g., 911) right away. Get medical help for stings near the eyes, nose or throat. Stay with the person who has been stung to monitor their reaction.

Staff who are allergic to bee stings are encouraged to inform their staff/project manager. If staff member carries an Epi-pen (i.e., epinephrine autoinjector) they are encouraged to inform their colleagues in case they are stung and are incapable of administering the injection. Examine site for any signs of activity or a hive/nest. If you see several insects flying around, see if they are entering/exiting from the same place. Most will not sting unless startled or attacked. Do not swat, let insects fly away on their own. If you must, walk away slowly or gently "blow" them away. If a nest is disturbed and you hear "wild" buzzing, protect your face with your hands and run from the area immediately. Wear long sleeves, long pants, and closed-toed boots. Wear light colored clothes such as khakis. Avoid brightly colored, patterned, or black clothing. Tie back long hair to avoid bees or wasps from entanglement. Do not wear perfumes, colognes or scented soaps as they contain fragrances that are attractive. If bee or wasp is found in your car, stop and leave windows open.

Small Mammals

Rodents, are the most abundant order of mammals. There are hundreds of species of rats; the most common are the black and brown rat. Other rodents you may encounter are mice, beavers, squirrels, guinea pigs, capybaras and coypu.

The Brown Rat has small ears, blunt nose, and short hair. It is approximately 14-18" long (with tail). They frequently infest garbage/rubbish, slaughterhouses, domestic dwellings, warehouses, and supermarkets. They also frequent any space with an easy meal and potential nesting sites. The Black Rat is identified by its tail, that is always longer than the length from the head to the body. It is also slimmer and more agile than the Brown rat. Its size varies according to its environment and food supply.

The House Mouse has the amazing ability to adapt and can frequently be found in human dwellings. In

buildings, mice will live anywhere and difficult to keep out. Mice are omnivorous, they will eat anything. Rats and mice often become a serious problem in cold winter months when they seek food and warmth inside buildings. They may suddenly appear in large numbers when excavation work disturbs their in-ground nesting locations or their food source is changed.

Some major problems caused by rats and mice are contaminating the food they eat with urine and excrement. Gnawing into materials such as paper, wood, or upholstery, to use as nest material. Also gnawing plastic, cement, soft metals such as lead and aluminum, and wiring, which may cause a fire hazard. Occasionally biting people and may kill small animals. They, or the parasites they carry, like fleas, mites and worms, spread many diseases such as salmonella, trichinosis, rat bite fever, hantavirus, Weil's disease, and bubonic plague. They damage ornamental plants by burrowing among the roots or feeding on new growth. They also eat garden vegetables, such as corn and squash. These rodents have been a problem for centuries, because of their incredible ability to survive and are so difficult to eliminate. In addition, they are extremely compatible with human behavior and needs.

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.

Location/Terrain			
Slip/Trip/Falls	SIMOPS	Choose an item.	Choose an item.
Slips, Trips & Falls Slip and trip injuries are the most frequent injuries to workers. Statistics show most falls happen on the same level resulting from slips and trips. Both slips and trips result from unintended or unexpected change in the contact between the feet and the ground or walking surface. Good housekeeping, quality of walking surfaces (flooring), awareness of surroundings, selection of proper footwear, and appropriate pace of walking are critical for preventing fall accidents. Site workers will be walking on a variety of irregular surfaces, that may affect their balance. Extra care must be taken to walk cautiously near rivers because the bottom of the riverbed maybe slick and may not be visible. Rocks, gradient changes, sandy bottoms, and debris may be present but not observable. Take your time and pay attention to where you are going. Adjust your stride to a pace that is suitable for the walking surface and the tasks you are doing. Check the work area to identify hazards - beware of trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain. Establish and utilize a pathway free of slip and trip hazards. Choose a safer walking route. Carry loads you can see over. Keep work areas clean and free of clutter. Communicate hazards to on-site personnel and remove hazards as appropriate. 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.

Miscellaneous

Extended Shift

Choose an item.

Choose an item.

Choose an item.

Extended Shift

An extended shift can include extending a workday beyond eight hours. Extended or unusual work shifts may be more stressful physically, mentally, and emotionally. Non-traditional shifts and extended work hours may disrupt the body's regular schedule, leading to increased fatigue, stress, and lack of concentration. This leads to an increased risk of operator error, injuries and/or accidents. 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 does 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 is a message to the body to rest and can be eliminated with proper rest. However, if rest is not possible, fatigue can increase and becomes distressing and eventually debilitating. 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, headache, loss of appetite, and digestive problems.

When possible, managers should limit use of extended shifts and increase the number of days worked. Working shifts longer than 8 hours generally result in reduced productivity and alertness. 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. This is an important consideration for pre-emergency planning.

Make efforts, when feasible, to ensure that unavoidable extended work shifts and shift changes allow affected employees time for adequate rest and recovery. Project Managers 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. In addition to formal breaks

such as lunch or dinner, 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.

Task Hazard Summary

Task 1 – GPR Survey

Surveying presents many challenges regarding safety given that the survey location is typically dynamic and can be at large construction sites, roadways, or in the woods. Before beginning a survey, determine potential hazards that might arise from the natural environment, the public, and the contractor's operations and plan the survey accordingly.

Work on a construction site will expose staff to heavy equipment, SIMOPs, and the hazards associated with the type of construction being conducted. Coordination with the site GC is critical. Work on a road way will expose staff to vehicular traffic and potentially foot traffic. The safety measures employed must be consistent with the MUTCD or equivalent state requirements. Staff need to maintain at least six feet of space between moving traffic and the work area. This includes work on shoulders as well as on the traveled way. Survey at the maximum space possible between moving traffic and the work area. Whenever feasible, each staff member must face moving traffic at all times. If it is not possible to face traffic, a lookout should be used. Work in remote areas may expose staff to wildlife, insects and poor communication. Equipment shall be carried properly so that pinch points are avoided and staff are not overloaded when moving from one location to another.

Use of proper PPE (e.g., High Visibility Vests) is an important component of conducting the work safely. Suspend survey operations when uncontrollable hazards develop. Resume work only when safe working conditions have been restored.

Task 2 – Drilling

Drilling is conducted for a range of services that can include but are not limited to: soil characterization, environmental investigation, well installation, and ore exploration. Familiarity with basic drilling safety is an essential component of all drilling projects. Potential hazards related to drilling operations include, but are not limited to encountering underground or overhead utilities, traffic and heavy equipment, hoisting heavy tools, steel impacts, open rotation entanglement, and the planned or unexpected encountering of toxic or hazardous substances. While staff members do not operate drilling equipment, they may work in close proximity to operating drilling equipment and may be exposed to many of the same hazards as the drilling subcontractor. It is imperative that staff are aware of emergency stops and establish communication protocols with the drillers prior to the start of work.

See OP 1002 Drilling Safety for more information.

Task 3A – Soil Sampling

Soil sampling by H&A staff on active construction sites can be conducted in conjunction with a wide range activities such as building construction, earthwork and soil management related activities. These

activities can include, but are not limited to: drill spoil characterization and management during building foundation element installation, characterization of excavated soils for management/disposal/reuse during earthwork activities, and as part of environmental remedial activities such as delineation and confirmation sampling. Familiarity with basic heavy construction safety, site conditions (geotechnical and environmental), and potential soil contaminants are essential components of soil sampling performed on active sites. Potential hazards related to soil sampling at construction sites include, but are not limited to: encountering site vehicle traffic and heavy equipment operations, manual lifting, generated waste, contact or exposure to impacted soil, and encountering unknown toxic or hazardous substances. Although soil sampling is commonly performed within active excavations, from stockpiles, or within trench excavations, sampling locations and situations will vary depending on site conditions. Care should be taken while entering and exiting excavations or trenches, and when accessing (climbing up or down) soil stockpiles, ensuring that the sampling area is not being actively accessed by construction equipment. Care should also be taken with handling of potentially environmentally impacted soil during sampling, with appropriate PPE identified and used. At no time during classification activities are personnel to reach for debris near machinery that is in operation, place any samples in their mouth, or come in contact with the soils without the use of gloves. Staff will have to carry and use a variety of sampling tools, equipment, containers, and potentially heavy sample bags. It is imperative that staff are aware of emergency / communication protocols with the Contractor prior to the start of work.

Task 3B – Soil Vapor Sampling

Soil gas sampling is employed as an indirect indicator of contamination in soil or groundwater particularly over and around landfill waste sites, or groundwater plumes. Soil gas sampling points can be installed manually using a slam bar or power driven mechanical devices (e.g., demolition hammer or Geoprobe) may be used based on site conditions (i.e., pavement, frozen ground, very dense clays, etc.). Soil gas samples can be drawn through the probe itself, or through Teflon tubing inserted through the probe and attached to the probe point. Samples are collected and analyzed as described below. Other field air monitoring devices, such as the Combustible Gas Indicator (CGI) and the Organic Vapor Analyzer (OVA), can also be used, depending on specific site conditions.

Because the sample is being drawn from underground, and no contamination is introduced into the breathing zone, soil gas sampling usually occurs in Level D. Nevertheless, ambient air should be constantly monitored to obtain background and breathing zone readings during the sampling procedure in the event the seal around the sampling point is breached. As long as the levels in ambient air do not rise above background, no upgrade of the level of protection is needed. Also, an underground utility search must be performed prior to sampling.

Task 3C – Water Sampling

Environmental water sampling could include activities such as groundwater sampling from permanent or temporary wells, or surface water sampling from streams, rivers, lakes, ponds, lagoons, and surface impoundments.

Sampling tasks could involve uncapping, purging (pumping water out of the well), and sampling, and/or monitoring, new or existing monitoring wells. A mechanical pump may be used to purge the wells and

can be hand-, gas-, or electric-operated. Water samples taken from the wells are then placed in containers and shipped to an analytical laboratory for analysis. The physical hazards of these operations are primarily associated with the collection methods and procedures used.

When sampling bodies of water containing known or suspected hazardous substances, adequate precautions must be taken to ensure the safety of sampling personnel. The sampling team member collecting the sample should not get too close to the edge, where ground failure or slips, trips or falls may cause him/her to lose his/her balance. The person performing the sampling should have fall restraint or protection for the task. When conducting sampling from a boat in an impoundment or flowing waters, appropriate vessel safety procedures should be followed. Avoid lifting heavy coolers with back muscles; instead, use ergonomic lifting techniques, team lift or mechanical lifts. Wear proper gloves, such as when handling sample containers to avoid contacting any materials that may have spilled out of the sample containers.

Inhalation and absorption of COCs are the primary routes of entry associated with water sampling, due to the manipulation of sample media and equipment, manual transfer of media into sample containers, and proximity of operations to the breathing zone. During this project, several different groundwater sampling methodologies may be used based on equipment accessibility and the types of materials to be sampled. These sampling methods may include hand or mechanical bailing. The primary hazards associated with these specific sampling procedures are not potentially serious; however, other operations in the area or the conditions under which samples must be collected may present chemical and physical hazards. The hazards directly associated with groundwater sampling procedures are generally limited to strains or sprains from hand bailing, and potential eye hazards. Exposure to water containing COCs is also possible. All tools and equipment that will be used at the site must be intrinsically safe (electronics and electrical equipment) and non-sparking or explosion-proof (hand tools).

Task Physical Hazards Checklist			
Potential Task Hazards	Task 1 GPR Survey	Task 2 Drilling	Task 3 Soil, Soil Vapor, Groundwater Sampling
Ergonomics	☐	☒	☒
Hand/Power Tools	☒	☒	☒
Manual Lifting	☐	☒	☒
Overhead Utilities	☐	☒	☐
Slippery Surfaces	☒	☒	☒
Traffic	☒	☒	☒
Sharp Objects	☒	☒	☒
Line of Fire	☒	☒	☒
Generated Wastes	☐	☐	☒

Ground Disturbance	☐	☒	☐
Heavy Equipment	☐	☒	☐
Noise	☐	☒	☐
Rotating Equipment	☐	☒	☒
Underground Utilities	☐	☒	☐
Other: Specify	☒	☐	☐

Summary of Physical Hazards & Controls

Ergonomics

Most Work-related Musculoskeletal Disorders (WMSDs) are caused by Ergonomic Stressors. Ergonomic Stressors are caused by poor workplace practices and/or insufficient design, which may present ergonomic risk factors. These stressors include, but not limited to, repetition, force, extreme postures, static postures, quick motions, contact pressure, vibration, and cold temperatures.

WMSDs are injuries to the musculoskeletal system, which involves bones, muscles, tendons, ligaments, and other tissues in the system. Symptoms may include numbness, tightness, tingling, swelling, pain, stiffness, fatigue, and/or redness. WMSD are usually caused by one or more Ergonomic Stressors. There may be individual differences in susceptibility and symptoms among employees performing similar tasks. Any symptoms are to be taken seriously and reported immediately.

See OP1053 Ergonomics for more information.

Controls

- Ensure workstations are ergonomically correct so bad posture is not required to complete tasks.
- Take periodic breaks over the course of the day.
- Stretch during break times.
- Break up tasks that require repetitive motion.
- Contact Corporate H&S with any ergonomic concerns

Hand and Power Tools

Hand and power tools can expose staff to a wide range of hazards depending upon the tool used. Hazards can include but are not limited to: falling, flying, abrasive, and splashing objects, or harmful dusts, fumes, mists, vapors, or gases.

Serious accidents often occur before steps are taken to evaluate and avoid or eliminate tool-related hazards. Staff must recognize the hazards associated with the different types of tools and the safety precautions necessary to prevent those hazards.

See OP 1026 Hand and Power Tools for more information.

Controls

- Keep all tools in good condition with regular maintenance.
- Use the right tool for the job. Do not use a tool for a task which it was not designed for.
- Examine each tool for damage before use and do not use damaged tools.
- For tools that are damaged or defective, red tag the tool and take out of service.
- Operate tools per the manufacturers' instructions.
- Use the appropriate personal protective equipment.
- All electrically powered tools will be connected through a ground fault circuit interrupter (GFCI).
- All personnel must be trained on the use of the tool they are utilizing.

Manual Lifting/Moving

Most materials associated with investigation, remedial, or construction-related activities are moved by hand. The human body is subject to damage in the forms of back injury, muscle strains, and hernia if caution is not observed in the handling process.

Controls

- Under no circumstances should any one person lift more than 49 pounds unassisted.
- Always push, not pull, the object when possible.
- Size up the load before lifting. If it is heavy or clumsy, get a mechanical aid or help from a worker.
- Bend the knees; it is the single most important aspect of lifting.
- When performing the lift:
 - Place your feet close to the object and center yourself over the load.
 - Get a good handhold.
 - Lift straight up, smoothly and let your legs do the work, not your back!
 - Avoid overreaching or stretching to pick up or set down a load.
 - Do not twist or turn your body once you have made the lift.
 - Make sure beforehand that you have a clear path to carry the load.
 - Set the load down properly.

Slippery Surfaces

Both slips and trips result from unintended or unexpected change in the contact between the feet and ground or walking surface. Good housekeeping, quality of walking surfaces, selection of proper footwear, and appropriate pace of walking are critical for preventing fall accidents. Slips happen where there is too little friction or traction between the footwear and walking surface.

Common causes of slips are wet or oily surfaces, spills, weather hazards, loose unanchored rugs or mats and flooring or other walking surfaces that do not have same degree of traction in all areas.

Weather-related slips and falls become a serious hazard as winter conditions often make for wet or icy surfaces outdoors. Even wet organic material or mud can create hazardous walking conditions. Spills and leaks can also lead to slips and falls.

Controls

- Evaluate the work area to identify any conditions that may pose a slip hazard.
- Address any spills, drips or leaks immediately.
- Mark areas where slippery conditions exist.

- Select proper footwear or enhance traction with additional PPE.
- Where conditions are uncertain or environmental conditions result in slippery surfaces walk slowly, take small steps, and slide feet on wet or slippery surfaces.

Traffic

To ensure worker protection and the safe passage of traffic through and around job sites, Site Traffic Control procedures may need to be implemented on project sites. Job zone control and traffic management are necessary when Simultaneous Operations (SIMOPS) or third parties could be at risk of injury by entering the work zone, or when the work crew is at risk of injury by other operations.

Traffic patterns shall be evaluated. Conditions such as high pedestrian traffic, peak periods, daily deliveries or SIMOPS known, Heavy equipment traffic volume and light duty traffic volume shall be evaluated

Early identification and planning for site operations that require job zone control and traffic management, including SIMOPS, is the responsibility of the Project Manager and primary contractor manager. Traffic control plans shall be consistent with the Manual on Uniform Traffic Control Devices.

See OP1025 Signs, Signals, and Barricades and/or OP1043 Site Traffic Control for more information.

Controls

- Alternate walkways where possible.
- Use of the local police to direct traffic.
- Use of an air horn to alert drivers or other workers.
- Maintain good housekeeping and clean the area as work is completed.
- Use the 'buddy' or 'watchperson' system while performing work.
- Use a spotter for backing, tight maneuvers and bin/tank/equipment drop-offs.
- Use traffic control devices, field vehicles and barricades and avoid the use of caution tape.
- Park all vehicles (with wheels in a safe direction away from work) to block traffic with a flashing yellow light. Park so that access to the vehicle is away from oncoming traffic while working.
- When parking a vehicle and equipment, utilize a 'first move forward' driving practice.
- Work in an upright position, face traffic and make eye contact with drivers when possible.
- Minimize work time in traffic.
- Establish a 'Stop Work' hand signal.
- Personnel shall always wear high visibility vest

If public sites, such as public roads, bicycle paths or footpaths, are closed or rerouted, local and regulatory requirements shall be followed and traffic control permits shall be put in place. Proper traffic guiding equipment includes stop/slow paddle signs, flaggers, flashing lights and directional signs.

All personnel on-site should be aware of the plan of the day and the Traffic Control Plan should be communicated with all parties involved during the pre-shift meeting.

Sharp Objects

Workers who handle sharp edged objects like sheets of steel or glass are at risk of cuts. Workers who handle sharp edged objects are also at risk of cuts. Injuries may occur to hands, fingers, or legs when

they are in the way of the blade, when the blade slips, or if an open blade is handled unexpectedly. Other hazards at job sites include stepping on sharp objects (e.g. wooden boards with protruding nails, sharp work-tools, chisels, etc.) and colliding with sharp and/or protruding objects.

Controls

Always be alert when handling sharps. Never look away or become distracted while handling sharp objects. Use caution when working with tools; use right tool for the job. Keep tools sharp, dull blades are a safety hazard, requiring more force to make cuts which can lead to tool slippage. Wear appropriate PPE and do not handle sharp objects (i.e., broken glass) with bare hands. Use mechanical devices, when possible. Stay away from building debris; avoid handling site debris or placing your hand where you cannot see. Watch out for barbed wire and electrical fences; cover with a car mat or equivalent to cross or walk around; use the buddy system to avoid entanglement; wear gloves. Do not leave unprotected sharps unattended. Use protective shields, cases, styrofoam blocks, etc. Pass a sharp by handing it over carefully by the handle with the blade down or retracted. Fixed open blades are prohibited. Always cut away from the body, making several passes when cutting thicker materials. Make sure blades are fitted properly into the knife. Never cut items with a blade or other sharp object on your lap. Never try to catch a blade or cutting tool that is falling.

Overhead Utilities

When work is undertaken near overhead electrical lines, the distance maintained from those lines shall also meet the minimum distances for electrical hazards as defined in Table 1 below. Note: utilities other than overhead electrical utilities need to be considered when performing work.

Table 1 Minimal Radial Clearance Distances *

Normal System Voltage Kilovolts (kV)	Required Minimal Radial Clearance Distance (feet/meters)
0 – 50	10/3.05
51 – 100	12/3.66
101 – 200	15/4.57
201 – 300	10/6.1
301 – 500	25/7.62
501 – 750	35/10.67
750 - 1000	45/13.72

* For those locations where the utility has specified more stringent safe distances, those distances shall be observed.

Controls

- To prevent damage, guy wires shall be visibly marked and work barriers or spotters provided in those areas where work is being conducted.
 - When working around guy wires, the minimum radial clearance distances for electrical power shall be observed.
- The PM shall research and determine if the local, responsible utility or client has more restrictive requirements than those stated in Table 1.
- If equipment cannot be positioned in accordance with the requirements established in Table 1 the lines need to be de-energized.

Line of Fire

Line of fire refers to the path an object will travel. Examples of line of fire situations typically observed on project sites include lifting/hoisting, lines under tension, objects that can fall or roll, pressurized objects or lines, springs or stored energy, work overhead, vehicles and heavy equipment.

Controls

- Never walk under a suspended load.
- Be aware and stay clear of tensioned lines such as cable, chain and rope.
- Be cautious of torque stresses that drilling equipment and truck augers can generate. Equipment can rotate unexpectedly long after applied torque force has been stopped.
- Springs and other items can release tremendous energy if compressed and suddenly released.
- Items under tension and pressure can release tremendous energy if it is suddenly released.
- Not all objects may be overhead; be especially mindful of top-heavy items and items being transported by forklift or flatbed.
- Secure objects that can roll such as tools, cylinders, and pipes.
- Stay clear of soil cuttings or soil stockpiles generated during drilling operations and excavations, be aware that chunks of soil, rocks, and debris can fall or roll.

Generated Waste

Activities on environmental sites may generate waste that requires regulated handling and disposal. Excess sample solids, decontamination materials, poly sheeting, used PPE, etc. that are determined to be free of contamination through field or laboratory screening can usually be disposed into client-approved, on-site trash receptacles. Uncontaminated wash water may be discarded onto the ground surface away from surface water bodies in areas where infiltration can occur. Contaminated materials must be segregated into liquids or solids and drummed separately for off-site disposal.

Controls

- Manage waste properly through good work practices.
- Collect, store, containerize waste, and dispose of it properly.
- All wastes generated shall be containerized in an appropriate container (i.e. open or closed top 55-gallon drum, roll-off container, poly tote, cardboard box, etc.) as directed by the PM.
- Containers should be inspected for damages or defects.
- Waste containers should be appropriately labeled indicating the contents, date the container was filled, owner of the material (including address) and any unique identification number, if necessary.
- Upon completion of filling the waste container, the container should be inspected for leaks and an appropriate seal.

Ground Disturbance

Ground disturbance is defined as any activity disturbing the ground. Ground disturbance activities include, but are not limited to, excavating, trenching, drilling (either mechanically or by hand), digging, plowing, grading, tunneling and pounding posts or stakes.

Because of the potential hazards associated with striking an underground utility or structure, the operating procedure for underground utility clearance shall be followed prior to performing any ground disturbance activities.

See OP1020 Working Near Utilities

Controls

Prior to performing ground disturbance activities, the following requirements should be applied:

- Confirm all approvals and agreements (as applicable) either verbal or written have been obtained.
- Request for line location has been registered with the applicable One-Call or Dial Before You Dig organization, when applicable.
 - Whenever possible, ground disturbance areas should be adequately marked or staked prior to the utility locators site visit.
- Notification to underground facility operator/owner(s) that may not be associated with any known public notification systems such as the One-Call Program regarding the intent to cause ground disturbance within the search zone.
- Notifications to landowners and/or tenant, where deemed reasonable and practicable.
- Proximity and Common Right of Way Agreements shall be checked if the line locator information is inconclusive.

Heavy Equipment

Staff must be careful and alert when working around heavy equipment, failure or breakage and limited visibility can lead to accidents and worker injury. Heavy equipment such as cranes, drills, haul trucks, or other can fail during operation increasing chances of worker injury. Equipment of this nature shall be visually inspected and checked for proper working order prior to commencement of field work. Those operating heavy equipment must meet all requirements to operate the equipment. Haley & Aldrich, Inc. staff that supervise projects or are associated with high risk projects that involve digging or drilling should use due diligence when working with a construction firm.

See OP1052 Heavy Equipment for additional information.

Controls

- Only approach equipment once you have confirmed contact with the operator (e.g., operator places the bucket on the ground).
- Always maintain visual contact with operators and keep out of the strike zone whenever possible.
- Always be alert to the position of the equipment around you.
- Always approach heavy equipment with an awareness of the swing radius and traffic routes of all equipment and never go beneath a hoisted load.
- Avoid fumes created by heavy equipment exhaust.

Noise

Working around heavy equipment (drill rigs, excavators, etc.) often creates excessive noise. The effects of noise include physical damage to the ear, pain, and temporary and/or permanent hearing loss. Workers can also be startled, annoyed, or distracted by noise during critical activities. Noise monitoring data that indicates that working within 25 feet of operating heavy equipment result in exposure to hazardous levels of noise (levels greater than 85 dBA).

See OP 1031 Hearing Conservation for additional information.

Controls

- Personnel are required to use hearing protection (earplugs or earmuffs) within 25 feet of any operating piece of heavy equipment.
- Limit the amount of time spent at a noise source.
- Move to a quiet area to gain relief from hazardous noise sources.
- Increase the distance from the noise source to reduce exposure.

Rotating Equipment

Exposure to rotating parts can occur when working near a drilling rig, or other similar equipment. All rotating parts should be covered with guards to prevent access by workers. When performing maintenance activities that require the rotating parts to be exposed, workers should not allow loose clothing, hands, or tools to approach the rotating parts. Energy isolation procedures must be followed, and guards must be replaced as soon as possible after completing the maintenance task.

Operation of drilling equipment also creates hazards associated with pinch points and rotating equipment. These are hazards where the body and extremities, especially the hands, can be caught in moving equipment and crushed.

Controls

- Evaluate work procedures to avoid placing the body and extremities in the path of rotating equipment and tools to avoid being struck by moving equipment, tools and machinery.
- Evaluate equipment and tool use to identify pinch points and develop procedures to avoid placing body parts in a position where they can be caught in moving equipment, tools and machinery.
- Follow energy isolation procedures if required
- Do not work near rotating equipment with long loose hair, loose clothing or jewelry.

Underground Utilities

Various forms of underground/overhead utility lines or conveyance pipes may be encountered during site activities. Prior to the start of intrusive operations, utility clearance is mandated, as well as obtaining authorization from all concerned public utility department offices. Should intrusive operations cause equipment to come into contact with utility lines, the SHSO, Project Manager, and Regional H&S Manager shall be notified immediately. Work will be suspended until the client and applicable utility agency is contacted and the appropriate actions for the situation can be addressed.

See [OP1020 Work Near Utilities for complete information.](#)

Controls

- Obtain as-built drawings for the areas being investigated from the property owner;
- Visually review each proposed soil boring locations with the property owner or knowledgeable site representative;
- Perform a geophysical survey to locate utilities;
- Hire a private line locating firm to determine location of utility lines that are present at the property;
- Identifying a no-drill or dig zone;
- Hand dig or use vacuum excavation in the proposed ground disturbance locations if insufficient data is unavailable to accurately determine the location of the utility lines.
-

NOTE: FIELD PERSONNEL MUST COMPLETE A TAILGATE SAFETY FORM EACH DAY AND THE SUBSURFACE CLEARANCE FIELD CHECKLIST PRIOR TO INITIATION OF SUBSURFACE DRILLING ACTIVITIES – SEE ATTACHMENT E PROJECT SITE FORMS – THESE FORMS MUST BE SAVED TO THE PROJECT FOLDER UPON COMPLETION OF FIELD WORK

4. PROTECTIVE MEASURES			
The personal protective equipment and safety equipment (if listed) is specific to the associated task. The required PPE and equipment listed must be onsite during the task being performed. Work shall not commence unless the required PPE or Safety Equipment is present.			
Required Safety & Personal Protective Equipment			
Required Personal Protective Equipment (PPE)	Task 1	Task 2	Task 3
	GPR Survey	Drilling	Soil, Soil Vapor, Groundwater Sampling
Safety Glasses	☒	☒	☒
Hearing Protection	☐	☒	☐
Safety Toed Shoes	☒	☒	☒
Class 2 Safety Vest	☒	☒	☒
Face Shield	☒	☒	☒
Cut Resistant Gloves	☒	☒	☒
Level of protection required	D	D	D
Required Safety Equipment			
First Aid Kit	☒	☒	☒

5. TRAINING REQUIREMENTS

The table below lists the training requirements staff must have respective to their assigned tasks and that are required to access the Site.

Site Specific Training Requirements

HAZWOPER - 40 Hour (Initial); HAZPOWER - 8 Hour (Annual Refresher); NYC Site Safety Training (SST); Tailgate Safety Meetings Daily

Task Specific Training Requirements

Required Training Type	Task 1	Task 2	Task 3	
	GPR Survey	Drilling	Soil, Soil Vapor, and Groundwater Sampling	Enter task description.
RCRA Haz Waste Generator	☒	☒	☒	☐
DOT HAZMAT Transporter Training	☒	☒	☒	☐
NYC Site Safety Training (SST)	☒	☒	☒	☐
Tailgate Safety Meetings (Daily)	☒	☒	☒	☐

6. AIR MONITORING PLAN AND EQUIPMENT

Exposures to airborne substances shall be fully characterized throughout project operations to ensure that exposure controls are effectively selected and modified as needed.

Is air/exposure monitoring required at this work site for personal protection? No

Is perimeter monitoring required for community protection? Yes

Air monitoring plan not applicable No

Air Monitoring/Screening Equipment Requirements

Photo-Ionization Detector (PID) 10.6eV

Dust Monitor (RAM)

The required equipment listed above must be on site. Work shall not commence unless the equipment is present and in working order.

Monitoring Plans

Parameter/ Contaminant	Equipment	Action Level	Response Activity
VOCs	PID 10.6 eV	< 10 ppm	Continue work and monitoring.
		>10 ppm for 5 minutes	Clear Instrument and Re-Monitor the Area. Implement PPE upgrades
		>10 ppm for >5 minutes	Evacuate the area and call the RHSM and/or PM for further guidance. Implement engineering controls.

Zone Location and Monitoring Interval

Breathing zone and edge of Exclusion Zone.

*If chemical does not have an action level use TLV or REL, whichever is lowest, to be used as an action level. If TLV or REL are the same as PEL, cut the PEL in half for an action level.

Parameter/ Contaminant	Equipment	Action Level*	Response Activity
VOCs	PID 10.6 eV	5 ppm	
Zone Location		Monitoring Interval	
Edge of Exclusion Zone	Choose an item.	Continual	

7. DECONTAMINATION & DISPOSAL METHODS

All possible and necessary steps shall be taken to reduce or minimize contact with chemicals and contaminated/impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment through or over, tracking, or splashing potential or known contaminated/impacted materials.)

Personal Hygiene Safeguards

The following minimum personal hygiene safeguards shall be adhered to:

1. No smoking or tobacco products in any project work areas.
2. No eating or drinking in the exclusion zone.
3. It is required that personnel present on site wash hands before eating, smoking, taking medication, chewing gum/tobacco, using the restroom, or 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.

Decontamination Supplies

All decontamination should be conducted at the project site in designated zones or as dictated by Client requirements. Decontamination should not be performed on Haley & Aldrich owned or leased premises.

☐ Acetone	☒ Distilled Water	☐ Polyethylene Sheeting
☒ Alconox Soap	☐ Drums	☐ Pressure/Steam Cleaner
☐ Brushes	☐ Hexane	☒ Tap Water
☒ Disposal Bags	☐ Methanol	☐ Wash tubs
☒ 5 Gallon Buckets	☒ Paper Towels	☐ Other: Specify

Location of Decontamination Station

N/A

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 other appropriate cleaner whenever possible. Remove inner gloves carefully by turning them inside out during removal. Wash hands and forearms frequently. It is good practice to wear work-designated clothing while on-site which can be removed as soon as possible. Non-disposable overalls and outer work clothing should be bagged onsite prior to laundering. If gross contamination is encountered on-site contact the Project Manager and Field Safety Manager 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. Remove and wipe clean hard hat
2. Rinse boots and gloves of gross contamination
3. Scrub boots and gloves clean
4. Rinse boots and gloves
5. Remove outer boots (if applicable)
6. Remove outer gloves (if applicable)
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.

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:

4. Wash using a solution of Alconox and water
5. Rinse with potable water
6. Rinse with methanol (or equivalent)
7. Rinse with distilled/deionized water

Inspect the equipment for any remaining contamination and repeat as necessary.

Disposal Methods
Procedures for disposal of contaminated materials, decontamination waste, and single use personal protective equipment shall meet applicable client, locate, State, and Federal requirements.
Disposal of Single Use Personal Protective Equipment
PPE that is not grossly contaminated can be bagged and disposed in regular trash receptacles. PPE that is grossly contaminated must be bagged (sealed and field personnel should communicate with the Project Manager to determine proper disposal.
Disposal Method for Contaminated Soil
- Contaminated soil cuttings and spoils must be containerized for disposal off-site unless otherwise specifically directed. - Soil cuttings and spoils determined to be free of contamination through field screening can usually be returned to the boreholes or excavations from which they came.
Standard Disposal Methods for Contaminated Materials
- Excess sample solids, decontamination materials, rags, brushes, poly-sheeting, etc. that are determined to be free of contamination through field screening can usually be disposed into client-approved, on-site trash receptacles. - Uncontaminated wash water may be discarded onto the ground surface away from surface water bodies in areas where infiltration can occur. - Contaminated materials must be segregated into liquids or solids and containerized separately for offsite disposal.

8. SITE CONTROL

The overall purpose of site control is to minimize potential contamination of workers, protect the public from the site's hazards, and prevent vandalism. Site control is especially important in emergency situations. The degree of site control necessary depends on site characteristics, site size, and the surrounding community. The following information identifies the elements used to control the activities and movements of people and equipment at the project site.

Communication
Internal Haley & Aldrich site personnel will communicate with other Haley & Aldrich staff member and/or subcontractors or contractors with: Face to Face Communication
External H&S site personnel will use the following means to communicate with off-site personnel or emergency services. Cellular Phones
Visitors
Project Site Will visitors be required to check-in prior to accessing the project site? Yes
Visitor Access Authorized visitors that require access to the project site need to be provided with known information with respect to the site operations and hazards as applicable to the purpose of their site visit. Authorized visitors must have the required PPE and appropriate training to access the project site. Site Safety Officer is responsible for facilitating authorized visitor access.
Zoning
Work Zone The work zone will be clearly delineated to ensure that the general public or unauthorized worker access is prevented. The following will be used: Temporary Fencing

9. SITE SPECIFIC EMERGENCY RESPONSE PLAN

The Emergency Response Plan addresses potential emergencies at this site, procedures for responding to these emergencies, roles, responsibilities during emergency response, and training. This section also describes the provisions this project has made to coordinate its emergency response with other contractors onsite and with offsite emergency response organizations (as applicable).

During the development of this emergency response plan, local, state, and federal agency disaster, fire, and emergency response organizations were consulted (if required) to ensure that this plan is compatible and integrated with plans of those organizations. Documentation of the dates of these consultations are the names of individuals contacted is kept on file and available upon request.

The site has been evaluated for potential emergency occurrences, based on site hazards, and the major categories of emergencies that could occur during project work are:

- Fire(s)/Combustion
- Hazardous Material Event
- Medical Emergency
- Natural Disaster

A detailed list of emergency types and response actions are summarized in Table X below. Prior to the start of work, the SSO will update the table with any additional site-specific information regarding evacuations, muster points, or additional emergency procedures. The SSO will establish evacuation routes and assembly areas for the Site. All personnel entering the Site will be informed of these routes and assembly areas.

Pre-Emergency Planning

Before the start of field activities, the Project Manager will ensure preparation has been made in anticipation of emergencies. Preparatory actions include the following:

Meeting with the subcontractor/and or client concerning the emergency procedures in the event a person is injured. Appropriate actions for specific scenarios will be reviewed. These scenarios will be discussed, and responses determined before the sampling event commences. A form of emergency communication (i.e.; Cell phone, Air horn, etc.) between the Project Manager and subcontractor and/or client will be agreed on before the work commences.

A training session (i.e., “safety meeting”) given by the Project Manager or their designee informing all field personnel of emergency procedures, locations of emergency equipment and their use, and proper evacuation procedures.

Ensuring field personnel are aware of the existence of the emergency response HASP and ensuring a copy of the HASP accompanies the field team(s).

Onsite Emergency Response Equipment

Emergency procedures may require specialized equipment to facilitate work rescue, contamination control and reduction or post-emergency cleanup. Emergency response equipment stocked

Table 9.1 Emergency Equipment and Emergency PPE			
Emergency Equipment	Specific Type	Quantity Stocked	Location Stored
First Aid Kit	General First Aid Kit	1 Per H&A employee	Throughout Site
Fire Extinguisher	Post-emergency cleanup	1 Fire Extinguisher	With Driller
Emergency PPE	Specific Type	Quantity Stocked	Location Stored
Gloves - "Nitrile"	General Nitrile Glove	1 Box	With H&A Personnel

EVACUATION ALARM
Verbal Communication (Site Personnel are adjacent in work zone)
EVACUATION ROUTES
Will be reviewed during project scoping kickoff meeting
EVACUATION MUSTER POINT(S)/ SHELTER AREA(S)
Will be reviewed during project scoping kickoff meeting
EVACUTION RESPONSE DRILLS
The Site relies on outside emergency responders and a drill is not required.

Table 9-2 – Emergency Planning

Emergency Type	Notification	Response Action	Evacuation Plan/Route
Chemical Exposure	Report event to SSO immediately	Refer to Safety Data Sheet for required actions	Remove personnel from work zone
Fire - Small	Notify SSO and contact 911	Use fire extinguisher if safe and qualified to do so	Mobilize to <i>Muster Point</i>
Fire – Large/Explosion	Notify SSO and contact 911	Evacuate immediately	Mobilize to <i>Muster Point</i>
Hazardous Material – Spill/Release	Notify SSO; SSO will contact PM to determine if additional agency notification is	If practicable don PPE and use spill kit and applicable procedures to contain the release	See Evacuation Map for route, move at least 100 ft upwind of spill location
Medical – Bloodborne Pathogen	Notify SSO	If qualified dispose in container or call client or city to notify for further instruction.	None Anticipated
Medical – First Aid	Notify SSO	If qualified perform first aid duties	None Anticipated
Medical – Trauma	If life threatening or transport is required call 911, immediately	Wait at site entrance for ambulance	Noe Anticipated
Security Threat	Notify SSO who will call 911 as warranted	Keep all valuables out of site and work zones delineated.	None Anticipated
Weather – Earthquake/Tsunami’s	STOP WORK and evacuate Site upon any earthquake	Turn off equipment and evacuate as soon as is safe to do so	Mobilize to <i>Shelter Location</i>
Weather – Lightning Storm	STOP WORK	Work may resume 30 minutes after the last observed lightning.	None Anticipated
Weather – Tornadoes/Hurricanes	Monitor weather conditions STOP WORK and evacuate the site	Evacuate to shelter location or shelter in place immediately	Mobilize to <i>Shelter Location</i>
<u>MUSTER POINT</u> Will be given location after site-specific training		<u>SHELTER LOCATION</u> Will be given location after site-specific training	
In case of site emergencies, site personnel shall be evacuated per this table and will not participate in emergency response activities. Site emergencies shall be reported to local, state, and federal governmental agencies as required.			

[illegible]

**ATTACHMENT A
HASP AMENDMENT FORM**

HASP AMENDMENT FORM

This form is to be used whenever there is an immediate change in the project scope that will require an amendment to the HASP. For project scope changes associated with “add-on” tasks, the changes must be made in the body of the HASP. Before changes can be made, a review of the potential hazards must be initiated by the Haley & Aldrich Project Manager.

This original form must remain on site with the original HASP. If additional copies of this HASP have been distributed, it is the Project Manager’s responsibility to forward a signed copy of this amendment to those who have copies.

Amendment No.	
Site Name	
Work Assignment No.	
Date	
Type of Amendment	
Reason for Amendment	
Alternate Safeguard Procedures	
Required Changes in PPE	

Project Manager Name (Print)

Project Manager Signature

Date

Health & Safety Approver Name
(Print)

Health & Safety Approver Signature

Date

**ATTACHMENT B
TRAINING REQUIREMENTS**

TRAINING REQUIREMENTS	
Health and Safety Training Requirements	
Personnel will not be permitted to supervise or participate in field activities until they have been trained to a level required by their job function and responsibility. 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. The Haley & Aldrich Project Manager/FSM will be responsible for maintaining and providing to the client/site manager documentation of Haley & Aldrich staff members' compliance with required training as requested. Records shall be maintained per OSHA requirements.	
40-Hour Health and Safety Training	
The 40-Hour Health and Safety Training course provides instruction on the nature of hazardous waste work, protective measures, proper use of personal protective equipment, recognition of signs and symptoms which might indicate exposure to hazardous substances, and decontamination procedures. It is required for all personnel working on-site, such as equipment operators, general laborers, and supervisors, who may be potentially exposed to hazardous substances, health hazards, or safety hazards consistent with 29 CFR 1910.120.	
8-hour Annual Refresher Training	
Personnel who complete the 40-hour health and safety training are subsequently required to attend an annual 8-hour refresher course to remain current in their training. When required, site personnel must be able to show proof of completion (i.e., certification) at an 8-hour refresher training course within the past 12 months.	
8-Hour Supervisor Training	
On-site managers and supervisors directly responsible for, or who supervise staff members engaged in hazardous waste operations, should have eight additional hours of Supervisor training in accordance with 29 CFR 1910.120. Supervisor Training includes, but is not limited to, accident reporting/investigation, regulatory compliance, work practice observations, auditing, and emergency response procedures.	
Additional Training for Specific Projects	
Haley & Aldrich personnel will ensure their personnel have received additional training on specific instrumentation, equipment, confined space entry, construction hazards, etc., as necessary to perform their duties. This specialized training will be provided to personnel before engaging in the specific work activities including: • Client specific training or orientation • Competent person excavations • Confined space entry (entrant, supervisor, and attendant) • Heavy equipment including aerial lifts and forklifts • First aid/ CPR • Use of fall protection • Use of nuclear density gauges • Asbestos awareness	

**ATTACHMENT C
ROLES AND RESPONSIBILITIES**

SITE ROLES AND RESPONSIBILITIES	
Haley & Aldrich Personnel	
Field Safety Manager (FSM)	The Haley & Aldrich FSM is a full-time Haley & Aldrich staff member, trained as a safety and health professional, who is responsible for the interpretation and approval of this Safety Plan. Modifications to this Safety Plan cannot be undertaken by the PM or the SSO without the approval of the FSM. Specific duties of the FSM include: • Approving and amending the Safety Plan for this project • Advising the PM and SHSOs on matter relating to health and safety • Recommending appropriate personal protective equipment (PPE) and air monitoring instrumentation • Maintaining regular contact with the PM and SSO to evaluate the conditions at the property and new information which might require modifications to the HASP and • Reviewing and approving JSAs developed for the site-specific hazards.
Project Manager (PM)	The Haley & Aldrich PM is responsible for ensuring that the requirements of this HASP are implemented at that project location. Some of the PM's specific responsibilities include: • Assuring that all personnel to whom this HASP applies have received a copy of it; • Providing the FSM with updated information regarding environmental conditions at the site and the scope of site work; • Providing adequate authority and resources to the on-site SHSO to allow for the successful implementation of all necessary safety procedures; • Supporting the decisions made by the SHSO; • Maintaining regular communications with the SHSO and, if necessary, the FSM; • Coordinating the activities of all subcontractors and ensuring that they are aware of the pertinent health and safety requirements for this project; • Providing project scheduling and planning activities; and • Providing guidance to field personnel in the development of appropriate Job Safety Analysis (JSA) relative to the site conditions and hazard assessment.
Site Health & Safety Officer (SHSO)	The SHSO is responsible for field implementation of this HASP and enforcement of safety rules and regulations. SHSO functions may include some or all of the following: • Act as Haley & Aldrich's liaison for health and safety issues with client, staff, subcontractors, and agencies. • Verify that utility clearance has been performed by Haley & Aldrich subcontractors. • Oversee day-to-day implementation of the Safety Plan by Haley & Aldrich personnel on site.

- Interact with subcontractor project personnel on health and safety matters.
- Verify use of required PPE as outlined in the safety plan.
- Inspect and maintain Haley & Aldrich safety equipment, including calibration of air monitoring instrumentation used by Haley & Aldrich.
- Perform changes to HASP and document in Appendix A of the HASP as needed and notify appropriate persons of changes.
- Investigate and report on-site accidents and incidents involving Haley & Aldrich and its subcontractors.
- Verify that site personnel are familiar with site safety requirements (e.g., the hospital route and emergency contact numbers).
- Report accidents, injuries, and near misses to the Haley & Aldrich PM and FSM as needed.

The SHSO will conduct initial site safety orientations with site personnel (including subcontractors) and conduct toolbox and safety meetings thereafter with Haley & Aldrich employees and Haley & Aldrich subcontractors at regular intervals and in accordance with Haley & Aldrich policy and contractual obligations. The SHSO will track the attendance of site personnel at Haley & Aldrich orientations, toolbox talks, and safety meetings.

Field Personnel

Haley & Aldrich personnel are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Reading the HASP in its entirety prior to the start of on-site work;
- Submitting a completed Safety Plan Acceptance Form and documentation of medical surveillance and training to the SHSO prior to the start of work;
- Attending the pre-entry briefing prior to beginning on-site work;
- Bringing forth any questions or concerns regarding the content of the Safety Plan to the PM or the SHSO prior to the start of work;
- Stopping work when it is not believed it can be performed safely;
- Reporting all accidents, injuries and illnesses, regardless of their severity, to the SHSO;
- Complying with the requirements of this safety plan and the requests of the SHSO; and
- Reviewing the established JSAs for the site-specific hazards on a daily basis and prior to each shift change, if applicable.

Visitors

Authorized visitors (e.g., Client Representatives, Regulators, Haley & Aldrich management staff, etc.) requiring entry to any work location on the site will be briefed by the Site Supervisor on the hazards present at that location. Visitors will be escorted at all times at the work location and will be responsible for compliance with their employer's health and safety policies. In addition, this safety plan specifies the minimum acceptable qualifications, training and personal protective equipment which are required for entry to any controlled work area; visitors must comply with these

requirements at all times. Unauthorized visitors, and visitors not meeting the specified qualifications, will not be permitted within established controlled work areas.

SUBCONTRACTOR PERSONNEL

Subcontractor Site Representative

Each contractor and subcontractor shall designate a Contractor Site Representative. The Contractor Site Representative will interface directly with Insert Staff Name Here, the Subcontractor Site Safety Manager, with regards to all areas that relate to this safety plan and safety performance of work conducted by the contractor and/or subcontractor workforce. Contractor Site Representatives for this site are listed in the Contact Summary Table at the beginning of the Safety Plan.

Subcontractor Site Safety Manager

Each contractor / subcontractor will provide a qualified representative who will act as their Site Safety Manager (Sub-SSM). This person will be responsible for the planning, coordination, and safe execution of subcontractor tasks, including preparation of job hazard analyses (JHA), performing daily safety planning, and coordinating directly with the Haley & Aldrich SHSO for other site safety activities. This person will play a lead role in safety planning for Subcontractor tasks, and in ensuring that all their employees 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.

General contractors / subcontractors are responsible for preparing a site-specific HASP and/or other task specific safety documents (e.g., JHAs), which are, at a minimum, in compliance with local, state, and/or federal other regulations, and/or industry and project specific safety standards or best management practices. The contractor(s)/subcontractor(s) safety documentation will be at least as stringent as the health and safety requirements of the Haley & Aldrich Project specific HASP.

Safety requirements include, but are not limited to: legal requirements, contractual obligations and industry best practices. Contractors/subcontractors will identify a site safety representative during times when contractor/subcontractor personnel are on the Site. All contractor/subcontractor personnel will undergo a field safety orientation conducted by the Haley & Aldrich SHSO and/or PM prior to commencing site work activities. All contractors / subcontractors will participate in Haley & Aldrich site safety meetings and their personnel will be subject to training and monitoring requirements identified in this Safety Plan. If the contractors / subcontractors means and methods deviate from the scope of work described in Section 1 of this Safety Plan, the alternate means and methods must be submitted, reviewed and approved by the Haley & Aldrich SHSO and/or PM prior to the commencement of the work task. Once approved by the Haley & Aldrich SHSO and/or PM, the alternate means and methods submittal will be attached to this Safety Plan as an Addendum.

**ATTACHMENT D
JOB SAFETY ANALYSES**



Safety
in everything we do

374 WALLABOUT STREET

KEY TASK: Remedial Investigation

Subtask Category	Potential Hazards	Controls
GPR Survey – Site Walk	Slips, Trips, and Falls	- Take your time and pay attention to where you are going - Adjust your stride to a pace that is suitable for the walking surface and tasks you are doing - Check the work area to identify hazards – beware of trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain - Establish and utilize a pathway free of slip and trip hazards - Choose a safer walking route - Carry loads you can see over - Keep work areas clean and free of clutter - Communicate hazards to on-site personnel – remove hazards as appropriate
GPR Survey – Site Walk	Vehicle traffic/safety	- Watch out for vehicular traffic in and around work area - Access work area along routes that are the least busy
Drilling	Work site access and controls	- Observe all work site access and controls before entering work area - Use only routes that are designated for personnel - Do not change or alter established work site access or controls
Drilling	Utility locators and underground hazards	- Observe work from a distance in case of utility strike - Immediately evacuate work area in the event of a utility strike
Drilling	Heavy equipment	Personal protective equipment, licensed excavator/machine operators

		• Maintain a safe distance from moving equipment and observe equipment swing radii •
Drilling	Noise reduction	• Personal protective equipment, ear plugs or ear muffs
Drilling	Cold stress	• Take breaks indoors, hand warmers
Drilling	Weather-related hazards	• Avoid slippery surfaces as a result of weather • Seek shelter in the event of a lightning storm and stay clear of potential lightning receptors
Drilling	Vehicle traffic/safety	• Watch out for vehicular traffic in and around work area • Access work area along routes that are the least busy
Drilling	Slips, trips, and falls	• As above
Soil, Soil Vapor, GW Sampling	Slips, trips, and falls	• As above
Soil, Soil Vapor, GW Sampling	Vehicle traffic/safety	• As above
Soil, Soil Vapor, GW Sampling	Weather-related hazards	• As above
Soil, Soil Vapor, GW Sampling	Cold stress	• As above
Soil, Soil Vapor, GW Sampling	Lifting	• You know where you are going • The area around the load is clear of obstacles • Doors are open and there is nothing on the floor that could trip someone or make them slip • You have a good grip on the load • Your hands, the load and any handles are not slippery • If you are lifting with someone else, both of you know what you are doing before you start • You should adopt the following technique when lifting the load: • Put your feet around the load and your body over it (if this is not feasible, try to

		keep your body as close as possible to the load and in front of it) • Use the muscles of your legs when lifting • Keep your back straight • Pull the load as close as possible to your body • Lift and carry the load with straight arms
Soil, Soil Vapor, GW Sampling	Tool/Equipment Use	• Inspect any tools or equipment before you use them • Ensure that any cords or plugs are not frayed or damaged • Only use tools/equipment for the purpose they are meant to be used – tools/equipment are not toys to be played with • Think of the steps in which you will use the tools/equipment before using them • Handle all tools/equipment in a safe manner • If unsure how to use a tool/equipment, be sure to receive proper training or instruction prior to using them • Use tools/equipment at a safe pace • Do not force tools/equipment to work

**ATTACHMENT E
PROJECT SITE FORMS**

PROJECT INFORMATION

Site Name:		Project Manager:	
Location:		Client Leader/LSRP:	
Client Name:		Scope of Work:	
Project Number:		Date of SSC Event:	

PROJECT BASICS (Completed prior to the start of field activities)

Site Contact Person Identified? Circle one: Yes No			
Contact Person/Company Name/Phone Number:			
Subcontractor & On-Site Representatives:			
Have the subsurface activities been explained to the subcontractor? Circle one: Yes No			
Public utility mark-out completed? Circle one: Yes No			
Public Mark-out/called in by Company/Representative:			Date:
Ticket Number:		Utilities Notified and Response received:	

PRE-CLEARANCE (Completed prior to breaking ground or determining final locations)

Private Utility Mark-out completed? Circle one: Yes No				Date:					
Work area and each intrusive location scanned for all utilities? Circle one: Yes No									
Private Mark-out completed by Subcontractor & Representative:									
Depth of accuracy (feet):				Limitations:					
Type of equipment used:									
Utility Identified & Marked-out		Depth (ft)	Yes	No	Utility Identified & Marked-out		Depth (ft)	Yes	No
Electricity (Red)					Sewer (Green)				
Gas (Yellow)					Telephone Data (Orange)				
Water (Blue)					Fuel/Oil				
Reclaimed H ₂ O/Irrigation (Purple)					Proposed excavation (white)				

SCOPE OF WORK

Scope of Work provided to subcontractors? Circle one: Yes No			
Number of intrusive locations:		Targeted depth (feet):	
Proposed intrusive locations within 10 feet of marked and/or known utility? Circle one: Yes No		Diameter of Borehole (inches):	
Final locations confirmed at least 10 feet away from all utilities? Circle one: Yes No			

FIELD OBSERVATIONS

Other Utilities & Visual Clues Observed	Yes	No	Other Utilities & Visual Clues Observed	Yes	No
Natural gas meters			Fire suppression		
Water meters			Fire hydrants		
Cable markers			Fire sprinkler lines		
Sewer drains/cleanouts			Sprinkler/irrigation systems		
Overhead lines (give 15' x 15' of clearance)			Utility poles with conduit leading to the ground		
Pipeline and pipeline markers			Utility boxes		
Underground storage tank (UST)			Manholes		
UST fill ports and vent pipes			Pavement scarring		
Lights			Remote buildings with no visible utilities		
Signage			Other (specify):		
Steam lines			Other (specify):		

Any mitigations taken if points cannot be obtained or site type was not listed: _____

Mitigations taken by whom: _____

Utility Point System: Gain points to protect against utility strike

Site Description	Minimum Points Needed
Combination of 2 or more Site Types	5
Commercial/Office Park	5
Downtown/Urban Development	5
Manufacturing/Active	5
Manufacturing/Non-Active	5
Mine	5
Rail	5
Residential	5
Roadway (right-of-way, highway, and secondary routes)	5
Roadway (right-of-way, rural route)	5
Universities/Government Campus/Airports	5
Abandoned/Non-Active/Vacant	3
Remote (field, woods, undisturbed)	2
Work over water	2
Site Type Not Listed Above	Consult with the PM, Utility Specialist, and Project Team
Cannot Gain Minimum Points	Perform hand clearing/soft dig/vacuum excavation

1 Point Value (2 Maximum from this Category)

Facility/contact supplied information (GIS figure with photo overlay; extensive client records and drawings)
The utilities have been marked using GPS or surveyed (with minimum accuracy of 0.1 foot)
A review of the work scope with a knowledgeable site contact (client contact, site manager, maintenance manager or other site personnel) about the site's history and utility locations/conditions (with a utility site drawing). A knowledgeable site contact is someone who has regular responsibilities for managing site infrastructure, construction activities, and/or retaining site drawings/figures.
A visual inspection of the site to verify that the utilities match the drawings and figures (completed after the State One Call Subsurface Clearance Checklist)
Confirmation of the low density of subsurface utilities (based on site maps, previous private utility locates)
Shallow boring advancement (<2 feet below ground surface (bgs) with non-mechanical drilling techniques)

2 Point Values

As-built drawings (plot plans, as-builts, pipeline or facilities maps, and/or lease drawings), reviewed and verified by client for updated changes
Confirmation that utilities cut off at street and align with drawings and figures
Drawing/figure (measured to scale, shows site utilities as visually verified during site walk); includes any new or repaired lines that match site (e.g., pavement scarring); depth and diameter of utilities; and recent (includes any new construction activity)
Survey data and figures produced by Haley & Aldrich and/or Haley & Aldrich site utility experience with additional site inspection
Site drawing and figures from prior private utility locate created by Haley & Aldrich (drawing must include GPS coordinates and utilities are to scale)
GPR/EM Cable location by private utility locate directly above proposed ground disturbance/borehole location

3 Point Values

3 Point Values	3 Point Values (Open Excavations Only)
Hand Clearing/Soft Dig/Vacuum Excavation to 5 feet bgs using the following soft dig clearance methods listed from least invasive to most: • Probing • Hand Digging • Hand Auguring • Vacuum Extraction • Air/Water Knife with Vacuum Extraction	Hand Clearing/Soft Dig/Vacuum Excavation using the following soft dig clearance methods to confirm location of known utilities prior to using mechanical excavation: • Probing • Hand Digging • Vacuum Extraction

Health & Safety Tailgate Meeting Form

Project:	Project No.:
Location:	Project Manager:
Subcontractor(s):	Date:
Site Safety & Health Officer (SSHO):	SSHO Contact Info:

Emergency Procedures

If an emergency occurs, follow procedure outlined in the HASP and contact numbers below. If non-life-threatening injury occurs, contact PM to report the incident. Seek first-aid treatment from the Occupational Health Center, as outlined in the HASP.

Emergency Dispatch phone number if other than 911:	
Local Hospital:	Local Hospital Phone #:
Evacuation/Muster Point:	Alt Evacuation/Muster Point:

Simultaneous Operations (SIMOPS)

SIMOPS or Multi-Crew Activity	☐ Yes	☐ No	If yes, describe SIMOPS:
Has SIMOPS been communicated to all workforce?	☐ Yes	☐ No	
SIMOPS PIC:			Phone Number:

Task Identification

Task	Responsible Company	Task Supervisor

Required Permits/Forms (check all that apply)

☐ None	☐ Lifting Plan	☐ Other:
☐ Confined Space Entry Permit	☐ Hot Work Permit	☐ Other:
☐ Lock-out / Tag-out (LOTO)	☐ Ground Disturbance Permit	☐ Other:
☐ Excavation Permit	☐ Other:	☐ Other:

Discussion of Work Hazards (check all that apply)

☐ Chemical ☐ Confined space ☐ Congested work area ☐ Elevated work ☐ Ergonomics ☐ Emergency egress	☐ Hazardous materials (lead, asbestos, etc.) ☐ Hoisting and rigging ☐ Hot work ☐ Material handling ☐ Noise pollution ☐ Oxygen deficiency	☐ Radiological ☐ Stored energy LOTO ☐ Traffic control ☐ Weather and/or temp extremes ☐ Waste generation ☐ Other:
--	---	---

Required PPE (check all that apply)

										
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hearing Protection	Safety Eyewear	Hard Hat	Safety Toed Shoes	Leather or Palm Protective	Safety Vest	Protective Clothing	Respiratory Protection	PFD	Face Shield	Fall Protection

Tailgate Topic / Hazard Discussion

Item	Discussion

Management of Change (MoC)

Does the work activity require a MoC? If yes, has it been authorized by applicable management? ☐ No ☐ Yes
Has the safety information been updated to incorporate any change in product, equipment, material or process? This information should include how to investigate accidents, audit compliance with safety procedures, and plan for emergency responses. ☐ No ☐ Yes
Have the procedures for a MoC been reviewed and evaluated? ☐ No ☐ Yes
Have all affected staff been informed and trained on the new equipment, process, or other changes? Health and safety hazards must be emphasized including processes/procedures in an emergency. The training must occur before any staff is allowed to operate the equipment or perform the job relating to the changes. ☐ No ☐ Yes
Have written procedures been put into place for the next time there is a change in safety management? ☐ No ☐ Yes

Best Practice(s) Observed? ☐ Yes ☐ No If yes, describe:	H&S Observations/ Near Misses/ Incidents Reported? ☐ Yes ☐ No If yes, describe:
Safe Work Interventions? ☐ Yes ☐ No If yes, describe:	Have additional hazards and risk controls been identified for future work? ☐ Yes ☐ No If yes, update appropriate job hazard analysis (JHA).

Site Safety & Health Officer Acknowledgement

At the conclusion of the day, I certify that the work site has been inspected and is being left in a safe and clean condition and any incidents have been properly reported.

Signature

Date

Worker Acknowledgement

By signing here, you are stating the following:

1. You understand the hazards and risk control actions associated with each task you are about to perform.
2. You understand the permit to work requirements pertinent to the work you are about to perform (if applicable).
3. You are aware that no tasks or work that is not risk-assessed is to be performed.
4. You also are aware of your obligation to implement 'Safe Work'.
5. You arrived and departed fit for duty.
6. You are physically and mentally fit for duty.
7. You are not under the influence of any type of medication, drugs, or alcohol that could affect your ability to work safely.
8. You are aware of your responsibility to bring any illness, injury (regardless of where or when it occurred), or fatigue issue you may have to the attention of the SSHO.
9. You signed out uninjured unless you have otherwise informed the SSHO.

Name (print)	Company	Initials & Sign In/Out Time		COVID-19 Self-Declaration
		In & Fit	Out & Fit	On File

Visitor Log *(Site Visitors not involved in the work activities)*

Name (print)	Company	Initials & Sign In/Out Time		COVID-19 Self Declaration
		In & Fit	Out & Fit	On File

**ATTACHMENT F
SITE-SPECIFIC OPERATING PROCEDURES**

APPENDIX F
NYSDOH CAMP Guidance Document

Appendix 1A

New York State Department of Health Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

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 $150 \text{ mcg}/\text{m}^3$ 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 $150 \text{ mcg}/\text{m}^3$ 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 $150 \text{ mcg}/\text{m}^3$ 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.

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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° C (14 to 122° 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.