Park Lane Senior

BRONX COUNTY

BRONX, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: C203138

Prepared for:

PL SARA LLC

70 East 55th Street, 7th Floor

New York, New York 10022

Prepared by:

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

DECEMBER 2023

CERTIFICATION STATEMENT

I, Charles McGuckin, P.E., certify that I am currently a NYS registered professional engineer and that this Site Management 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).

Charles J. McGuckin [P.E.]

December 18, 2023 DATE

Park Lane Senior

BRONX COUNTY

BRONX, NEW YORK

SITE MANAGEMENT PLAN

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List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
DUSR	Data Usability Summary Report
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Greenhouse Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCDOHMH	New York City Department of Health and Mental Hygiene
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PGWSCO	Protection of Groundwater Soil Cleanup Objective
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan

RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RRSCO	Restricted Residential Soil Cleanup Objective
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOE	Support of Excavation
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UUSCO	Unrestricted Use Soil Cleanup Objective
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification: C203138 - Park Lane Senior 1940 Turnbull Avenue, Bronx New York

Institutional Controls:	1. The property may be used for Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii), and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv) use;
	2. All ECs must be operated, maintained, and inspected at a frequency and in a manner defined in the SMP;
	3. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the NYCDOHMH to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
	4. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
	5. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
	6. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
	7. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
	8. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;

Site Identification:	C203138 - Park Lane Senior 1940 Turnbull Avenue, Bronx New York
	9. Access to the Site must be provided to agents, employees, or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
	10. The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 8, and any potential impacts that are identified must be monitored or mitigated;
	11. Vegetable gardens and farming on the Site are prohibited;
	12. An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any existing structures are demolished, or if the subsurface is otherwise made accessible.
Engineering Controls:	1. Cover system for Track 4 portion of the Site.

Inspections:	Frequency
1. Site wide inspection, including cover system	Annually
Monitoring: Not applicable	Not applicable
Maintenance: Cover system repairs/restoration	As needed
Reporting:	
Periodic Review Report	First report 16 months after COC is issued; then annually until completion and documentation of all development-related construction; then every 3 years thereafter.

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Park Lane Senior Project located in Bronx, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State (NYS) Brownfield Cleanup Program (BCP), Site No. C203138, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

PL SARA LLC entered into a Brownfield Cleanup Agreement (BCA), on November 16, 2020, as a Volunteer with the NYSDEC to remediate the Site. BCA Amendment No. 1 was executed on October 21, 2022, to change the ownership and request a determination that the Site is eligible for tangible property credits. A figure showing the Site location and boundaries of this site is provided in **Figure 1**. The boundaries of the Site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in **Appendix A**. The Environmental Easement was recorded on November 17, 2023.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Bronx County Clerk, requires compliance with this SMP and all ECs and ICs placed on the Site.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC); and

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the BCA (Index #C203138-09-20, Site #C203138)for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in **Appendix B** of this SMP.

This SMP was prepared by Roux Environmental Engineering and Geology, D.P.C. on behalf of PL SARA LLC in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010 and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the Site.

1.2 Revisions and Alterations

Revisions and alterations to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. All approved alterations must conform with Article 145 Section 7209 of the Education Law regarding the application of professional seals and alterations. For example, any changes to as-built drawings must be stamped by a New York State Professional Engineer. In accordance with the Environmental Easement for the Site, the NYSDEC project manager will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

1. 60-day advance notice of any proposed changes in site use that are required under the terms of the BCA, 6 NYCRR Part 375 and/or Environmental Conservation Law.

2. 7-day advance notice of any field activity associated with the remedial program.

3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.

4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.

5. Notice within 48 hours of any non-routine maintenance activities.

6. Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

1. At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the Brownfield Cleanup Agreement (BCA), and all approved work plans and reports, including this SMP.

2. Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 below includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table 1: Notifications*

Name	**Contact Information**	**Required Notification****
Christopher Allan NYSDEC Project Manager	(718) 482-4065 Christopher.Allan@dec.ny.org	All Notifications
Jane O'Connell NYSDEC Regional Remediation Engineer	(718) 482-4599 jane.oconnell@dec.ny.gov	All Notifications
Cris-Sandra Maycock NYSDEC Project Manager's Supervisor	(718) 482-4679 cris-sandra.maycock@dec.ny.gov	All Notifications
NYSDEC Site Control	(518) 402-9553 dersitecontrol@dec.ny.gov	Notifications 1, 8, and 9
Sally Rushford NYSDOH Project Manager	(518) 402-5465 Sally.Rushford@health.ny.gov	Notifications 4, 6, and 7

* Note: Notifications are subject to change and will be updated, as necessary.

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in the Bronx, Bronx County, New York and is identified as Section 2. Block 3672 and Lot 30 on the New York City and Borough of the Bronx Tax Map (see **Figure 2**). The site is an approximately 0.293-acre area and is part of a greater property which serves as an senior affordable housing complex, identified as adjacent Lots 1 and 20. The site is bounded by Turnbull Avenue and commercial retail stores to the north, a residential housing building to the east (Lot 1), a private parking lot that serves the adjoining complex to the south (Lot 20), and a basketball court and additional parking to the west (Lot 20). The boundaries of the Site are more fully described in **Appendix A** – Environmental Easement. The owners and operator of the Site parcel at the time of issuance of this SMP are:

- Fee Owner –HP Park Lane Senior Housing Development Fund Company, Inc.
- Beneficial Owner – PL SARA LLC.
- Operator – Grenadier Realty Corporation

2.2 Physical Setting

2.2.1 Land Use

The Site consists of the following: a parking lot and multi-family residential building. The Site is zoned residential with a commercial overlay (R8/ C2-4) and is currently undergoing redevelopment. Prior to the start of remedial activities, the Site was part of a wetland river system until the mid-1950s when it was filled with unknown fill material. The site was then improved to a paved parking lot in the early 1970s.

The properties adjoining the Site to the east, south, and west; and the Site itself are part of a greater property that serves a senior affordable housing complex. The neighborhood surrounding the Site and its adjoining properties primarily includes commercial and residential use properties. The properties immediately south of the complex include public facility and institutional properties; the properties immediately north of the complex include commercial retail and office properties; the properties immediately east of the complex include residential properties; and the properties to the west of the complex include commercial retail and office properties.

2.2.2 Geology

The shallow deposits on the Site are typical fill material found in urban environments and extends to depths between 15 and 18 feet below land surface (ft bls) across the Site. The urban fill overlies native deposits consisting mostly of silty clay. Bedrock was not encountered during the RI; however prior geotechnical investigations indicate the bedrock depth is variable across the Site, and at its shallowest point was encountered at 40 ft bls at certain portions of the Site.

A geologic cross section following completion of the remedial excavation is shown in **Figure 3**.

2.2.3 Hydrogeology

Groundwater at the Site is present at depths between 10.43 ft bls and 11.32 ft bls (Elevation 5.27 to 5.50 ft North American Vertical Datum of 1988 [NAVD88]) based on a gauging event of four onsite monitoring wells completed on June 14, 2021 during the Remedial Investigation (RI). Based upon Site measurements groundwater generally flows southeast. Groundwater in this area of the Bronx is not used as a source of potable water.

A groundwater contour map is shown in **Figure 4**. As a result of the construction activity and implementation of the Remedial Action, all monitoring wells installed for the RI have since been removed.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

The following environmental reports were available for review:

- Environmental Assessment Statement (EAS) prepared by Philip Habib & Associates (PHA), dated June 2017;
- Phase I Environmental Site Assessment (ESA), prepared by Roux, dated April 2020;
- Phase II ESA, prepared by Roux, dated April 2020;
- Remedial Investigation Report (RIR)/Remedial Action Work Plan (RAWP), prepared by Roux, dated November 2021;
- Waste Characterization Report, prepared by PT Consultants, Inc., dated June 2022.

Based on the Roux Phase II ESA, the Site appeared to have been impacted by polycyclic aromatic hydrocarbons (PAHs) and metals originating from prior site operations most likely associated with placement of historic urban fill to fill the marshland historically present at the Site and surrounding area. As part of the NYSDEC BCP, the Site underwent additional investigations to delineate the nature and extent of contamination.

2.3.1 Nature and Extent of Contamination Prior to Remediation

As part of prior investigations to support diligence and investigate the Site for remedial planning, soil and groundwater samples were collected and analyzed for Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), pesticides, per- and polyfluoroalkyl substances (PFAS). Soil vapor was analyzed for VOCs. These investigations identified that the primary contaminants of concern are SVOCs and metals in soil and groundwater. The investigations also identified low-level concentrations of VOCs in soil vapor that did not warrant mitigation.

2.3.1.1 Soil

SVOCs were detected in soil at concentrations exceeding RRSCOs, including benzo(a)anthracene at a maximum concentration of 108 parts per million (ppm) (RRSCO is 1 ppm), benzo(a)pyrene at a maximum concentration of 110 ppm (RRSCO is 1 ppm), benzo(b)fluoranthene at a maximum concentration of 95.3 ppm (RRSCO is 1 ppm), benzo(k)fluoranthene at a maximum of 83 ppm (RRSCO is 3.9 ppm), chrysene at a maximum of 96.8 ppm (RRSCO is 3.9 ppm), dibenz(a,h)anthracene at a maximum of 19 ppm (RRSCO is 0.33 ppm), and indeno(1,2,3-cd)pyrene at a maximum of 92.9 ppm (RRSCO is 0.5 ppm).

Metals including arsenic, barium, chromium, lead, and mercury were found in soil exceeding the RRSCOs. Arsenic was found at a maximum concentration of 92.7 ppm (RRSCO is 16 ppm). Barium was found at a maximum concentration of 2,810 ppm (RRSCO is 400 ppm). Trivalent chromium was found at a maximum concentration of 670 ppm (RRSCO is 180 ppm). Lead was found at a maximum concentration of 60,700 ppm (RRSCO is 400 ppm). Mercury was found at a maximum concentration of 3.44 ppm (RRSCO is 0.81 ppm).

These contaminants were detected in soil borings throughout the Site ranging from 0 to 15 ft bls. No VOCs, PCBs, or pesticides were detected at concentrations exceeding RRSCOs. No PFAS compounds were found at concentrations exceeding the Restricted Residential Guidance Values. The data does not indicate any off-site impacts in soil related to this site.

2.3.1.2 Groundwater

SVOCs were detected in groundwater at concentrations exceeding Ambient Water Quality Standard and Guidance Values (AWQSGVs), including benzo(a)anthracene at a maximum of 0.2 parts per billion (ppb) (AWQSGV is 0.002 ppb), benzo(a)pyrene at a maximum of 0.156 parts per billion (ppb) (AWQSGV is 0.002 ppb), benzo(b)fluoranthene at a maximum of 0.122 parts per billion (ppb) (AWQSGV is 0.002 ppb), benzo(k)fluoranthene at a maximum of 0.133 parts per billion (ppb) (AWQSGV is 0.002 ppb), chrysene at a maximum of 0.178 parts per billion (ppb) (AWQSGV is 0.002 ppb), and indeno(1,2,3-cd)pyrene at a maximum of 0.078 parts per billion (ppb) (AWQSGV is 0.002 ppb).

Only naturally occurring metals were found at concentrations exceeding AWQSGVs.

PFAS detections in exceedance of NYSDOH Maximum Contaminant Levels (MCLs) included perfluorooctanoic acid (PFOA) (max of 21.3 parts per trillion (ppt); MCL of 10 ppt).

No pesticides or PCBs were found exceeding AWQSGVs.

The data does not indicate any off-site impacts in groundwater related to this site.

2.3.1.3 Soil Vapor

VOCs were detected in soil vapor including tetrachloroethene (PCE) found at a maximum of 75.5 micrograms per cubic meter (ug/m3) and trichloroethene (TCE) found at a maximum of 0.261 ug/m3. The data does not indicate any off-site impacts in soil vapor related to this site.

2.3.2 Summary of Contamination Prior to Remediation

The data generated during the RI indicated the following about site-wide conditions:

- The only VOC detected in soil exceeding NYSDEC PGWSCOs was acetone, which is a common laboratory contaminant. There were no exceedances of AWQSGVs in groundwater and there is no indication that there is a source of groundwater contamination at the Site for VOCs. According to the NYSDOH Soil Vapor/Indoor Air Matrix 1, the VOCs detected in soil vapor do not exceed the "reasonable and practical" level for sub-slab vapor.
- SVOCs, exclusively PAHs, were detected at elevated concentrations above NYSDEC RRSCOs and PGWSCOs in most soils across the Site as well as detected in groundwater above the AWQSGV in two samples. It is likely that SVOCs present in the unfiltered groundwater samples were a result of sediment present in the samples and are not representative of dissolved impacts in groundwater. This data indicates that SVOCs in soil are not a significant source of groundwater contamination at the Site.
- Metals were detected in soil at elevated concentrations above NYSDEC SCOs across the Site. Arsenic, Barium, Cadmium, Chromium III, Copper, Lead, and Mercury were detected at concentrations exceeding NYSDEC RRSCOs. Metals contamination is related to the use of urban fill at the Site. A notable detection of lead was detected in soil at a concentration of 60,700 mg/kg, at one location (RXSB-7) at a depth interval of 5-7 feet ft bls. Based on nearby data, this condition appears to be isolated and was co-located with historic fill material consisting of fine to coarse sand, gravel, brick, and asphalt. A corresponding sample was collected from RXSB-7/5-7 for leachable lead analysis using the Toxicity Characteristic Leaching Procedure (TCLP), which yielded leachable lead results of 120 mg/L, which is over the United State Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA) threshold for determining presence of characteristic hazardous waste (i.e., 5.0 mg/L). Metals detected in groundwater above the AWQSGV were Iron, Magnesium, Manganese, and Sodium. The metals detected at concentrations above NYSDEC PGWSCOs in soil were not detected in dissolved groundwater indicating that metals in soil are not a source of groundwater contamination at the Site.
- PCBs were not detected in any of the soil or groundwater samples.
- Pesticides and Herbicides were detected sporadically throughout Site soils at concentrations exceeding NYSDEC UUSCOs, but none in exceedance of their RRSCOs and they were not detected in groundwater.
- PFAS compounds were detected in both the soil fill layer and groundwater. There were no exceedances of the NYSDEC guidance values for RRSCOs and

one exceedance for PFOA of the NYSDEC PGWSCOs guidance values. Concentrations of PFOS were above the NYSDEC UUSCOs guidance values at five locations. The presence of PFAS is likely due to background levels of these compounds in New York City and they are not considered contaminants of concern.

- Low level concentrations of VOCs TCE and PCE were present in soil vapor and were not indicative of a source. A single detection of TCE (0.261 ug/m3) was present in soil vapor sampled from SV-4, and the highest concentration of PCE was detected in soil vapor at SV-6 at a concentration of 75.5 ug/m3. According to water-level data collected during the RI, the elevation of the water table at the Site ranges from approximately 5.27 ft NAVD 88 at the northeast portion of the Site to approximately 5.50 ft NAVD 88 in the northwest portion of the Site. Groundwater depth at the Site varied from 10.43 ft bls to 11.32 ft bls. Groundwater gauging data is included as **Table 1 of the RIR/RAWP**. A groundwater flow map is provided in **Figure 4** and it shows that the flow is generally to the southeast towards Westchester Creek.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Decision Document dated December 8, 2021, are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

RAOs for Environmental Protection

- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

2.5 Summary of Remedial Action

The RIR/RAWP proposed a combined Track 2 and Track 4 Restricted Residential Use cleanup consisting of the following remedial components that were completed:

- Installation of SOE as required by the NYCDOB to reach excavation depths;
- Excavation and off-Site disposal of approximately 7,935 tons (5,505 cy) of soil, as described below:
  - Soil removed to a depth of 15 feet in the west and center portions of the Site designated for the senior housing building footprint to achieve a Track 2 Restricted Residential Use cleanup;
  - Soil removed to a depth of 2 feet in the east portion of the Site designated for a parking lot to achieve a Track 4 Restricted Residential Use cleanup. Within this area, additional soil was removed pertaining to the following:
    - Soil removed to a maximum depth of 12 feet in the southeast portion of the Site for a hazardous lead hot spot;
    - Soil removed to a depth of 6 feet in the southeast portion of the Site for a utility trench;
- Collection and analysis of endpoint samples to evaluate the performance of the remedy with respect to attainment of Track 2 and Track 4 RRSCOs.
- Backfilled excavated areas with clean fill that met the requirements of 6 NYCRR Part 375-6.7(d) for restricted residential use. The clean fill replaced the excavated soil and established the designed grades at the Site. Approximately 1,530 cy of clean fill was imported to the Site.
- Dewatered and off-Site disposal of groundwater as needed to facilitate excavation.
- Installation of a Site cover system consisting of asphalt pavement overlying imported sub-base aggregate backfill, as detailed in Section 3.3.1.
- Recording of an Environmental Easement, including ICs and ECs, to ensure proper site use and prevent future exposure to any residual contamination remaining at the Site; and
- Preparation of an SMP for long term management of residual contamination as required by the Environmental Easement.

2.6 Remaining Contamination

Remaining contamination is present in soil after the remedial action was completed. The building footprint achieved a Track 2 Restricted Residential Use cleanup and, the paved area of the Site achieved a Track 4 Restricted Residential Use cleanup through the implementation of EC (Site Cover System). Long term management of the EC/ICs will be performed in accordance with this SMP. The area that achieved Track 4 is shown in **Figure 8**.

2.6.1 Soil

Tables 2 through 8 and **Figure 5** summarize the results of all soil samples collected that exceed the PGWSCOs and the RRSCOs at the Site after completion of the remedial action.

Based on the endpoint samples collected during the remedial action, the remaining contamination is primarily limited to SVOCs and metals. All remaining contamination is located under the building foundation slab or asphalt surfaces.

2.6.2 Soil Vapor

Table 9 and **Figure 6** summarize the results of all samples of soil vapor that exceeded the SCGs during the RI.

Soil vapor data was collected during the RI, as discussed in Section 2.3. Soil vapor concentrations were generally low and have been addressed through the excavation and offsite disposal of soil down to at least 15 ft bls to facilitate installation of the building's foundation. As part of the Site's redevelopment, a waterproofing system was installed beneath the building as an element of construction. It consists of:

- 47-mil Preprufe 300R waterproofing membrane applied beneath the cellar floor and elevator pit slab;
- 31-mil Preprufe 160R waterproofing membrane applied outside all sub-grade single formed foundation sidewalls in the cellar area;
- Bituthene System 4000 waterproofing membrane applied to double formed walls;
- Bituthene liquid sealant applied around piles and other penetrations.

2.6.3 Groundwater

Tables 10 through 15 and **Figure 7** summarize the results of all samples of groundwater that exceeded the SCGs during the RI.

Groundwater data was collected during the RI, as discussed in Section 2.3. The remedial action addressed groundwater through removal of soil with SVOCs above RRSCOs and/or PGWSCOs. The underlying soil did not exhibit signs of impact (odor, staining, PID readings, etc.).

During the remedial action, groundwater was extracted via a dewatering system pursuant to NYCDEP discharge permits C001466335, C001812693, and C002087899. Groundwater removed from the excavation was treated on-Site utilizing a settling tank prior to discharge to the combined sewer system. Any remaining contamination is located under the building foundation slab or asphalt surfaces.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the Site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC project manager.

This plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix C) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the Site remedy, as determined by the NYSDEC project manager.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and (3) limit the use and development of the Site to restricted residential, commercial, and/or industrial uses only. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on **Figure 8**. These ICs are:

- The property may be used for: restricted residential; commercial, industrial use;
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the NYCDOHMH to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on **Figure 8**, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the Site are prohibited; and
- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 Engineering Controls

3.3.1 Site Cover

Exposure to remaining contamination at the Site is prevented by a cover system placed over the Track 4 area of the Site. This cover system is comprised of a minimum of 4 inches of asphalt pavement, overlying a 4-inch imported sub-base aggregate backfill. **Figure 8** presents the location of the cover system and applicable demarcation layers. The Excavation Work Plan (EWP) provided in **Appendix C** outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed. Procedures for the inspection of this cover are provided in the Monitoring Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the Site and provided in **Appendix E**. Any breach of the Site's cover system must be overseen by a Professional Engineer (PE) who is licensed and registered in New York State or a qualified person who directly reports to a PE who is licensed and registered in New York State.

3.3.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

3.3.2.1 Site Cover

The site cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

4.0 MONITORING PLAN

4.1 General

This Monitoring Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring Plan may only be revised with the approval of the NYSDEC project manager.

This Monitoring Plan describes the methods to be used for:

- Monitoring the site cover system; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring Plan provides information on:

- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site – wide Inspection

Site-wide inspections will be performed annually. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix F** – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;

- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the Site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Environmental Easement;
- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, verbal notice to the NYSDEC project manager must be given by noon of the following day. In addition, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the Site by a qualified environmental professional, as defined in 6 NYCCR Part 375. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public. The remedial party will submit follow-up status reports to the NYSDEC within 45 days of the event on actions taken to respond to any emergency event requiring ongoing responsive action, describing and documenting actions taken to restore the effectiveness of the ECs.

4.3 Treatment System Monitoring and Sampling

There are no active ECs, therefore, Treatment System Monitoring and Sampling is not included in this SMP.

4.4 Post-Remediation Media Monitoring and Sampling

There is no media to be monitored and sampled after the remediation is completed; therefore, it is not included in this SMP. The remedial elements including excavation within the Track 2 area and the site cover system within the Track 4 area addressed the remaining soil contamination. Based on the RI data, groundwater is not significantly impacted and is not used for drinking or other potable uses, and there is no direct contact with or ingestion by the general public. Based on the soil vapor data from the RI and no on-Site source identified during the remediation, there is no current vapor intrusion risk for the building currently under construction at the time this SMP was prepared.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

The site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the Site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the Site during periodic assessments, and briefly summarizes the vulnerability of the Site and/or engineering controls to severe storms/weather events and associated flooding.

- Flood Plain: The Site is not located in the 100-year flood zone, but it is located in the 500-year flood zone.
- Site Drainage and Storm Water Management: A building encompasses the majority of the Site. Onsite stormwater from the roof of the building and in the area surrounding the building will be managed via trench drains, planter drains, and catch basins. Storm water will pass through a detention tank that will capture and retain any sediment prior to discharge into the NYC sewer system. The offsite surrounding area drains to the NYC sewer system through catch basins near the Site.
- Erosion: The Site will be primarily covered by buildings, pavers, and pavement; these improvements will prevent erosion.
- High Wind: There are no remedial aspects of the Site that would be affected by high wind.
- Spill/Containment Release: No areas of the Site have been identified that may be susceptible to a spill or other containment release due to storm-related damage caused by flooding, erosion, high winds, loss of power, etc.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the Site during site management, and as reported in the Periodic Review Report (PRR).

In the selection of the remedy several components of sustainability were evaluated, including waste generation, energy usage, emissions, water usage, and land and/or ecosystems.

The current ECs have no mechanical systems; require no operations or maintenance; and therefore, generate no waste, use no energy, produce no emissions, require no water, and shouldn't require any disturbances of land and/or ecosystems.

If alterations are made to the ECs at the Site, to reduce energy consumption, resource usage, waste generation, and water usage, etc. will be included in the PRR.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the NYSDEC project manager feels appropriate, e.g., during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.2 Building Operations

Structures including buildings and sheds will be operated and maintained to provide for the most efficient operation of the remedy, while minimizing energy, waste generation and water consumption.

6.2.3 Frequency of Periodic Activities

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to conduct system checks and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

Consideration shall be given to:

- Reduced site visits and system checks;
- Coordination/consolidation of activities to maximize labor time; and
- Use of mass transit for site visits, where available, and carpooling.

6.2.4 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix F – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits. A set of metrics has been developed.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix F. These forms are subject to NYSDEC revision. All site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records generated for the Site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of **Table 17** and summarized in the Periodic Review Report.

Table 17: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Periodic Review Report	First report 16 months after COC is issued; then annually until completion and documentation of all development-related construction; then every 3 years thereafter.

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC project manager.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;

- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the NYSDEC project manager beginning sixteen (16) months after the Certificate of Completion is issued. After submittal of the initial PRR, the next PRR shall be submitted annually to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that the Site is subdivided into separate parcels with different ownership, a single PRR will be prepared that addresses the Site described in **Appendix A** -Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site.
- Results of the required annual site inspections, fire inspections and severe condition inspections, if applicable.
- Description of any change of use, import of materials, or excavation that occurred during the certifying period.
- All applicable site management forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- A site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the Site-specific Remedial Action Work Plan (RAWP), ROD or Decision Document;
  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;

- Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
- An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the RAWP, ROD or Decision Document; and
- The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional as defined in 6 NYCRR Part 375 or Professional Engineer licensed to practice and registered in New York State will prepare, and include in the PRR, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the site, I certify that all of the following statements are true:*

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*

- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Charles McGuckin, of Roux Environmental Engineering and Geology, D.P.C., am certifying as Owner's Designated Site Representative.

I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report."

The signed certification will be included in the PRR.

The PRR will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager. The PRR may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control or failure to conduct site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC project manager.

8.0 REFERENCES

6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

NYSDEC, December 2021. Declaration Statement – Decision Document.

NYSDEC, January 2021. Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs.

Philip Habib & Associates (PHA) Environmental Assessment Statement (EAS) CEQR#17DCP172X ULURP #s C170392ZMX & N170393ZRX, dated June 2, 2017;

Roux Phase I ESA: Park Lane Senior Block 3672, Lot 30 Bronx, New York, dated April 30, 2020

Roux Phase II ESA: Park Lane Senior Block 3672, Lot 30 Bronx, New York, dated April 17, 2020.

Roux Remedial Investigation Report / Remedial Action Work Plan: Park Lane Senior, dated November 16, 2021.

TABLES

Notes Utilized Throughout Tables	
Soil Tables	
J -	Estimated value
J+ -	Estimated value, high bias
J- -	Estimated value, low bias
U -	The analyte was analyzed for, but was not detected above the level of the associated reported quantitation limit
UJ -	Analyte was not detected. The associated reported quantitation limit is an estimate
R -	Sample results rejected by validator
T -	Indicates that a quality control parameter has exceeded laboratory limits
ft bls -	Feet below land surface
FD -	Duplicate sample
µg/kg -	Micrograms per kilogram
mg/kg -	Milligrams per kilogram
NYSDEC -	New York State Department of Environmental Conservation
SCO -	Soil Cleanup Objectives
--	No SCO available
Bold data indicates that parameter was detected above the NYSDEC Part 375 Restricted Residential SCO	
Shaded data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater SCO	
Per- and Polyfluoroalkyl Substances (PFAS)	
GV -	Guidance Values
Bold data indicates that parameter exceeded the NYSDEC Restricted Residential Guidance Values	
Shaded data indicates that parameter exceeded the NYSDEC Protection of Groundwater Guidance Values	
TCLP Tables	
mg/L -	Milligrams per liter
USEPA -	United States Environmental Protection Agency
TCLP -	Toxicity Characteristic Leaching Procedure
USEPA Regulatory Levels - United States Environmental Protection	
	Agency Limits for RCRA Characteristic Waste for Toxicity
RCRA -	Resource Conservation and Recovery Act
Bold -	Parameter was detected above USEPA Regulatory Levels

Table 2. Summary of Remaining Volatile Organic Compounds in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-1	BDS-2	BDS-3	BDS-4	BDS-5	BDS-6
			Sample Date:	11/22/2022	12/08/2022	11/22/2022	12/08/2022	11/18/2022	11/08/2022
			Sample Depth (ft bls):	15 - 17	15 - 17	15 - 17	15 - 17	15 - 17	19 - 20
			Normal Sample or Field Duplicate:	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
1,1,1-Trichloroethane (TCA)	100	0.68	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
1,1-Dichloroethane	26	0.27	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
1,1-Dichloroethene	100	0.33	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
1,2,4-Trimethylbenzene	52	3.6	MG/KG	0.0024 UJ	0.0022 J-	0.0017 UJ	0.0021 U	0.0047 U	0.0028 UJ
1,2-Dichlorobenzene	100	1.1	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
1,2-Dichloroethane	3.1	0.02	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
1,3,5-Trimethylbenzene (Mesitylene)	52	8.4	MG/KG	0.0024 UJ	0.00087 J-	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
1,3-Dichlorobenzene	49	2.4	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
1,4-Dichlorobenzene	13	1.8	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
Acetone	100	0.05	MG/KG	0.42 J-	0.23 J-	0.44 J-	0.05	0.24	0.41
Benzene	4.8	0.06	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
Carbon Tetrachloride	2.4	0.76	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
Chlorobenzene	100	1.1	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
Chloroform	49	0.37	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 UT	0.0047 U	0.0028 U
Cis-1,2-Dichloroethylene	100	0.25	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 UT	0.0047 U	0.0028 U
Ethylbenzene	41	1	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
Methyl Ethyl Ketone (2-Butanone)	100	0.12	MG/KG	0.06 J-	0.029 J-	0.073 J-	0.01 U	0.024 U	0.055
Methylene Chloride	100	0.05	MG/KG	0.0047 UJ	0.0042 UJ	0.0033 UJ	0.0041 U	0.0095 U	0.0055 U
N-Butylbenzene	100	12	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
N-Propylbenzene	100	3.9	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
Sec-Butylbenzene	100	11	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 UT	0.0047 U	0.0028 U
T-Butylbenzene	100	5.9	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 UJ
Tert-Butyl Methyl Ether	100	0.93	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 UT	0.0047 U	0.0028 U
Tetrachloroethylene (PCE)	19	1.3	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
Toluene	100	0.7	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
Trans-1,2-Dichloroethene	100	0.19	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
Trichloroethylene (TCE)	21	0.47	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 UT	0.0047 U	0.0028 U
Vinyl Chloride	0.9	0.02	MG/KG	0.0024 UJ	0.0021 UJ	0.0017 UJ	0.0021 U	0.0047 U	0.0028 U
Xylenes	100	1.6	MG/KG	0.0047 UJ	0.0042 UJ	0.0008 J	0.0041 U	0.0095 U	0.0055 U

Table 2. Summary of Remaining Volatile Organic Compounds in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-7	BDS-8	BDS-9	BDS-10	BDS-11	BDS-11
			Sample Date:	11/17/2022	11/17/2022	11/17/2022	11/10/2022	03/01/2023	03/01/2023
			Sample Depth (ft bls):	15 - 17	15 - 17	15 - 17	15 - 16	2 - 4	2 - 4
			Normal Sample or Field Duplicate:	N	N	N	N	N	FD
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
1,1,1-Trichloroethane (TCA)	100	0.68	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
1,1-Dichloroethane	26	0.27	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
1,1-Dichloroethene	100	0.33	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
1,2,4-Trimethylbenzene	52	3.6	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0015 J	0.0014 U	0.0015 U
1,2-Dichlorobenzene	100	1.1	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
1,2-Dichloroethane	3.1	0.02	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
1,3,5-Trimethylbenzene (Mesitylene)	52	8.4	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
1,3-Dichlorobenzene	49	2.4	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
1,4-Dichlorobenzene	13	1.8	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Acetone	100	0.05	MG/KG	0.15	0.2	0.092	0.17	0.0087 U	0.0087 U
Benzene	4.8	0.06	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Carbon Tetrachloride	2.4	0.76	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Chlorobenzene	100	1.1	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Chloroform	49	0.37	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Cis-1,2-Dichloroethylene	100	0.25	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Ethylbenzene	41	1	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Methyl Ethyl Ketone (2-Butanone)	100	0.12	MG/KG	0.012 U	0.027	0.013	0.02	0.0072 U	0.0073 U
Methylene Chloride	100	0.05	MG/KG	0.0049 U	0.0045 U	0.0027 J	0.0042 U	0.0029 U	0.0029 U
N-Butylbenzene	100	12	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
N-Propylbenzene	100	3.9	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Sec-Butylbenzene	100	11	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
T-Butylbenzene	100	5.9	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Tert-Butyl Methyl Ether	100	0.93	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Tetrachloroethylene (PCE)	19	1.3	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Toluene	100	0.7	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0012 J	0.0014 U	0.0015 U
Trans-1,2-Dichloroethene	100	0.19	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Trichloroethylene (TCE)	21	0.47	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Vinyl Chloride	0.9	0.02	MG/KG	0.0024 U	0.0022 U	0.0021 U	0.0021 U	0.0014 U	0.0015 U
Xylenes	100	1.6	MG/KG	0.0049 U	0.0045 U	0.0041 U	0.0014 J	0.0029 U	0.0029 U

Table 2. Summary of Remaining Volatile Organic Compounds in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-12	BDS-13	BDS-14	B1	SE1	SN1
			Sample Date:	03/01/2023	03/01/2023	09/29/2022	08/31/2022	08/30/2022	08/30/2022
			Sample Depth (ft bls):	2 - 4	2 - 4	2 - 4	13 - 14	5 - 7	7 - 8
			Normal Sample or Field Duplicate:	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
1,1,1-Trichloroethane (TCA)	100	0.68	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
1,1-Dichloroethane	26	0.27	MG/KG	0.0012 U	0.0013 U	0.0012 U	0.0023 U	0.0015 U	0.0015 U
1,1-Dichloroethene	100	0.33	MG/KG	0.0012 U	0.0013 U	0.0012 U	0.0023 U	0.0015 U	0.0015 U
1,2,4-Trimethylbenzene	52	3.6	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
1,2-Dichlorobenzene	100	1.1	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
1,2-Dichloroethane	3.1	0.02	MG/KG	0.0012 U	0.0013 U	0.0012 U	0.0023 U	0.0015 U	0.0015 U
1,3,5-Trimethylbenzene (Mesitylene)	52	8.4	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
1,3-Dichlorobenzene	49	2.4	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
1,4-Dichlorobenzene	13	1.8	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
Acetone	100	0.05	MG/KG	0.0069 U	0.0078 U	0.091 J	0.014 U	0.0088 U	0.058
Benzene	4.8	0.06	MG/KG	0.0012 U	0.0013 U	0.0012 U	0.0023 U	0.0015 U	0.0015 U
Carbon Tetrachloride	2.4	0.76	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
Chlorobenzene	100	1.1	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
Chloroform	49	0.37	MG/KG	0.0012 U	0.0028	0.0012 U	0.0023 U	0.0015 U	0.0015 U
Cis-1,2-Dichloroethylene	100	0.25	MG/KG	0.0012 U	0.0013 U	0.0012 U	0.0023 U	0.0015 U	0.0015 U
Ethylbenzene	41	1	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
Methyl Ethyl Ketone (2-Butanone)	100	0.12	MG/KG	0.0058 U	0.0065 U	0.0058 U	0.011 U	0.0073 U	0.0076 U
Methylene Chloride	100	0.05	MG/KG	0.0023 U	0.0026 U	0.0023 U	0.0045 U	0.0029 U	0.003 U
N-Butylbenzene	100	12	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
N-Propylbenzene	100	3.9	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
Sec-Butylbenzene	100	11	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
T-Butylbenzene	100	5.9	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
Tert-Butyl Methyl Ether	100	0.93	MG/KG	0.0012 U	0.0013 U	0.0012 U	0.0023 U	0.0015 U	0.0015 U
Tetrachloroethylene (PCE)	19	1.3	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0014 J	0.0015 U	0.00058 J
Toluene	100	0.7	MG/KG	0.0012 U	0.0013 U	0.0012 U	0.0023 U	0.0015 U	0.0015 U
Trans-1,2-Dichloroethene	100	0.19	MG/KG	0.0012 U	0.0013 U	0.0012 U	0.0023 U	0.0015 U	0.0015 U
Trichloroethylene (TCE)	21	0.47	MG/KG	0.0012 U	0.0013 U	0.0012 UJ	0.0023 U	0.0015 U	0.0015 U
Vinyl Chloride	0.9	0.02	MG/KG	0.0012 U	0.0013 U	0.0012 U	0.0023 U	0.0015 U	0.0015 U
Xylenes	100	1.6	MG/KG	0.0023 U	0.0026 U	0.0023 UJ	0.0045 U	0.0029 U	0.003 U

Table 2. Summary of Remaining Volatile Organic Compounds in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	SS1	SW1
			Sample Date:	08/30/2022	08/30/2022
			Sample Depth (ft bls):	7 - 8	7 - 8
			Normal Sample or Field Duplicate:	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units		
1,1,1-Trichloroethane (TCA)	100	0.68	MG/KG	0.0016 U	0.0013 U
1,1-Dichloroethane	26	0.27	MG/KG	0.0016 U	0.0013 U
1,1-Dichloroethene	100	0.33	MG/KG	0.0016 U	0.0013 U
1,2,4-Trimethylbenzene	52	3.6	MG/KG	0.0016 U	0.0013 U
1,2-Dichlorobenzene	100	1.1	MG/KG	0.0016 U	0.0013 U
1,2-Dichloroethane	3.1	0.02	MG/KG	0.0016 U	0.0013 U
1,3,5-Trimethylbenzene (Mesitylene)	52	8.4	MG/KG	0.0016 U	0.0013 U
1,3-Dichlorobenzene	49	2.4	MG/KG	0.0016 U	0.0013 U
1,4-Dichlorobenzene	13	1.8	MG/KG	0.0016 U	0.0013 U
Acetone	100	0.05	MG/KG	0.0097 U	0.0075 U
Benzene	4.8	0.06	MG/KG	0.0016 U	0.0013 U
Carbon Tetrachloride	2.4	0.76	MG/KG	0.0016 U	0.0013 U
Chlorobenzene	100	1.1	MG/KG	0.0016 U	0.0013 U
Chloroform	49	0.37	MG/KG	0.0016 U	0.0013 U
Cis-1,2-Dichloroethylene	100	0.25	MG/KG	0.0016 U	0.0013 U
Ethylbenzene	41	1	MG/KG	0.0016 U	0.0013 U
Methyl Ethyl Ketone (2-Butanone)	100	0.12	MG/KG	0.0081 U	0.0063 U
Methylene Chloride	100	0.05	MG/KG	0.0032 U	0.0025 U
N-Butylbenzene	100	12	MG/KG	0.0016 U	0.0013 U
N-Propylbenzene	100	3.9	MG/KG	0.0016 U	0.0013 U
Sec-Butylbenzene	100	11	MG/KG	0.0016 U	0.0013 U
T-Butylbenzene	100	5.9	MG/KG	0.0016 U	0.0013 U
Tert-Butyl Methyl Ether	100	0.93	MG/KG	0.0016 U	0.0013 U
Tetrachloroethylene (PCE)	19	1.3	MG/KG	0.0011 J	0.0013 U
Toluene	100	0.7	MG/KG	0.0016 U	0.0013 U
Trans-1,2-Dichloroethene	100	0.19	MG/KG	0.0016 U	0.0013 U
Trichloroethylene (TCE)	21	0.47	MG/KG	0.0016 U	0.0013 U
Vinyl Chloride	0.9	0.02	MG/KG	0.0016 U	0.0013 U
Xylenes	100	1.6	MG/KG	0.0032 U	0.0025 U

Table 3. Summary of Remaining Semivolatile Organic Compounds in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-1	BDS-2	BDS-3	BDS-4	BDS-5	BDS-6	BDS-7
			Sample Date:	11/22/2022	12/08/2022	11/22/2022	12/08/2022	11/18/2022	11/08/2022	11/17/2022
			Sample Depth (ft bls):	15 - 17	15 - 17	15 - 17	15 - 17	15 - 17	19 - 20	15 - 17
			Normal Sample or Field Duplicate:	N	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units							
1,4-Dioxane (P-Dioxane)	13	0.1	MG/KG	0.052 UJ	0.043 R	0.051 R	0.04 U	0.035 U	0.056 U	0.044 U
2-Methylphenol (O-Cresol)	100	0.33	MG/KG	0.048 J	0.02 J-	0.51 R	0.4 UJ	0.35 UJ	0.56 UJ	0.44 UJ
Acenaphthene	100	98	MG/KG	0.062 J	0.73 J-	0.28 J	0.49	0.2 J	0.1 J	0.11 J
Acenaphthylene	100	107	MG/KG	0.046 J	0.23 J-	0.074 J	0.24 J	0.16 J	0.56 UJ	0.077 J
Anthracene	100	1000	MG/KG	0.2 J	1.7 J-	0.74 J	1.7 J	0.57 J	0.18 J	0.26 J
Benzo(A)Anthracene	**1**	1	MG/KG	0.77 J	**3.6 J-**	**2.6 J**	**6 J**	**1.8**	0.65	0.57
Benzo(A)Pyrene	**1**	22	MG/KG	0.79 J	**3.4 J-**	**2.3 J**	**5.9 J**	**1.5 J**	0.58 J	0.46 J
Benzo(B)Fluoranthene	**1**	1.7	MG/KG	**1.1 J**	**4.2 J-**	**3.4 J**	**6.4 J**	**2.1 J**	0.81	0.64 J
Benzo(G,H,I)Perylene	100	1000	MG/KG	0.36 J	2.1 J-	0.96 J	3.6 J	0.94	0.34 J	0.32 J
Benzo(K)Fluoranthene	**3.9**	1.7	MG/KG	0.35 J	1.6 J-	1.3 J	2.5	0.84 J	0.27	0.28 J
Chrysene	**3.9**	1	MG/KG	0.81 J	3.7 J-	2.5 J	**5.7 J**	1.8	0.61 J	0.55
Cresols, M & P	100	0.33	MG/KG	0.18 J	0.13 J-	0.057 J	0.039 J	0.035 J	0.56 UJ	0.044 J
Dibenz(A,H)Anthracene	**0.33**	1000	MG/KG	0.12 T	**0.56 J-**	0.31 J	**0.86 J**	0.28	0.15 J	0.083
Dibenzofuran	59	210	MG/KG	0.068 J	0.72 J-	0.29 J	0.39 J	0.16 J	0.097 J	0.1 J
Fluoranthene	100	1000	MG/KG	1.3 J	6.9 J-	4.7 J	8.7 J	3.1 J	1.1	1.1 J
Fluorene	100	386	MG/KG	0.1 J	1 J-	0.4 J	0.56	0.24 J	0.085 J	0.13 J
Hexachlorobenzene	1.2	3.2	MG/KG	0.052 UJ	0.043 R	0.051 R	0.04 UJ	0.035 UJ	0.056 UJ	0.044 UJ
Indeno(1,2,3-C,D)Pyrene	**0.5**	8.2	MG/KG	0.44 J	**2.6 J-**	**1.2 J**	**4 J**	**1.1**	0.42 J+	0.36
Naphthalene	100	12	MG/KG	0.13 J	0.76 J-	0.46 J	0.66 J	0.24 J	0.1 J	0.26 J
Pentachlorophenol	6.7	0.8	MG/KG	0.42 UJ	0.34 R	0.41 R	0.32 U	0.28 U	0.45 U	0.35 U
Phenanthrene	100	1000	MG/KG	0.83 J	6.9 J-	3.8 J	5.8 J	2.2 J	0.72 J	0.98 J
Phenol	100	0.33	MG/KG	0.12 J	0.13 J-	0.038 J	0.037 J	0.039 J	0.56 UJ	0.047 J
Pyrene	100	1000	MG/KG	1.3 J	7.4 J-	4.3 J	10 J-	3.3	0.99	1.1

Table 3. Summary of Remaining Semivolatile Organic Compounds in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-8	BDS-9	BDS-10	BDS-11	BDS-11	BDS-12	BDS-13
			Sample Date:	11/17/2022	11/17/2022	11/10/2022	03/01/2023	03/01/2023	03/01/2023	03/01/2023
			Sample Depth (ft bls):	15 - 17	15 - 17	15 - 16	2 - 4	2 - 4	2 - 4	2 - 4
			Normal Sample or Field Duplicate:	N	N	N	N	FD	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units							
1,4-Dioxane (P-Dioxane)	13	0.1	MG/KG	0.048 U	0.044 R	0.047 U	0.19 U	0.038 U	0.037 U	0.038 U
2-Methylphenol (O-Cresol)	100	0.33	MG/KG	0.019 J	0.44 R	0.025 J	1.9 U	0.38 U	0.37 U	0.38 U
Acenaphthene	100	98	MG/KG	0.41 J	0.16 J	1.4 J	0.66 J	0.82	1.2	0.043 J
Acenaphthylene	100	107	MG/KG	0.11 J	0.08 J	0.28 J	0.17 J	0.11 J	0.22 J	0.038 J
Anthracene	100	1000	MG/KG	0.57 J	0.46 J	2.5 J	1.5 J	1.6	2.4	0.093 J
Benzo(A)Anthracene	**1**	1	MG/KG	**1.5**	0.88 J	**7.1 J**	**4.2 J**	**4 J**	**4.3 J**	0.42 J
Benzo(A)Pyrene	**1**	22	MG/KG	**1.3 J**	0.81 J	**7.1 J**	**3.7 J**	**3.5 J**	**3.7 J**	0.54 J
Benzo(B)Fluoranthene	**1**	1.7	MG/KG	**1.8 J**	1 J	**10 J**	**4.6 J**	**4.5 J**	**5 J**	0.8 J
Benzo(G,H,I)Perylene	100	1000	MG/KG	0.86	0.54 J	2.8 J	2 J	2.2 J	1.8 J	0.61 J
Benzo(K)Fluoranthene	**3.9**	1.7	MG/KG	0.62 J	0.32 J	3.4 J	1.6 J	1.6 J	1.8 J	0.27 J
Chrysene	**3.9**	1	MG/KG	1.7	0.89 J	**7.1 J**	**4**	3.6 T	**4.2**	0.46
Cresols, M & P	100	0.33	MG/KG	0.1 J	0.037 J	0.18 J	1.9 U	0.38 U	0.37 U	0.38 U
Dibenz(A,H)Anthracene	**0.33**	1000	MG/KG	0.26	0.15 J	**0.92 J**	**0.57**	**0.59**	**0.56**	0.14
Dibenzofuran	59	210	MG/KG	0.36 J	0.18 J	1.3 J	0.32 J	0.46	0.87	0.036 J
Fluoranthene	100	1000	MG/KG	3.1 J	2 J	14 J	7.6 J	6.9 J	8.7 J	0.59 J
Fluorene	100	386	MG/KG	0.33 J	0.26 J	1.4 J	0.58 J	0.77	1.5	0.039 J
Hexachlorobenzene	1.2	3.2	MG/KG	0.048 UJ	0.044 R	0.047 UJ	0.19 U	0.038 U	0.037 U	0.038 U
Indeno(1,2,3-C,D)Pyrene	**0.5**	8.2	MG/KG	**1**	**0.64 J**	**3.6 J**	**2.6 J**	**2.8 J**	**2.5 J**	**0.63 J**
Naphthalene	100	12	MG/KG	0.28 J	0.22 J	0.92 J	0.19 J	0.35 J	1	0.12 J
Pentachlorophenol	6.7	0.8	MG/KG	0.38 U	0.35 R	0.38 U	1.5 U	0.31 U	0.3 U	0.31 U
Phenanthrene	100	1000	MG/KG	2.7 J	2.1 J	9 J	5.9 J	6.6 J	8.4 J	0.46 J
Phenol	100	0.33	MG/KG	0.094 J	0.048 J	0.11 J	1.9 U	0.38 U	0.37 U	0.38 U
Pyrene	100	1000	MG/KG	3.1	1.9 J	12 J	6.9 J	7.2 J	7.4 J	0.67 J

Table 3. Summary of Remaining Semivolatile Organic Compounds in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	**BDS-14**	**B1**	**SE1**	**SN1**	**SS1**	**SW1**
			Sample Date:	**09/29/2022**	**08/31/2022**	**08/30/2022**	**08/30/2022**	**08/30/2022**	**08/30/2022**
			Sample Depth (ft bls):	**2 - 4**	**13 - 14**	**5 - 7**	**7 - 8**	**7 - 8**	**7 - 8**
			Normal Sample or Field Duplicate:	**N**	**N**	**N**	**N**	**N**	**N**
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
1,4-Dioxane (P-Dioxane)	13	0.1	MG/KG	0.036 U	0.039 UJ	0.036 UJ	0.037 UJ	0.037 UJ	0.04 UJ
2-Methylphenol (O-Cresol)	100	0.33	MG/KG	0.36 UJ	0.39 U	0.36 U	0.37 U	0.37 U	0.4 U
Acenaphthene	100	98	MG/KG	0.1 J	0.11 J	0.058 J	0.13 J	0.33 J	0.4
Acenaphthylene	100	107	MG/KG	0.06 J	0.17 J	0.24 J	0.085 J	0.65	0.099 J
Anthracene	100	1000	MG/KG	0.28 J	0.32 J	0.32 J	0.37	1.7	0.83
Benzo(A)Anthracene	**1**	1	MG/KG	0.98	0.97	**1.4**	**1.4**	**18**	**2.6**
Benzo(A)Pyrene	**1**	22	MG/KG	0.87 J	0.9 J	**1.2 J**	**1.3 J**	**16 J**	**2.3 J**
Benzo(B)Fluoranthene	**1**	1.7	MG/KG	**1.1**	**1.3**	**1.7**	**1.8**	**16**	**3**
Benzo(G,H,I)Perylene	100	1000	MG/KG	0.5 J	0.52 J	0.82 J	0.85 J	8 J	1.2 J
Benzo(K)Fluoranthene	**3.9**	1.7	MG/KG	0.5 J	0.48	0.57	0.52	**6.6**	1.2
Chrysene	**3.9**	1	MG/KG	0.94	0.93	1.2	1.4	**21**	2.4
Cresols, M & P	100	0.33	MG/KG	0.36 UJ	0.39 U	0.36 U	0.37 U	0.37 U	0.4 U
Dibenz(A,H)Anthracene	**0.33**	1000	MG/KG	0.11 J	0.15	0.22	0.25	**2.7**	**0.38**
Dibenzofuran	59	210	MG/KG	0.044 J	0.076 J	0.061 J	0.083 J	0.12 J	0.22 J
Fluoranthene	100	1000	MG/KG	1.7 J	1.8 J	2.7 J	2.4 J	16 J	4.6 J
Fluorene	100	386	MG/KG	0.081 J	0.11 J	0.082 J	0.13 J	0.34 J	0.39 J
Hexachlorobenzene	1.2	3.2	MG/KG	0.036 UJ	0.039 U	0.036 U	0.037 U	0.037 U	0.04 U
Indeno(1,2,3-C,D)Pyrene	**0.5**	8.2	MG/KG	**0.65 J**	**0.61**	**1**	**1.1**	**8.6**	**1.5**
Naphthalene	100	12	MG/KG	0.039 J	0.77	0.065 J	0.16 J	0.41	0.2 J
Pentachlorophenol	6.7	0.8	MG/KG	0.29 U	0.32 U	0.29 U	0.3 U	0.29 U	0.32 U
Phenanthrene	100	1000	MG/KG	1 J	1 J	1.3 J	1.5 J	6.5 J	3.2 J
Phenol	100	0.33	MG/KG	0.36 U	0.39 U	0.36 U	0.37 U	0.034 J	0.4 U
Pyrene	100	1000	MG/KG	1.6 J	1.5 J	2.4 J	2.5 J	25	3.9 J

Table 4. Summary of Remaining Metals in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-1	BDS-2	BDS-3	BDS-4	BDS-5	BDS-6	BDS-7
			Sample Date:	11/22/2022	12/08/2022	11/22/2022	12/08/2022	11/18/2022	11/08/2022	11/17/2022
			Sample Depth (ft bls):	15 - 17	15 - 17	15 - 17	15 - 17	15 - 17	19 - 20	15 - 17
			Normal Sample or Field Duplicate:	N	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units							
Arsenic	**16**	16	MG/KG	9.5	14	10.7	9.9	10.5	**19.6**	10.5
Barium	**400**	820	MG/KG	**719**	**945**	**751**	**3020**	**1090**	**1310**	**1310**
Beryllium	72	47	MG/KG	0.48 J	0.33 J	0.47 J	0.3 J	0.36 J	0.66	0.42 J
Cadmium	**4.3**	7.5	MG/KG	1.2 J	3.6	1.9	**8.9**	3.5	**8.6**	2.2
Chromium III	180	--	MG/KG	63	69.5	75.7	52.9	27.9	102	47.7
Chromium, Hexavalent	110	19	MG/KG	3.1 U	2.5 U	3 U	2.4 U	2.1 U	3.4 U	2.6 U
Chromium, Total	180	--	MG/KG	63	69.5	75.7	52.9	27.9	102	47.7
Copper	**270**	1720	MG/KG	164	**314**	**2030**	**563**	247	**358**	257
Cyanide	27	40	MG/KG	1.6	1.3	0.2 J	1.3 T	1.5	0.4 U	2.3
Lead	**400**	450	MG/KG	**700**	**1040**	**743**	**3940**	**983**	**1240**	**1040**
Manganese	2000	2000	MG/KG	277	325	616	355	140	729	229
Mercury	**0.81**	0.73	MG/KG	**1**	**8.2**	**2.3**	0.45	**4.5**	**1.1**	**3.3**
Nickel	310	130	MG/KG	33.2	38.1	47.2	33.4	26.6	116	32.2
Selenium	180	4	MG/KG	1.4 J	1 J	1.4 J	1.1 J	1.1 J	0.97 J	2
Silver	180	8.3	MG/KG	1.4	1.1	1	1.7	1.1	2.4	1.7
Zinc	10000	2480	MG/KG	721	1350	1170	4240	1340	2680	949

Table 4. Summary of Remaining Metals in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-8	BDS-9	BDS-10	BDS-11	BDS-11	BDS-12	BDS-13
			Sample Date:	11/17/2022	11/17/2022	11/10/2022	03/01/2023	03/01/2023	03/01/2023	03/01/2023
			Sample Depth (ft bls):	15 - 17	15 - 17	15 - 16	2 - 4	2 - 4	2 - 4	2 - 4
			Normal Sample or Field Duplicate:	N	N	N	N	FD	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units							
Arsenic	**16**	16	MG/KG	7.8	12.2	**28.4**	3.1	2.6	11.5	8.4
Barium	**400**	820	MG/KG	**619**	**3380**	**1600**	218	168	193	**1200**
Beryllium	72	47	MG/KG	0.47 J	0.48 J	0.39 J	0.34 J	0.29 J	0.32 J	0.42
Cadmium	**4.3**	7.5	MG/KG	3.4	3.4	**21**	0.97 J	0.39 J	1.5	1.4
Chromium III	180	--	MG/KG	54.2	51.9	82.7	16	18	24.2	22.7
Chromium, Hexavalent	110	19	MG/KG	2.9 U	2.6 U	2.8 U	2.2 U	2.3 U	2.2 U	2.3 U
Chromium, Total	180	--	MG/KG	54.2	51.9	82.7	16 T	18	24.2	22.7
Copper	**270**	1720	MG/KG	126	**296**	**635**	31.8 T	31.2	57.8	133
Cyanide	27	40	MG/KG	2.3	2.3	3.2	0.27 U	0.23 J	0.77	1.2
Lead	**400**	450	MG/KG	**605**	**2690**	**7110**	133	173	188	**1090**
Manganese	2000	2000	MG/KG	264	268	497	221 T	182	279	209
Mercury	**0.81**	0.73	MG/KG	**2.1**	**1.5**	**9.5**	0.12	0.14	0.31	**28.1**
Nickel	310	130	MG/KG	28.3	35	94.8	12.7	11.4	27.4	21.6
Selenium	180	4	MG/KG	0.8 J	1.8	1.6	0.22 J	0.17 J	0.26 J	0.47 J
Silver	180	8.3	MG/KG	0.69	1.3	1.3	0.11 J	0.093 J	0.089 J	0.32 J
Zinc	10000	2480	MG/KG	691	1440	2940	432	404	1130	732

Table 4. Summary of Remaining Metals in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-14	B1	SE1	SN1	SS1	SW1
			Sample Date:	09/29/2022	08/31/2022	08/30/2022	08/30/2022	08/30/2022	08/30/2022
			Sample Depth (ft bls):	2 - 4	13 - 14	5 - 7	7 - 8	7 - 8	7 - 8
			Normal Sample or Field Duplicate:	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
Arsenic	**16**	16	MG/KG	8.7	11.4	4.4	10.6	11.1	14.5
Barium	**400**	820	MG/KG	191	**1200**	**435**	**1070**	355	**1030**
Beryllium	72	47	MG/KG	0.33 J	0.6	0.36	0.65	0.66	0.5
Cadmium	**4.3**	7.5	MG/KG	0.34 J	3.2	0.43 J	1.3	1	1.5
Chromium III	180	--	MG/KG	22.7	47	19.3	38.3	38.3	28
Chromium, Hexavalent	110	19	MG/KG	2.2 U	2.4 U	2.2 U	2.2 U	2.2 U	2.3 U
Chromium, Total	180	--	MG/KG	22.7 T	47	19.3	38.3	38.3	28
Copper	**270**	1720	MG/KG	27.8	191	30.6	116	77.8	91.9
Cyanide	27	40	MG/KG	0.23 U	0.73	0.22	0.41	0.19 J	0.65
Lead	**400**	450	MG/KG	175	**1440**	**446**	**782**	**500**	**859**
Manganese	2000	2000	MG/KG	240 T	241	205	255	206	372
Mercury	**0.81**	0.73	MG/KG	0.36	**4.4**	0.39	**0.94**	0.37	**1.5**
Nickel	310	130	MG/KG	15.5 T	37.2	11.8	28.7	29	29.5
Selenium	180	4	MG/KG	0.36 J	1.2	0.32 J	0.61 J	0.79 J	0.52 J
Silver	180	8.3	MG/KG	0.081 J	11.7	0.18 J	0.55	0.37	0.46
Zinc	10000	2480	MG/KG	153 T	889	365	832	542	923

Table 5. Summary of Remaining Polychlorinated Biphenyls in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-1	BDS-2	BDS-3	BDS-4	BDS-5	BDS-6
			Sample Date:	11/22/2022	12/08/2022	11/22/2022	12/08/2022	11/18/2022	11/08/2022
			Sample Depth (ft bls):	15 - 17	15 - 17	15 - 17	15 - 17	15 - 17	19 - 20
			Normal Sample or Field Duplicate:	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
PCB-1016 (Aroclor 1016)	--	--	MG/KG	0.11 U	0.086 U	0.1 U	0.081 U	0.072 U	0.11 U
PCB-1221 (Aroclor 1221)	--	--	MG/KG	0.11 U	0.086 U	0.1 U	0.081 U	0.072 U	0.11 U
PCB-1232 (Aroclor 1232)	--	--	MG/KG	0.11 U	0.086 U	0.1 U	0.081 U	0.072 U	0.11 U
PCB-1242 (Aroclor 1242)	--	--	MG/KG	0.11 U	0.086 U	0.1 U	0.081 U	0.072 U	0.11 U
PCB-1248 (Aroclor 1248)	--	--	MG/KG	0.11 U	0.086 U	0.1 U	0.081 U	0.072 U	0.11 U
PCB-1254 (Aroclor 1254)	--	--	MG/KG	0.11 U	0.086 U	0.1 U	0.081 U	0.072 U	0.11 U
PCB-1260 (Aroclor 1260)	--	--	MG/KG	0.11 U	0.086 U	0.1 U	0.081 U	0.072 U	0.11 U
PCB-1262 (Aroclor 1262)	--	--	MG/KG	0.11 U	0.091	0.1 U	0.081 U	0.14	0.11 U
PCB-1268 (Aroclor 1268)	--	--	MG/KG	0.11 U	0.086 U	0.1 U	0.081 U	0.072 U	0.11 U
Polychlorinated Biphenyl (PCBs)	1	3.2	MG/KG	0.11 U	0.091	0.1 U	0.081 U	0.14	0.11 U

Table 5. Summary of Remaining Polychlorinated Biphenyls in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-7	BDS-8	BDS-9	BDS-10	BDS-11	BDS-11
			Sample Date:	11/17/2022	11/17/2022	11/17/2022	11/10/2022	03/01/2023	03/01/2023
			Sample Depth (ft bls):	15 - 17	15 - 17	15 - 17	15 - 16	2 - 4	2 - 4
			Normal Sample or Field Duplicate:	N	N	N	N	N	FD
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
PCB-1016 (Aroclor 1016)	--	--	MG/KG	0.089 U	0.097 U	0.089 U	0.096 U	0.077 U	0.078 U
PCB-1221 (Aroclor 1221)	--	--	MG/KG	0.089 U	0.097 U	0.089 U	0.096 U	0.077 U	0.078 U
PCB-1232 (Aroclor 1232)	--	--	MG/KG	0.089 U	0.097 U	0.089 U	0.096 U	0.077 U	0.078 U
PCB-1242 (Aroclor 1242)	--	--	MG/KG	0.089 U	0.097 U	0.089 U	0.096 U	0.077 U	0.078 U
PCB-1248 (Aroclor 1248)	--	--	MG/KG	0.089 U	0.097 U	0.089 U	0.096 U	0.077 U	0.078 U
PCB-1254 (Aroclor 1254)	--	--	MG/KG	0.089 U	0.097 U	0.089 U	0.096 U	0.077 U	0.078 U
PCB-1260 (Aroclor 1260)	--	--	MG/KG	0.089 U	0.097 U	0.2	0.096 U	0.077 U	0.078 U
PCB-1262 (Aroclor 1262)	--	--	MG/KG	0.089 U	0.097 U	0.089 U	0.096 U	0.077 U	0.078 U
PCB-1268 (Aroclor 1268)	--	--	MG/KG	0.089 U	0.097 U	0.089 U	0.096 U	0.077 U	0.078 U
Polychlorinated Biphenyl (PCBs)	1	3.2	MG/KG	0.089 U	0.097 U	0.2	0.096 U	0.077 U	0.078 U

Table 5. Summary of Remaining Polychlorinated Biphenyls in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-12	BDS-13	BDS-14	B1	SE1	SN1
			Sample Date:	03/01/2023	03/01/2023	09/29/2022	08/31/2022	08/30/2022	08/30/2022
			Sample Depth (ft bls):	2 - 4	2 - 4	2 - 4	13 - 14	5 - 7	7 - 8
			Normal Sample or Field Duplicate:	N	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units						
PCB-1016 (Aroclor 1016)	--	--	MG/KG	0.074 U	0.077 U	0.073 U	0.08 U	0.073 U	0.075 U
PCB-1221 (Aroclor 1221)	--	--	MG/KG	0.074 U	0.077 U	0.073 U	0.08 U	0.073 U	0.075 U
PCB-1232 (Aroclor 1232)	--	--	MG/KG	0.074 U	0.077 U	0.073 U	0.08 U	0.073 U	0.075 U
PCB-1242 (Aroclor 1242)	--	--	MG/KG	0.074 U	0.077 U	0.073 U	0.08 U	0.073 U	0.075 U
PCB-1248 (Aroclor 1248)	--	--	MG/KG	0.074 U	0.077 U	0.073 U	0.08 U	0.073 U	0.075 U
PCB-1254 (Aroclor 1254)	--	--	MG/KG	0.074 U	0.077 U	0.073 U	0.08 U	0.073 U	0.075 U
PCB-1260 (Aroclor 1260)	--	--	MG/KG	0.21	0.077 U	0.073 U	0.08 U	0.073 U	0.075 U
PCB-1262 (Aroclor 1262)	--	--	MG/KG	0.074 U	0.077 U	0.073 U	0.08 U	0.073 U	0.075 U
PCB-1268 (Aroclor 1268)	--	--	MG/KG	0.074 U	0.077 U	0.073 U	0.08 U	0.073 U	0.075 U
Polychlorinated Biphenyl (PCBs)	1	3.2	MG/KG	0.21	0.077 U	0.073 U	0.08 U	0.073 U	0.075 U

Table 5. Summary of Remaining Polychlorinated Biphenyls in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	**SS1**	**SW1**
			Sample Date:	**08/30/2022**	**08/30/2022**
			Sample Depth (ft bls):	**7 - 8**	**7 - 8**
			Normal Sample or Field Duplicate:	**N**	**N**
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units		
PCB-1016 (Aroclor 1016)	--	--	MG/KG	0.074 U	0.081 U
PCB-1221 (Aroclor 1221)	--	--	MG/KG	0.074 U	0.081 U
PCB-1232 (Aroclor 1232)	--	--	MG/KG	0.074 U	0.081 U
PCB-1242 (Aroclor 1242)	--	--	MG/KG	0.074 U	0.081 U
PCB-1248 (Aroclor 1248)	--	--	MG/KG	0.074 U	0.081 U
PCB-1254 (Aroclor 1254)	--	--	MG/KG	0.074 U	0.081 U
PCB-1260 (Aroclor 1260)	--	--	MG/KG	0.074 U	0.081 U
PCB-1262 (Aroclor 1262)	--	--	MG/KG	0.074 U	0.081 U
PCB-1268 (Aroclor 1268)	--	--	MG/KG	0.074 U	0.081 U
Polychlorinated Biphenyl (PCBs)	1	3.2	MG/KG	0.074 U	0.081 U

Table 6. Summary of Remaining Pesticides and Herbicides in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-1	BDS-2	BDS-3	BDS-4	BDS-5
			Sample Date:	11/22/2022	12/08/2022	11/22/2022	12/08/2022	11/18/2022
			Sample Depth (ft bls):	15 - 17	15 - 17	15 - 17	15 - 17	15 - 17
			Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units					
Aldrin	0.097	0.19	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.48	0.02	MG/KG	0.0032 U	0.0026 U	0.0031 U	0.0024 U	0.0021 U
Alpha Endosulfan	24	102	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.36	0.09	MG/KG	0.0032 U	0.0026 U	0.0031 U	0.0024 U	0.0021 U
Beta Endosulfan	24	102	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Chlordane (Technical)	--	--	MG/KG	0.11 U	0.086 U	0.1 U	0.081 U	0.072 U
cis-Chlordane	4.2	2.9	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Delta BHC (Delta Hexachlorocyclohexane)	100	0.25	MG/KG	0.0032 U	0.0026 U	0.0031 U	0.0024 U	0.0021 U
Dieldrin	0.2	0.1	MG/KG	0.0032 U	0.0026 U	0.0031 U	0.0024 U	0.0021 U
Endosulfan Sulfate	24	1000	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Endrin	11	0.06	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Endrin Aldehyde	--	--	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Endrin Ketone	--	--	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Gamma Bhc (Lindane)	1.3	0.1	MG/KG	0.0032 U	0.0026 U	0.0031 U	0.0024 U	0.0021 U
Heptachlor	2.1	0.38	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Heptachlor Epoxide	--	--	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Methoxychlor	--	--	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
P,P'-DDD	13	14	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
P,P'-DDE	**8.9**	17	MG/KG	0.0039 J	0.0086 U	0.0056 J	0.0081 U	0.009 J+
P,P'-DDT	**7.9**	136	MG/KG	0.011 U	0.0086 U	0.01 U	0.0081 U	0.0072 U
Silvex (2,4,5-TP)	100	3.8	MG/KG	0.052 U	0.043 U	0.051 U	0.041 U	0.036 U
Toxaphene	--	--	MG/KG	0.11 U	0.086 U	0.1 U	0.081 U	0.072 U

Table 6. Summary of Remaining Pesticides and Herbicides in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-6	BDS-7	BDS-8	BDS-9	BDS-10
			Sample Date:	11/08/2022	11/17/2022	11/17/2022	11/17/2022	11/10/2022
			Sample Depth (ft bls):	19 - 20	15 - 17	15 - 17	15 - 17	15 - 16
			Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units					
Aldrin	0.097	0.19	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.48	0.02	MG/KG	0.0034 U	0.0026 U	0.0029 U	0.0027 U	0.0029 U
Alpha Endosulfan	24	102	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.36	0.09	MG/KG	0.0034 U	0.0026 U	0.0029 U	0.0027 U	0.0029 U
Beta Endosulfan	24	102	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
Chlordane (Technical)	--	--	MG/KG	0.11 U	0.089 U	0.097 U	0.089 U	0.096 U
cis-Chlordane	4.2	2.9	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
Delta BHC (Delta Hexachlorocyclohexane)	100	0.25	MG/KG	0.0034 U	0.0026 U	0.0029 U	0.0027 U	0.0029 U
Dieldrin	0.2	0.1	MG/KG	0.0034 U	0.0026 U	0.0029 U	0.0065	0.0029 U
Endosulfan Sulfate	24	1000	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
Endrin	11	0.06	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
Endrin Aldehyde	--	--	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
Endrin Ketone	--	--	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
Gamma Bhc (Lindane)	1.3	0.1	MG/KG	0.0034 U	0.0026 U	0.0029 U	0.0027 U	0.0029 U
Heptachlor	2.1	0.38	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
Heptachlor Epoxide	--	--	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
Methoxychlor	--	--	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
P,P'-DDD	13	14	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.0096 U
P,P'-DDE	**8.9**	17	MG/KG	0.011 U	0.0044 J	0.0089 J	0.012	0.011
P,P'-DDT	**7.9**	136	MG/KG	0.011 U	0.0089 U	0.0097 U	0.0089 U	0.024
Silvex (2,4,5-TP)	100	3.8	MG/KG	0.057 U	0.044 U	0.048 U	0.044 U	0.048 U
Toxaphene	--	--	MG/KG	0.11 U	0.089 U	0.097 U	0.089 U	0.096 U

Table 6. Summary of Remaining Pesticides and Herbicides in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-11	BDS-11	BDS-12	BDS-13	BDS-14
			Sample Date:	03/01/2023	03/01/2023	03/01/2023	03/01/2023	09/29/2022
			Sample Depth (ft bls):	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4
			Normal Sample or Field Duplicate:	N	FD	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units					
Aldrin	0.097	0.19	MG/KG	0.0077 U	0.0078 U	0.0074 U	0.039 U	0.0073 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.48	0.02	MG/KG	0.0023 U	0.0023 U	0.0022 U	0.012 U	0.0022 U
Alpha Endosulfan	24	102	MG/KG	0.0077 U	0.0078 U	0.0074 U	0.039 U	0.0073 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.36	0.09	MG/KG	0.0023 U	0.0023 U	0.0022 U	0.012 U	0.0022 U
Beta Endosulfan	24	102	MG/KG	0.0077 U	0.0078 U	0.0074 U	0.039 U	0.0073 U
Chlordane (Technical)	--	--	MG/KG	0.077 U	0.064 J	0.074 U	0.39 U	0.073 U
cis-Chlordane	4.2	2.9	MG/KG	0.0077 U	0.0085 J	0.0081	0.039 U	0.0073 U
Delta BHC (Delta Hexachlorocyclohexane)	100	0.25	MG/KG	0.0023 U	0.0023 U	0.0022 U	0.012 U	0.0022 U
Dieldrin	0.2	0.1	MG/KG	0.0023 U	0.0023 U	0.0057 J	0.012 U	0.0022 U
Endosulfan Sulfate	24	1000	MG/KG	0.0077 U	0.0078 U	0.0074 U	0.039 U	0.0073 U
Endrin	11	0.06	MG/KG	0.0077 U	0.0078 U	0.0074 U	0.039 U	0.0073 U
Endrin Aldehyde	--	--	MG/KG	0.0077 U	0.0078 U	0.0074 U	0.039 U	0.0073 U
Endrin Ketone	--	--	MG/KG	0.0077 U	0.0078 U	0.0074 U	0.039 U	0.0073 U
Gamma Bhc (Lindane)	1.3	0.1	MG/KG	0.0023 U	0.0023 U	0.0022 U	0.012 U	0.0022 U
Heptachlor	2.1	0.38	MG/KG	0.0077 U	0.0078 U	0.0074 U	0.039 U	0.0073 U
Heptachlor Epoxide	--	--	MG/KG	0.0077 U	0.0078 U	0.0074 U	0.039 U	0.0073 U
Methoxychlor	--	--	MG/KG	0.0077 U	0.0078 U	0.0074 U	0.039 U	0.0073 U
P,P'-DDD	13	14	MG/KG	0.0033 J	0.0059 J	0.0059 J	0.039 U	0.0073 U
P,P'-DDE	**8.9**	17	MG/KG	0.023	0.049	0.032	0.41	0.036 J
P,P'-DDT	**7.9**	136	MG/KG	0.036	0.062	0.083	0.5	0.048
Silvex (2,4,5-TP)	100	3.8	MG/KG	0.039 U	0.039 U	0.037 U	0.038 U	0.036 U
Toxaphene	--	--	MG/KG	0.077 U	0.078 U	0.074 U	0.39 U	0.073 U

Table 6. Summary of Remaining Pesticides and Herbicides in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	B1	SE1	SN1	SS1	SW1
			Sample Date:	08/31/2022	08/30/2022	08/30/2022	08/30/2022	08/30/2022
			Sample Depth (ft bls):	13 - 14	5 - 7	7 - 8	7 - 8	7 - 8
			Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO	Units					
Aldrin	0.097	0.19	MG/KG	1.6 U	0.0073 U	0.37 U	0.0074 U	0.0081 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.48	0.02	MG/KG	0.48 U	0.0022 U	0.11 U	0.0022 U	0.0024 U
Alpha Endosulfan	24	102	MG/KG	1.6 U	0.0073 U	0.37 U	0.0074 U	0.0081 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.36	0.09	MG/KG	0.48 U	0.0022 U	0.11 U	0.0022 U	0.0024 U
Beta Endosulfan	24	102	MG/KG	1.6 U	0.0073 U	0.37 U	0.0074 U	0.0081 U
Chlordane (Technical)	--	--	MG/KG	16 U	0.07 J	3.7 U	0.074 U	0.18 J
cis-Chlordane	4.2	2.9	MG/KG	1.6 U	0.019	0.37 U	0.0074 U	0.035 J
Delta BHC (Delta Hexachlorocyclohexane)	100	0.25	MG/KG	0.48 U	0.0022 U	0.11 U	0.0022 U	0.0024 U
Dieldrin	0.2	0.1	MG/KG	0.48 U	0.0022 U	0.11 U	0.0022 U	0.0024 U
Endosulfan Sulfate	24	1000	MG/KG	1.6 U	0.0073 U	0.37 U	0.0074 U	0.0081 U
Endrin	11	0.06	MG/KG	1.6 U	0.0073 U	0.37 U	0.0074 U	0.0081 U
Endrin Aldehyde	--	--	MG/KG	1.6 U	0.0073 U	0.37 U	0.0074 U	0.0081 U
Endrin Ketone	--	--	MG/KG	1.6 U	0.0073 U	0.37 U	0.0074 U	0.0081 U
Gamma Bhc (Lindane)	1.3	0.1	MG/KG	0.48 U	0.0022 U	0.11 U	0.0022 U	0.0024 U
Heptachlor	2.1	0.38	MG/KG	1.6 U	0.0073 U	0.37 U	0.0074 U	0.0081 U
Heptachlor Epoxide	--	--	MG/KG	1.6 U	0.0073 U	0.37 U	0.0074 U	0.0081 U
Methoxychlor	--	--	MG/KG	1.6 U	0.0073 U	0.37 U	0.0074 U	0.0081 U
P,P'-DDD	13	14	MG/KG	2.5	0.0083	0.18 J	0.0074 U	0.021
P,P'-DDE	**8.9**	17	MG/KG	**46**	0.064	3.7	0.0031 J	0.24
P,P'-DDT	**7.9**	136	MG/KG	**54**	0.12	4.7	0.0055 J	0.34
Silvex (2,4,5-TP)	100	3.8	MG/KG	0.04 U	0.036 U	0.037 U	0.037 U	0.04 U
Toxaphene	--	--	MG/KG	16 U	0.073 U	3.7 U	0.074 U	0.081 U

Table 7. Summary of Remaining Per- and Polyfluoroalkyl Substances in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-1	BDS-2	BDS-3	BDS-4	BDS-5
			Sample Date:	11/22/2022	12/08/2022	11/22/2022	12/08/2022	11/18/2022
			Sample Depth (ft bls):	15 - 17	15 - 17	15 - 17	15 - 17	15 - 17
			Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential GV	NYSDEC Part 375 Protection of Groundwater GV	Units					
2-(N-methyl perfluorooctanesulfonamido) acetic acid	--	--	UG/KG	2.83 U	3.21 U	2.82 U	2.49 U	2.64 U
N-ethyl perfluorooctanesulfonamidoacetic acid	--	--	UG/KG	2.83 U	3.21 U	2.82 U	2.49 U	2.64 U
Perfluorobutanesulfonic acid (PFBS)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluorobutanoic Acid	--	--	UG/KG	0.71 U	0.8 U	0.7 U	0.62 U	0.66 U
Perfluorodecane Sulfonic Acid	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluorodecanoic acid (PFDA)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluorododecanoic acid (PFDoA)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluoroheptane Sulfonate (PFHPS)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluoroheptanoic acid (PFHpA)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluorohexanesulfonic acid (PFHxS)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluorohexanoic acid (PFHxA)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluorononanoic acid (PFNA)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluorooctane Sulfonamide (FOSA)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluorooctanesulfonic acid (PFOS)	44	3.7	UG/KG	0.18 J	0.32 U	0.28 U	0.25 U	0.36
Perfluorooctanoic acid (PFOA)	33	1.1	UG/KG	0.28 U	0.1 J	0.28 U	0.25 U	0.26 U
Perfluoropentanoic Acid (PFPeA)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluorotetradecanoic acid (PFTA)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluorotridecanoic Acid (PFTriA)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Perfluoroundecanoic Acid (PFUnA)	--	--	UG/KG	0.28 U	0.32 U	0.28 U	0.25 U	0.26 U
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2)	--	--	UG/KG	2.83 U	3.21 U	2.82 U	2.49 U	2.64 U
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2)	--	--	UG/KG	2.83 U	3.21 U	2.82 U	2.49 U	2.64 U

Table 7. Summary of Remaining Per- and Polyfluoroalkyl Substances in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-6	BDS-7	BDS-8	BDS-9	BDS-10
			Sample Date:	11/08/2022	11/17/2022	11/17/2022	11/17/2022	11/10/2022
			Sample Depth (ft bls):	19 - 20	15 - 17	15 - 17	15 - 17	15 - 16
			Normal Sample or Field Duplicate:	N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential GV	NYSDEC Part 375 Protection of Groundwater GV	Units					
2-(N-methyl perfluorooctanesulfonamido) acetic acid	--	--	UG/KG	4.65 U	2.87 U	3.2 U	2.84 U	3.46 U
N-ethyl perfluorooctanesulfonamidoacetic acid	--	--	UG/KG	4.65 U	2.87 U	3.2 U	2.84 U	3.46 U
Perfluorobutanesulfonic acid (PFBS)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluorobutanoic Acid	--	--	UG/KG	1.16 U	0.72 U	0.8 U	0.71 U	0.86 U
Perfluorodecane Sulfonic Acid	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluorodecanoic acid (PFDA)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluorododecanoic acid (PFDoA)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluoroheptane Sulfonate (PFHPS)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluoroheptanoic acid (PFHpA)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluorohexanesulfonic acid (PFHxS)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluorohexanoic acid (PFHxA)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.082 J
Perfluorononanoic acid (PFNA)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluorooctane Sulfonamide (FOSA)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluorooctanesulfonic acid (PFOS)	44	3.7	UG/KG	0.47 U	0.27 J	0.18 J	0.28 U	0.76
Perfluorooctanoic acid (PFOA)	33	1.1	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluoropentanoic Acid (PFPeA)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluorotetradecanoic acid (PFTA)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluorotridecanoic Acid (PFTriA)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Perfluoroundecanoic Acid (PFUnA)	--	--	UG/KG	0.47 U	0.29 U	0.32 U	0.28 U	0.35 U
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2)	--	--	UG/KG	4.65 U	2.87 U	3.2 U	2.84 U	3.46 U
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2)	--	--	UG/KG	4.65 U	2.87 U	3.2 U	2.84 U	3.46 U

Table 7. Summary of Remaining Per- and Polyfluoroalkyl Substances in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

			Sample Designation:	BDS-11	BDS-11	BDS-12	BDS-13	BDS-14
			Sample Date:	03/01/2023	03/01/2023	03/01/2023	03/01/2023	09/29/2022
			Sample Depth (ft bls):	2 - 4	2 - 4	2 - 4	2 - 4	2 - 4
			Normal Sample or Field Duplicate:	N	FD	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential GV	NYSDEC Part 375 Protection of Groundwater GV	Units					
2-(N-methyl perfluorooctanesulfonamido) acetic acid	--	--	UG/KG	2.24 U	2.23 U	2.24 U	2.21 U	2.45 U
N-ethyl perfluorooctanesulfonamidoacetic acid	--	--	UG/KG	0.34 J	0.37 J	2.24 U	2.21 U	2.45 U
Perfluorobutanesulfonic acid (PFBS)	--	--	UG/KG	0.22 U	0.22 U	0.22 U	0.22 U	0.24 U
Perfluorobutanoic Acid	--	--	UG/KG	0.56 U	0.56 U	0.56 U	0.55 U	0.61 U
Perfluorodecane Sulfonic Acid	--	--	UG/KG	0.22 U	0.22 U	0.16 J	0.22 U	0.11 J
Perfluorodecanoic acid (PFDA)	--	--	UG/KG	0.031 J	0.22 U	0.069 J	0.22 U	0.049 J
Perfluorododecanoic acid (PFDoA)	--	--	UG/KG	0.22 U	0.22 U	0.11 J	0.22 U	0.063 J
Perfluoroheptane Sulfonate (PFHPS)	--	--	UG/KG	0.22 U	0.22 U	0.22 U	0.22 U	0.24 U
Perfluoroheptanoic acid (PFHpA)	--	--	UG/KG	0.22 U	0.22 U	0.22 U	0.043 J	0.24 U
Perfluorohexanesulfonic acid (PFHxS)	--	--	UG/KG	0.22 U	0.22 U	0.22 U	0.22 U	0.24 U
Perfluorohexanoic acid (PFHxA)	--	--	UG/KG	0.22 U	0.22 U	0.051 J	0.22 U	0.24 U
Perfluorononanoic acid (PFNA)	--	--	UG/KG	0.12 J	0.13 J	0.22 U	0.22 U	0.24 U
Perfluorooctane Sulfonamide (FOSA)	--	--	UG/KG	0.25	0.25	0.22 U	0.22 U	0.24 U
Perfluorooctanesulfonic acid (PFOS)	44	3.7	UG/KG	1.44	1.43	0.58	0.13 J	0.31
Perfluorooctanoic acid (PFOA)	33	1.1	UG/KG	0.19 J	0.18 J	0.088 J	0.44	0.24 U
Perfluoropentanoic Acid (PFPeA)	--	--	UG/KG	0.22 U	0.22 U	0.22 U	0.22 U	0.24 U
Perfluorotetradecanoic acid (PFTA)	--	--	UG/KG	0.22 U	0.22 U	0.068 J	0.22 U	0.032 J
Perfluorotridecanoic Acid (PFTriA)	--	--	UG/KG	0.22 U	0.22 U	0.075 J	0.22 U	0.035 J
Perfluoroundecanoic Acid (PFUnA)	--	--	UG/KG	0.22 U	0.22 U	0.13 J	0.22 U	0.058 J
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2)	--	--	UG/KG	2.24 U	2.23 U	2.24 U	2.21 U	2.45 U
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2)	--	--	UG/KG	2.24 U	2.23 U	2.24 U	2.21 U	2.45 U

Table 7. Summary of Remaining Per- and Polyfluoroalkyl Substances in Documentation Soil Samples in Track 2 and 4 Areas
1940 Turnbull Avenue, Bronx, New York

				Sample Designation:	B1	SE1	SN1	SS1

Sample Designation:				B1	SE1	SN1	SS1	SW1
Sample Date:				09/01/2022	08/30/2022	08/30/2022	08/30/2022	08/30/2022
Sample Depth (ft bls):				13 - 14	5 - 7	7 - 8	7 - 8	7 - 8
Normal Sample or Field Duplicate:				N	N	N	N	N
Parameter	NYSDEC Part 375 Restricted Residential GV	NYSDEC Part 375 Protection of Groundwater GV	Units					
2-(N-methyl perfluorooctanesulfonamido) acetic acid	--	--	UG/KG	2.77 U	2.09 U	2.19 U	2.15 U	2.32 U
N-ethyl perfluorooctanesulfonamidoacetic acid	--	--	UG/KG	2.77 U	2.09 U	2.19 U	2.15 U	2.32 U
Perfluorobutanesulfonic acid (PFBS)	--	--	UG/KG	0.28 U	0.21 U	0.22 U	0.22 U	0.23 U
Perfluorobutanoic Acid	--	--	UG/KG	0.69 U	0.52 U	0.55 U	0.54 U	0.58 U
Perfluorodecane Sulfonic Acid	--	--	UG/KG	0.28 U	0.21 U	0.22 U	0.22 U	0.1 J
Perfluorodecanoic acid (PFDA)	--	--	UG/KG	0.28 U	0.21 U	0.22 U	0.22 U	0.061 J
Perfluorododecanoic acid (PFDoA)	--	--	UG/KG	0.28 U	0.21 U	0.22 U	0.22 U	0.063 J
Perfluoroheptane Sulfonate (PFHPS)	--	--	UG/KG	0.28 U	0.21 U	0.22 U	0.22 U	0.23 U
Perfluoroheptanoic acid (PFHpA)	--	--	UG/KG	0.1 J	0.21 U	0.075 J	0.045 J	0.062 J
Perfluorohexanesulfonic acid (PFHxS)	--	--	UG/KG	0.078 J	0.21 U	0.22 U	0.22 U	0.23 U
Perfluorohexanoic acid (PFHxA)	--	--	UG/KG	0.22 J	0.05 J	0.13 J	0.06 J	0.11 J
Perfluorononanoic acid (PFNA)	--	--	UG/KG	0.28 U	0.04 J	0.13 J	0.22 U	0.11 J
Perfluorooctane Sulfonamide (FOSA)	--	--	UG/KG	0.28 U	0.21 U	0.22 U	0.22 U	0.23 U
Perfluorooctanesulfonic acid (PFOS)	44	3.7	UG/KG	0.85	0.35	0.5	0.3	0.78
Perfluorooctanoic acid (PFOA)	33	1.1	UG/KG	0.92	0.49 J	0.59	0.36	0.37
Perfluoropentanoic Acid (PFPeA)	--	--	UG/KG	0.27 J	0.21 U	0.11 J	0.08 J	0.088 J
Perfluorotetradecanoic acid (PFTA)	--	--	UG/KG	0.28 U	0.21 U	0.22 U	0.22 U	0.23 U
Perfluorotridecanoic Acid (PFTriA)	--	--	UG/KG	0.28 U	0.21 U	0.22 U	0.22 U	0.23 U
Perfluoroundecanoic Acid (PFUnA)	--	--	UG/KG	0.28 U	0.21 U	0.22 U	0.22 U	0.052 J
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2)	--	--	UG/KG	2.77 UJ	2.09 U	2.19 U	2.15 U	2.32 UJ
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2)	--	--	UG/KG	2.77 UJ	2.09 U	2.19 U	2.15 U	2.32 U

Table 8. Summary of Remaining TCLP Metals in Soil, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	BDS-10	B1	SE1	SN1	SS1	SW1
		Sample Date:	11/10/2022	08/31/2022	08/30/2022	08/30/2022	08/30/2022	08/30/2022
		Sample Depth (ft bls):	15 - 16	13 - 14	5 - 7	7 - 8	7 - 8	7 - 8
		Normal Sample or Field Duplicate:	N	N	N	N	N	N
Parameter	USEPA Regulatory Levels (mg/L)	Units						
Lead	5	MG/L	0.464 J	3.9	0.674	1.35 J+	0.434	2.08

Notes Utilized Throughout Tables	
Soil Vapor	
J -	Estimated value
J- -	Estimated value, low bias
D -	A secondary analysis after dilution due to exceedance of the calibration range in the original sample.
U -	Indicates that the compound was analyzed for but not detected
FD -	Duplicate sample
ug/m3 -	Micrograms per cubic meter
Bold data indicates that parameter was detected	

Table 9. Summary of Remaining Volatile Organic Compounds in Soil Vapor, 1940 Turnbull Avenue, Bronx, New York

Sample Designation:		SV-1	SV-2	SV-3	SV-4	SV-5	SV-5	SV-6	SV-7
Sample Date:		06/02/2021	06/02/2021	06/02/2021	06/02/2021	06/02/2021	06/02/2021	06/02/2021	06/02/2021
Normal Sample or Field Duplicate:		N	N	N	N	N	FD	N	N
Parameter	Units								
1,1,1-Trichloroethane (TCA)	UG/M3	4.44 U	8.9 U	4.24 U	0.885 U	1.62 U	1.73 U	3.61 U	4.33 U
1,1,2,2-Tetrachloroethane	UG/M3	5.59 U	11.2 U	5.34 U	1.11 U	2.04 U	2.17 U	4.55 U	5.44 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	6.24 U	12.5 U	5.96 U	1.24 U	2.27 U	2.42 U	5.08 U	6.08 U
1,1,2-Trichloroethane	UG/M3	4.44 U	8.9 U	4.24 U	0.885 U	1.62 U	1.73 U	3.61 U	4.33 U
1,1-Dichloroethane	UG/M3	3.3 U	6.61 U	3.15 U	0.656 U	1.2 U	1.28 U	2.68 U	3.21 U
1,1-Dichloroethene	UG/M3	1.61 U	3.24 U	1.54 U	0.322 U	0.588 U	0.627 U	1.31 U	1.57 U
1,2,4-Trichlorobenzene	UG/M3	6.04 U	12.1 U	5.77 U	1.2 U	2.2 U	2.35 U	4.92 U	5.89 U
1,2,4-Trimethylbenzene	UG/M3	**16.8 D**	**15.2 D**	**8.02 D**	**18.1 D**	**14.6 D**	**19.6 D**	**16.3 D**	**6.24 D**
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	6.26 U	12.5 U	5.97 U	1.25 U	2.28 U	2.43 U	5.09 U	6.09 U
1,2-Dichlorobenzene	UG/M3	4.9 U	9.81 U	4.67 U	0.975 U	1.78 U	1.9 U	3.98 U	4.77 U
1,2-Dichloroethane	UG/M3	3.3 U	6.6 U	3.15 U	0.656 U	1.2 U	1.28 U	2.68 U	3.21 U
1,2-Dichloropropane	UG/M3	3.76 U	7.54 U	3.59 U	0.75 U	1.37 U	1.46 U	3.06 U	3.66 U
1,2-Dichlorotetrafluoroethane	UG/M3	5.69 U	11.4 U	5.43 U	1.13 U	2.07 U	2.21 U	4.63 U	5.54 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	**4.4 D**	8.02 U	3.82 U	**4.86 D**	**3.21 D**	**6.69 D**	**3.58 D**	3.9 U
1,3-Butadiene	UG/M3	5.41 U	10.8 U	5.16 U	1.08 U	1.97 U	2.1 U	4.4 U	5.26 U
1,3-Dichlorobenzene	UG/M3	4.9 U	9.81 U	4.67 U	0.975 U	1.78 U	1.9 U	3.98 U	4.77 U
1,4-Dichlorobenzene	UG/M3	4.9 U	9.81 U	4.67 U	0.975 U	1.78 U	1.9 U	3.98 U	4.77 U
1,4-Dioxane (P-Dioxane)	UG/M3	5.87 U	11.8 U	5.6 U	1.17 U	2.14 U	2.28 U	4.77 U	5.71 U
2-Hexanone	UG/M3	**106 J-D**	**139 J-D**	**98.7 J-D**	**24.8 J-D**	**36.9 J-D**	**35.6 J-D**	**87.1 J-D**	**90 J-D**
4-Ethyltoluene	UG/M3	**16 D**	**15.2 D**	**5.35 D**	**16.2 D**	**13.4 D**	**19.3 D**	**15 D**	**3.9 D**
Acetone	UG/M3	**81.8 D**	**126 D**	**65.2 D**	**12.5 D**	**21.5 D**	**21.7 D**	**60.7 D**	**37.7 D**
Allyl Chloride (3-Chloropropene)	UG/M3	12.7 U	25.5 U	12.2 U	2.54 U	4.64 U	4.95 U	10.4 U	12.4 U
Benzene	UG/M3	**3.9 D**	5.21 U	**12.4 D**	**1.4 D**	**1.8 D**	**2.02 D**	**3.39 D**	2.53 U
Benzyl Chloride	UG/M3	4.22 U	8.45 U	4.02 U	0.84 U	1.54 U	1.64 U	3.43 U	4.11 U
Bromodichloromethane	UG/M3	5.46 U	10.9 U	5.21 U	1.09 U	1.99 U	2.12 U	4.44 U	5.31 U
Bromoform	UG/M3	8.42 U	16.9 U	8.03 U	1.68 U	3.07 U	3.27 U	6.85 U	8.2 U
Bromomethane	UG/M3	3.16 U	6.34 U	3.02 U	0.63 U	1.15 U	1.23 U	2.57 U	3.08 U
Carbon Disulfide	UG/M3	**10.7 D**	**5.08 D**	**21.3 D**	**27.7 D**	0.924 U	0.985 U	2.06 U	2.47 U
Carbon Tetrachloride	UG/M3	1.28 U	2.57 U	1.22 U	0.255 U	0.466 U	0.498 U	1.04 U	1.25 U
Chlorobenzene	UG/M3	3.75 U	7.51 U	3.58 U	0.747 U	1.37 U	1.46 U	3.05 U	3.65 U
Chloroethane	UG/M3	2.15 U	4.31 U	2.05 U	0.428 U	0.783 U	0.835 U	1.75 U	2.09 U
Chloroform	UG/M3	3.98 U	7.97 U	**153 D**	**26.4 D**	**3.77 D**	**4.02 D**	3.23 U	**31.7 D**
Chloromethane	UG/M3	1.68 U	3.37 U	1.6 U	0.335 U	0.612 U	0.653 U	1.37 U	1.64 U
Cis-1,2-Dichloroethylene	UG/M3	1.61 U	3.24 U	1.54 U	0.322 U	0.588 U	0.627 U	1.31 U	1.57 U
Cis-1,3-Dichloropropene	UG/M3	3.7 U	7.41 U	3.53 U	0.736 U	1.35 U	1.44 U	3.01 U	3.6 U

Table 9. Summary of Remaining Volatile Organic Compounds in Soil Vapor, 1940 Turnbull Avenue, Bronx, New York

Sample Designation:		SV-1	SV-2	SV-3	SV-4	SV-5	SV-5	SV-6	SV-7
Sample Date:		06/02/2021	06/02/2021	06/02/2021	06/02/2021	06/02/2021	06/02/2021	06/02/2021	06/02/2021
Normal Sample or Field Duplicate:		N	N	N	N	N	FD	N	N
Parameter	Units								
Cyclohexane	UG/M3	2.8 U	5.62 U	**5.35 D**	**0.893 D**	1.02 U	**2.29 D**	2.28 U	2.73 U
Dibromochloromethane	UG/M3	6.94 U	13.9 U	6.62 U	1.38 U	2.53 U	2.7 U	5.64 U	6.76 U
Dichlorodifluoromethane	UG/M3	4.03 U	8.07 U	3.84 U	**2.17 D**	**2.2 D**	**2.19 D**	3.28 U	3.92 U
Ethyl Acetate	UG/M3	5.87 U	11.8 U	5.6 U	1.17 U	2.14 U	2.28 U	4.77 U	5.71 U
Ethylbenzene	UG/M3	**7.78 D**	**7.09 D**	**7.42 D**	**7.61 D**	**4.12 D**	**4.95 D**	**6.33 D**	3.44 U
Hexachlorobutadiene	UG/M3	8.69 U	17.4 U	8.29 U	1.73 U	3.16 U	3.37 U	7.06 U	8.46 U
Isopropanol	UG/M3	4 U	**35.7 D**	**7.45 D**	0.797 U	1.46 U	1.56 U	3.26 U	3.9 U
Methyl Ethyl Ketone (2-Butanone)	UG/M3	**775 D**	**1140 D**	**709 D**	**145 D**	**191 D**	**195 D**	**619 D**	**710 D**
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	3.34 U	6.69 U	3.18 U	0.664 U	1.22 U	1.3 U	2.71 U	3.25 U
Methyl Methacrylate	UG/M3	3.33 U	6.68 U	3.18 U	0.664 U	1.21 U	1.3 U	2.71 U	3.25 U
Methylene Chloride	UG/M3	5.66 U	11.3 U	5.4 U	1.13 U	2.06 U	2.2 U	4.6 U	5.51 U
M-P-Xylene	UG/M3	**30.1 D**	**29.1 D**	**11.1 D**	**35.4 D**	**18.8 D**	**29.1 D**	**26.5 D**	6.89 U
N-Heptane	UG/M3	**8.68 D**	**8.03 D**	**11.5 D**	**3.79 D**	**5.35 D**	**7.26 D**	**372 D**	3.25 U
N-Hexane	UG/M3	**10.3 D**	**7.48 D**	**38.4 D**	**2.46 D**	**3.97 D**	**8.92 D**	**625 D**	**6.15 D**
O-Xylene (1,2-Dimethylbenzene)	UG/M3	**10.6 D**	**9.92 D**	**4.05 D**	**11.5 D**	**6.05 D**	**11.8 D**	**8.92 D**	3.44 U
Propylene	UG/M3	**27.8 D**	**41 D**	1.34 U	**9.44 D**	**9.14 D**	**9.75 D**	1.14 U	**14.3 D**
Styrene	UG/M3	3.47 U	6.95 U	3.31 U	**0.691 D**	1.26 U	1.35 U	2.82 U	3.38 U
Tert-Butyl Methyl Ether	UG/M3	2.94 U	5.88 U	2.8 U	0.585 U	1.07 U	1.14 U	2.39 U	2.86 U
Tetrachloroethylene (PCE)	UG/M3	**59.1 D**	**16.6 D**	**41.1 D**	**35.8 D**	**31 D**	**32.2 D**	**75.5 D**	**19.4 D**
Tetrahydrofuran	UG/M3	4.8 U	9.63 U	4.58 U	**1.72 D**	1.75 U	1.87 U	3.91 U	4.68 U
Toluene	UG/M3	**59.2 D**	**41.2 D**	**22.8 D**	**77.4 D**	**40.2 D**	**47.2 D**	**43.2 D**	**19.4 D**
Trans-1,2-Dichloroethene	UG/M3	3.23 U	6.47 U	3.08 U	0.643 U	1.18 U	1.25 U	2.63 U	3.14 U
Trans-1,3-Dichloropropene	UG/M3	3.7 U	7.41 U	3.53 U	0.736 U	1.35 U	1.44 U	3.01 U	3.6 U
Trichloroethylene (TCE)	UG/M3	1.09 U	2.19 U	1.04 U	**0.261 D**	0.398 U	0.425 U	0.89 U	1.07 U
Trichlorofluoromethane	UG/M3	4.58 U	9.17 U	4.37 U	**1.46 D**	1.67 U	1.78 U	3.72 U	4.46 U
Vinyl Acetate	UG/M3	2.87 U	5.75 U	2.74 U	0.571 U	1.04 U	1.11 U	2.33 U	2.79 U
Vinyl Bromide	UG/M3	3.56 U	7.14 U	3.4 U	0.71 U	1.3 U	1.38 U	2.9 U	3.47 U
Vinyl Chloride	UG/M3	1.04 U	2.09 U	0.993 U	0.207 U	0.379 U	0.404 U	0.847 U	1.01 U

Table 10. Summary of Remaining Volatile Organic Compounds in Groundwater, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	MW-1	MW-1	MW-2	MW-3	MW-4	MW-5
		Sample Date:	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021
		Normal Sample or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units						
1,1,1,2-Tetrachloroethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,1-Trichloroethane (TCA)	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2,2-Tetrachloroethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-Trichloroethane	1	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1-Dichloroethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1-Dichloroethene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,3-Trichlorobenzene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,3-Trichloropropane	0.04	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,4-Trichlorobenzene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,4-Trimethylbenzene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dibromo-3-Chloropropane	0.04	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichlorobenzene	3	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloroethane	0.6	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloropropane	1	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3,5-Trimethylbenzene (Mesitylene)	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichlorobenzene	3	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,4-Dichlorobenzene	3	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,4-Dioxane (P-Dioxane)	--	UG/L	40 U	40 U	40 U	40 U	40 U	40 U
2-Hexanone	50	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Acetone	50	UG/L	1 U	1 U	1 U	1 U	1 U	1.63 J
Acrolein	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Acrylonitrile	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzene	1	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromochloromethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromodichloromethane	50	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromoform	50	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromomethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Carbon Disulfide	60	UG/L	0.2 U	0.37 J	0.2 U	0.2 U	0.2 U	0.2 U
Carbon Tetrachloride	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

Table 10. Summary of Remaining Volatile Organic Compounds in Groundwater, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	MW-1	MW-1	MW-2	MW-3	MW-4	MW-5
		Sample Date:	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021
		Normal Sample or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units						
Chlorobenzene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroform	7	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloromethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Cis-1,2-Dichloroethylene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Cis-1,3-Dichloropropene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Cyclohexane	--	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dibromochloromethane	50	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dibromomethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dichlorodifluoromethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Ethylbenzene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Hexachlorobutadiene	0.5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Isopropylbenzene (Cumene)	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Methyl Acetate	--	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Methyl Ethyl Ketone (2-Butanone)	50	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	--	UG/L	0.2 U	0.2 U	0.42 J	0.2 U	0.2 U	0.2 U
Methylcyclohexane	--	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Methylene Chloride	5	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
M-P-Xylene	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
N-Butylbenzene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
N-Propylbenzene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
O-Xylene (1,2-Dimethylbenzene)	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
P-Cymene (P-Isopropyltoluene)	--	UG/L	0.2 U	0.2 U	0.2 U	0.21 J	0.38 J	0.2 U
Sec-Butylbenzene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Styrene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
T-Butylbenzene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tert-Butyl Alcohol	--	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tert-Butyl Methyl Ether	10	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethylene (PCE)	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Toluene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trans-1,2-Dichloroethene	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

Table 10. Summary of Remaining Volatile Organic Compounds in Groundwater, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	MW-1	MW-1	MW-2	MW-3	MW-4	MW-5
		Sample Date:	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021
		Normal Sample or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units						
Trans-1,3-Dichloropropene	--	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trichloroethylene (TCE)	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trichlorofluoromethane	5	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Vinyl Chloride	2	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Xylenes, Total	5	UG/L	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U

Table 11. Summary of Remaining Semivolatile Organic Compounds in Groundwater, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	MW-1	MW-1	MW-2	MW-3	MW-4	MW-5
		Sample Date:	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021
		Normal Sample or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units						
1,2,4,5-Tetrachlorobenzene	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
1,2,4-Trichlorobenzene	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
1,2-Dichlorobenzene	3	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
1,3-Dichlorobenzene	3	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
1,4-Dichlorobenzene	3	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
1,4-Dioxane (P-Dioxane)	1	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,3,4,6-Tetrachlorophenol	--	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
2,4,5-Trichlorophenol	--	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
2,4,6-Trichlorophenol	--	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
2,4-Dichlorophenol	5	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
2,4-Dimethylphenol	50	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
2,4-Dinitrophenol	10	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
2,4-Dinitrotoluene	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
2,6-Dinitrotoluene	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
2-Chloronaphthalene	10	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
2-Chlorophenol	--	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
2-Methylnaphthalene	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
2-Methylphenol (O-Cresol)	--	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
2-Nitroaniline	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
2-Nitrophenol	--	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
3- And 4- Methylphenol (Total)	--	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
3,3'-Dichlorobenzidine	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
3-Nitroaniline	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
4,6-Dinitro-2-Methylphenol	--	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
4-Bromophenyl Phenyl Ether	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
4-Chloro-3-Methylphenol	--	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
4-Chloroaniline	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
4-Chlorophenyl Phenyl Ether	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
4-Nitroaniline	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
4-Nitrophenol	--	UG/L	5.71 U	5.26 U	5.56 U	5.56 U	5.88 U	5.56 U
Acenaphthene	20	UG/L	0.0571	0.0526 U	0.0556 U	0.689	0.0941	0.0556 U

Table 11. Summary of Remaining Semivolatile Organic Compounds in Groundwater, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	MW-1	MW-1	MW-2	MW-3	MW-4	MW-5
		Sample Date:	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021
		Normal Sample or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units						
Acenaphthylene	20	UG/L	0.0571 U	0.0526 U	0.0556 U	0.0556 U	0.0588 U	0.0556 U
Acetophenone	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Aniline	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Anthracene	50	UG/L	0.0571	0.0526 U	0.0556 U	0.389	0.0588 U	0.0556 U
Atrazine	7.5	UG/L	0.571 U	0.526 U	0.556 U	0.556 U	0.588 U	0.556 U
Benzaldehyde	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Benzidine	5	UG/L	5.71 UJ	5.26 U	5.56 U	5.56 U	5.88 UJ	5.56 UJ
Benzo(A)Anthracene	**0.002**	UG/L	0.0571 U	0.0526 U	0.0556 U	**0.2**	0.0588 U	**0.1**
Benzo(A)Pyrene	**0**	UG/L	0.0571 U	0.0526 U	0.0556 U	**0.156**	0.0588 U	**0.0778**
Benzo(B)Fluoranthene	**0.002**	UG/L	0.0571 U	0.0526 U	0.0556 U	**0.122**	0.0588 U	**0.0667**
Benzo(G,H,I)Perylene	--	UG/L	0.0571 U	0.0526 U	0.0556 U	0.0778	0.0588 U	0.0556 U
Benzo(K)Fluoranthene	**0.002**	UG/L	0.0571 U	0.0526 U	0.0556 U	**0.133**	0.0588 U	**0.0667**
Benzoic Acid	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Benzyl Alcohol	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Benzyl Butyl Phthalate	50	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Biphenyl (Diphenyl)	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Bis(2-Chloroethoxy) Methane	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	1	UG/L	1.14 UJ	1.05 U	1.11 U	1.11 U	1.18 UJ	1.11 UJ
Bis(2-Chloroisopropyl) Ether	5	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Bis(2-Ethylhexyl) Phthalate	5	UG/L	0.674	0.526 U	0.556 U	0.556 U	0.588 U	0.956
Caprolactam	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Carbazole	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Chrysene	**0.002**	UG/L	0.0571 U	0.0526 U	0.0556 U	**0.178**	0.0588 U	**0.0778**
Dibenz(A,H)Anthracene	--	UG/L	0.0571 U	0.0526 U	0.0556 U	0.0556 U	0.0588 U	0.0556 U
Dibenzofuran	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Diethyl Phthalate	50	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Dimethyl Phthalate	50	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Di-N-Butyl Phthalate	50	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Di-N-Octylphthalate	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Fluoranthene	50	UG/L	0.0571 U	0.0526 U	0.0556 U	0.889	0.0588	0.244
Fluorene	50	UG/L	0.0571	0.0526 U	0.256	0.511	0.0588 U	0.267

Table 11. Summary of Remaining Semivolatile Organic Compounds in Groundwater, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	MW-1	MW-1	MW-2	MW-3	MW-4	MW-5
		Sample Date:	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021
		Normal Sample or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units						
Hexachlorobenzene	0.04	UG/L	0.0229 U	0.0211 U	0.0222 U	0.0222 U	0.0235 U	0.0222 U
Hexachlorobutadiene	0.5	UG/L	0.571 U	0.526 U	0.556 U	0.556 U	0.588 U	0.556 U
Hexachlorocyclopentadiene	5	UG/L	5.71 UJ	5.26 U	5.56 U	5.56 U	5.88 UJ	5.56 UJ
Hexachloroethane	5	UG/L	0.571 U	0.526 U	0.556 U	0.556 U	0.588 U	0.556 U
Indeno(1,2,3-C,D)Pyrene	**0.002**	UG/L	0.0571 U	0.0526 U	0.0556 U	**0.0778**	0.0588 U	0.0556 U
Isophorone	50	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Naphthalene	10	UG/L	0.0914 J	0.0526 J	0.0556 U	0.278	0.165	0.0556 U
Nitrobenzene	0.4	UG/L	0.286 U	0.263 U	0.278 U	0.278 U	0.294 U	0.278 U
N-Nitrosodimethylamine	--	UG/L	0.571 U	0.526 U	0.556 U	0.556 U	0.588 U	0.556 U
N-Nitrosodi-N-Propylamine	--	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
N-Nitrosodiphenylamine	50	UG/L	2.86 UJ	2.63 U	2.78 U	2.78 U	2.94 UJ	2.78 UJ
Pentachlorophenol	1	UG/L	0.286 U	0.263 U	0.278 U	0.278 U	0.294 U	0.278 U
Phenanthrene	50	UG/L	0.0571 U	0.0526 U	0.0556 U	1.18	0.0706	0.0778
Phenol	1	UG/L	2.86 U	2.63 U	2.78 U	2.78 U	2.94 U	2.78 U
Pyrene	50	UG/L	0.0571 U	0.0526 U	0.0556 U	0.544	0.0588 U	0.178

Table 12. Summary of Remaining Metals in Groundwater, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	MW-1	MW-1	MW-1	MW-1	MW-2	MW-2	MW-3	MW-3
		Sample Date:	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021
		Normal Sample or Field Duplicate:	N	N	FD	FD	N	N	N	N
		Total or Dissolved:	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units								
Aluminum	--	UG/L	55.6 U	55.6 U	55.6 U	55.6 U	55.6 U	55.6 U	79.7	55.6 U
Antimony	3	UG/L	1.11 U	1.11 U	1.11 U	1.11 U	1.11 U	1.11 U	1.11 U	1.11 U
Arsenic	25	UG/L	1.6	1.11 U	1.48	1.11 U	1.11 U	1.11 U	1.16	1.11 U
Barium	1000	UG/L	440	302	378	324	156	136	164	112
Beryllium	3	UG/L	0.333 U	0.333 U	0.333 U	0.333 U	0.333 U	0.333 U	0.333 U	0.333 U
Cadmium	5	UG/L	0.556 U	0.556 U	0.556 U	0.556 U	0.556 U	0.556 U	0.556 U	0.556 U
Calcium	--	UG/L	248000	251000	255000	250000	241000	248000	273000	271000
Chromium III	--	UG/L	10 U	NA	10 U	NA	10 U	NA	10 U	NA
Chromium, Hexavalent	50	UG/L	10 U	NA	10 U	NA	10 U	NA	10 U	NA
Chromium, Total	50	UG/L	5.56 U	5.56 U	5.56 U	5.56 U	5.56 U	5.56 U	5.56 U	5.56 U
Cobalt	--	UG/L	4.44 U	4.44 U	4.44 U	4.44 U	4.44 U	4.44 U	4.44 U	4.44 U
Copper	200	UG/L	22.2 U	22.2 U	22.2 U	22.2 U	22.2 U	22.2 U	22.2 U	22.2 U
Cyanide	200	UG/L	12.8	NA	10 U	NA	12.5	NA	14.7	NA
Iron	**300**	UG/L	**21100**	278 U	**19700**	278 U	**4180**	278 U	**25600**	278 U
Lead	25	UG/L	11.8 B	5.56 U	5.56 U	5.56 U	5.56 U	5.56 U	14.8 B	5.56 U
Magnesium	**35000**	UG/L	**39300**	**37500**	**43200**	**37200**	33500	33200	**36100**	**35900**
Manganese	**300**	UG/L	**435**	**451**	**473**	**446**	**398**	**396**	**312**	291
Mercury	0.7	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	100	UG/L	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
Potassium	--	UG/L	17200	15700 B	18500	15600 B	15200	15400 B	13300	12500 B
Selenium	10	UG/L	1.11 U	1.11 U	1.11 U	1.11 U	1.18	1.11 U	1.11 U	1.11 U
Silver	50	UG/L	5.56 U	5.56 U	5.56 U	5.56 U	5.56 U	5.56 U	5.56 U	5.56 U
Sodium	**20000**	UG/L	**222000**	**233000**	**257000**	**226000**	**248000**	**279000**	**155000**	**165000**
Thallium	0.5	UG/L	1.11 U	1.11 U	1.11 U	1.11 U	1.11 U	1.11 U	1.11 U	1.11 U
Vanadium	--	UG/L	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U	11.1 U
Zinc	2000	UG/L	27.8 U	27.8 U	27.8 U	27.8 U	27.8 U	27.8 U	27.8 U	27.8 U

Table 12. Summary of Remaining Metals in Groundwater, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	MW-4	MW-4	MW-5	MW-5
		Sample Date:	06/14/2021	06/14/2021	06/14/2021	06/14/2021
		Normal Sample or Field Duplicate:	N	N	N	N
		Total or Dissolved:	Total	Dissolved	Total	Dissolved
Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units				
Aluminum	--	UG/L	82.2	55.6 U	194	55.6 U
Antimony	3	UG/L	1.11 U	1.11 U	1.11 U	1.11 U
Arsenic	25	UG/L	3.17	1.11 U	2.07	1.11 U
Barium	1000	UG/L	179	143	317	277
Beryllium	3	UG/L	0.333 U	0.333 U	0.333 U	0.333 U
Cadmium	5	UG/L	0.556 U	0.556 U	0.556 U	0.556 U
Calcium	--	UG/L	297000	295000	252000	253000
Chromium III	--	UG/L	10 U	NA	10 U	NA
Chromium, Hexavalent	50	UG/L	10 U	NA	10 U	NA
Chromium, Total	50	UG/L	5.56 U	5.56 U	5.56 U	5.56 U
Cobalt	--	UG/L	4.44 U	4.44 U	4.44 U	4.44 U
Copper	200	UG/L	22.2 U	22.2 U	22.2 U	22.2 U
Cyanide	200	UG/L	10.3	NA	10 U	NA
Iron	**300**	UG/L	**13800**	278 U	**6450**	278 U
Lead	25	UG/L	12.5 B	5.56 U	16.1 B	5.56 U
Magnesium	**35000**	UG/L	**45300**	**43400**	30900	30600
Manganese	**300**	UG/L	**614**	**641**	**522**	**509**
Mercury	0.7	UG/L	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	100	UG/L	11.1 U	11.1 U	11.1 U	11.1 U
Potassium	--	UG/L	18400	17300 B	12900	13000 B
Selenium	10	UG/L	1.11 U	1.11 U	1.11 U	1.11 U
Silver	50	UG/L	5.56 U	5.56 U	5.56 U	5.56 U
Sodium	**20000**	UG/L	**250000**	**262000**	**179000**	**190000**
Thallium	0.5	UG/L	1.11 U	1.11 U	1.11 U	1.11 U
Vanadium	--	UG/L	11.1 U	11.1 U	11.1 U	11.1 U
Zinc	2000	UG/L	27.8 U	27.8 U	27.8 U	27.8 U

Table 13. Summary of Remaining Polychlorinated Biphenyls in Groundwater, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	MW-1	MW-1	MW-2	MW-3	MW-4	MW-5
		Sample Date:	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021
		Normal Sample or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units						
PCB-1016 (Aroclor 1016)	--	UG/L	0.0625 U	0.0556 U	0.0556 U	0.0571 U	0.0606 U	0.0571 U
PCB-1221 (Aroclor 1221)	--	UG/L	0.0625 U	0.0556 U	0.0556 U	0.0571 U	0.0606 U	0.0571 U
PCB-1232 (Aroclor 1232)	--	UG/L	0.0625 U	0.0556 U	0.0556 U	0.0571 U	0.0606 U	0.0571 U
PCB-1242 (Aroclor 1242)	--	UG/L	0.0625 U	0.0556 U	0.0556 U	0.0571 U	0.0606 U	0.0571 U
PCB-1248 (Aroclor 1248)	--	UG/L	0.0625 U	0.0556 U	0.0556 U	0.0571 U	0.0606 U	0.0571 U
PCB-1254 (Aroclor 1254)	--	UG/L	0.0625 U	0.0556 U	0.0556 U	0.0571 U	0.0606 U	0.0571 U
PCB-1260 (Aroclor 1260)	--	UG/L	0.0625 U	0.0556 U	0.0556 U	0.0571 U	0.0606 U	0.0571 U
Polychlorinated Biphenyl (PCBs)	0.09	UG/L	0.0625 U	0.0556 U	0.0556 U	0.0571 U	0.0606 U	0.0571 U

Table 14. Summary of Remaining Pesticides and Herbicides in Groundwater, 1940 Turnbull Avenue, Bronx, New York

		Sample Designation:	MW-1	MW-1	MW-2	MW-3	MW-4	MW-5
		Sample Date:	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021
		Normal Sample or Field Duplicate:	N	FD	N	N	N	N
Parameter	NYSDEC Ambient Water Quality Standards and Guidance Values	Units						
2,4-D (Dichlorophenoxyacetic Acid)	50	UG/L	5 U	5 U	5 U	5 U	5 U	5 U
Acetic acid, (2,4,5-trichlorophenoxy)-	35	UG/L	5 U	5 U	5 U	5 U	5 U	5 U
Aldrin	0	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Alpha Bhc (Alpha Hexachlorocyclohexane)	0.01	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Alpha Endosulfan	--	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.04	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Beta Endosulfan	--	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Chlordane	0.05	UG/L	0.0125 U	0.0111 U	0.0111 U	0.0114 U	0.0121 U	0.0114 U
cis-Chlordane	--	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Delta BHC (Delta Hexachlorocyclohexane)	0.04	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Dieldrin	0.004	UG/L	0.0025 U	0.00222 U	0.00222 U	0.00229 U	0.00242 U	0.00229 U
Endosulfan Sulfate	--	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Endrin	0	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Endrin Aldehyde	5	UG/L	0.0125 U	0.0111 U	0.0111 U	0.0114 U	0.0121 U	0.0114 U
Endrin Ketone	5	UG/L	0.0125 U	0.0111 U	0.0111 U	0.0114 U	0.0121 U	0.0114 U
Gamma Bhc (Lindane)	0.05	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Heptachlor	0.04	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Heptachlor Epoxide	0.03	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Methoxychlor	35	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
P,P'-DDD	0.3	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
P,P'-DDE	0.2	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
P,P'-DDT	0.2	UG/L	0.005 U	0.00444 U	0.00444 U	0.00457 U	0.00485 U	0.00457 U
Silvex (2,4,5-TP)	0.26	UG/L	5 U	5 U	5 U	5 U	5 U	5 U
Toxaphene	0.06	UG/L	0.125 U	0.111 U	0.111 U	0.114 U	0.121 U	0.114 U

Table 15. Summary of Remaining Per- and Polyfluoralkyl Substances in Groundwater, 1940 Turnbull Avenue, Bronx, New York

Sample Designation:			MW-1	MW-1	MW-2	MW-3	MW-4	MW-5
Sample Date:			06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021	06/14/2021
Normal Sample or Field Duplicate:			N	FD	N	N	N	N
Parameter	NYSDEC Drinking Water MCL	Units						
2-(N-methyl perfluorooctanesulfonamido) acetic acid	--	NG/L	0.551 U	0.517 U	0.501 U	0.501 U	0.529 U	0.509 U
N-ethyl perfluorooctanesulfonamidoacetic acid	--	NG/L	0.58 U	0.544 U	0.527 U	0.527 U	0.557 U	0.536 U
Perfluorobutanesulfonic acid (PFBS)	--	NG/L	4.1	3.65	3.8	3.13	4.21	4.33
Perfluorobutanoic Acid	--	NG/L	8.47	8.25	9.35	6.97	7.82	8.28
Perfluorodecane Sulfonic Acid	--	NG/L	0.598 U	0.561 U	0.544 U	0.544 U	0.574 U	0.552 U
Perfluorodecanoic acid (PFDA)	--	NG/L	0.546 U	0.512 U	0.496 U	0.496 U	0.524 U	0.504 U
Perfluorododecanoic acid (PFDoA)	--	NG/L	0.809 U	0.759 U	0.736 U	0.736 U	0.777 U	0.747 U
Perfluoroheptane Sulfonate (PFHPS)	--	NG/L	0.432 U	0.405 U	0.393 U	0.393 U	0.415 U	0.399 U
Perfluoroheptanoic acid (PFHpA)	--	NG/L	7.72	7.43	8	5.55	7.72	7.01
Perfluorohexanesulfonic acid (PFHxS)	--	NG/L	3.23	3.21	3.02	2.92	3.45	2.74
Perfluorohexanoic acid (PFHxA)	--	NG/L	8.99	8.84	10.8	7.55	10.1	7.84
Perfluorononanoic acid (PFNA)	--	NG/L	0.598 U	0.561 U	0.544 U	0.544 U	0.574 U	0.552 U
Perfluorooctane Sulfonamide (FOSA)	--	NG/L	0.308 U	0.289 U	0.28 U	0.28 U	0.296 U	0.285 U
Perfluorooctanesulfonic acid (PFOS)	10	NG/L	4.62	6.07	6.35	5.69	7.31	7.42
Perfluorooctanoic acid (PFOA)	**10**	NG/L	**20.4**	**20.4**	**18.4**	**18.1**	**21.3**	**18.8**
Perfluoropentanoic Acid (PFPeA)	--	NG/L	10.8	10.1	13.6	7.68	10.8	9.96
Perfluorotetradecanoic acid (PFTA)	--	NG/L	0.553 U	0.519 U	0.503 U	0.503 U	0.531 U	0.511 U
Perfluorotridecanoic Acid (PFTriA)	--	NG/L	1.43 U	1.34 U	1.3 U	1.3 U	1.37 U	1.32 U
Perfluoroundecanoic Acid (PFUnA)	--	NG/L	0.684 U	0.642 U	0.622 U	0.622 U	0.657 U	0.632 U
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2)	--	NG/L	0.416 UJ	0.39 U	0.378 UJ	0.378 UJ	0.399 UJ	0.384 UJ
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2)	--	NG/L	0.512 UJ	0.48 UJ	0.466 UJ	0.466 UJ	0.492 UJ	0.473 UJ

Table 16. List of Soil Cleanup Objectives, 1940 Turnbull Avenue, Bronx, New York

Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO
Volatile Organic Compounds (Concentrations in mg/kg)		
1,1,1-Trichloroethane	100	680
1,1-Dichloroethane	26	270
1,1-Dichloroethene	100	330
1,2,4-Trimethylbenzene	52	3600
1,3,5-Trimethylbenzene	52	8400
1,2-Dichlorobenzene	100	1100
1,2-Dichloroethane	3.1	20
1,3-Dichlorobenzene	49	2400
1,4-Dichlorobenzene	13	1800
2-Butanone (MEK)	100	120
Acetone	100	50
Benzene	4.8	60
n-Butylbenzene	100	12000
Carbon tetrachloride	2.4	760
Chlorobenzene	100	1100
Chloroform	49	370
cis-1,2-Dichloroethene	100	250
Ethylbenzene	41	1000
Methylene chloride	100	50
MTBE	100	930
n-Propylbenzene	100	3900
sec-Butylbenzene	100	11000
tert-Butylbenzene	100	5900
Tetrachloroethene	19	1300
Toluene	100	700
trans-1,2-Dichloroethene	100	190
Trichloroethene	21	470
Vinyl chloride	0.9	20
Xylenes (total)	100	1600
Semivolatile Organic Compounds (Concentrations in mg/kg)		
1,4-Dioxane	13	0.1
2-Methylphenol	100	0.33
Acenaphthene	100	98
Acenaphthylene	100	107
Anthracene	100	1000
Benzo[a]anthracene	1	1
Benzo[a]pyrene	1	22
Benzo[b]fluoranthene	1	1.7
Benzo[g,h,i]perylene	100	1000
Benzo[k]fluoranthene	3.9	1.7
Chrysene	3.9	1
Dibenzo[a,h]anthracene	0.33	1000
Dibenzofuran	59	210
Fluoranthene	100	1000
Fluorene	100	386
Hexachlorobenzene	1.2	3.2
Indeno[1,2,3-cd]pyrene	0.5	8.2
Naphthalene	100	12
Pentachlorophenol	6.7	0.8
Phenanthrene	100	1000
Phenol	100	0.33
Pyrene	100	1000

Table 16. List of Soil Cleanup Objectives, 1940 Turnbull Avenue, Bronx, New York

Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO
Metals (Concentrations in mg/kg)		
Arsenic	16	16
Barium	400	820
Beryllium	72	47
Cadmium	4.3	7.5
Chromium, Hexavalent	110	19
Chromium, Trivalent	180	NA
Copper	270	1720
Cyanide, Total	27	40
Lead	400	450
Manganese	2000	2000
Mercury	0.81	0.73
Nickel	310	130
Selenium	180	4
Silver	180	8.3
Zinc	10000	2480
Pesticides (Concentrations in mg/kg)		
2,4,5-TP	100	3.8
4,4'-DDD	13	14
4,4'-DDE	8.9	17
4,4'-DDT	7.9	136
Aldrin	0.097	0.19
alpha-BHC	0.48	0.02
alpha-Chlordane	4.2	2.9
beta-BHC	0.36	0.09
delta-BHC	100	0.25
Dieldrin	0.2	0.1
Endosulfan I	24	102
Endosulfan II	24	102
Endosulfan sulfate	24	1000
Endrin	11	0.06
gamma-BHC (Lindane)	1.3	0.1
Heptachlor	2.1	0.38
Total Polychlorinated Biphenyls (Concentrations in mg/kg)		
Total Polychlorinated Biphenyls	1	3.2
Perfluorinated Alkyl Acids (Concentrations in µg/kg)		
1H,1H,2H,2H-PERFLUORODECANESULFONIC ACID (8:2FTS)	--	--
1H,1H,2H,2H-PERFLUOROOCTANESULFONIC ACID (6:2FTS)	--	--
N-ETHYL PERFLUOROOCTANESULFONAMIDOACETIC ACID (NETFOSAA)	--	--
N-METHYL PERFLUOROOCTANESULFONAMIDOACETIC ACID (NMEFOSA	--	--
PERFLUOROBUTANESULFONIC ACID (PFBS)	--	--
PERFLUOROBUTANOIC ACID (PFBA)	--	--
PERFLUORODECANESULFONIC ACID (PFDS)	--	--
PERFLUORODECANOIC ACID (PFDA)	--	--
PERFLUORODODECANOIC ACID (PFDOA)	--	--
PERFLUOROHEPTANESULFONIC ACID (PFHPS)	--	--
PERFLUOROHEPTANOIC ACID (PFHPA)	--	--
PERFLUOROHEXANESULFONIC ACID (PFHXS)	--	--
PERFLUOROHEXANOIC ACID (PFHXA)	--	--
PERFLUORONONANOIC ACID (PFNA)	--	--
PERFLUOROOCTANESULFONAMIDE (FOSA)	--	--
PERFLUOROOCTANESULFONIC ACID (PFOS)	--	--
PERFLUOROOCTANOIC ACID (PFOA)	--	--
PERFLUOROPENTANOIC ACID (PFPEA)	--	--
PERFLUOROTETRADECANOIC ACID (PFTA)	--	--
PERFLUOROTRIDECANOIC ACID (PFTRDA)	--	--
PERFLUOROUNDECANOIC ACID (PFUNA)	--	--
PFOA/PFOS, TOTAL	--	--

Table 16. List of Soil Cleanup Objectives, 1940 Turnbull Avenue, Bronx, New York

Parameter	NYSDEC Part 375 Restricted Residential SCO	NYSDEC Part 375 Protection of Groundwater SCO

* Backfill soil cleanup objectives for the Track 1 remedy are the NYSDEC Part 375 Unrestricted Residential Use

** Backfill soil cleanup objectives for the Tracks 2 and 4 remedy are the lower of the NYSDEC Part 375 Protection of Groundwater or Restricted Residential Use SCOs.

mg/kg - Milligrams per kilogram
NYSDEC - New York State Department of Environmental Conservation
SCOs - Soil Cleanup Objectives
NA - Not Applicable

--Standards not yet determined. The following guidance values are to be used until SCOs are in effect:

PFOA (Concentrations in μg/kg)	1.1	1.1
PFOS (Concentrations in μg/kg)	3.7	3.7

FIGURES

QUADRANGLE LOCATION

N

1,000 0 1,000'

Title:

SITE LOCATION MAP

SITE MANAGEMENT PLAN - PARK LANE SENIOR
1940 TURNBULL AVENUE, BRONX, NEW YORK, 10473

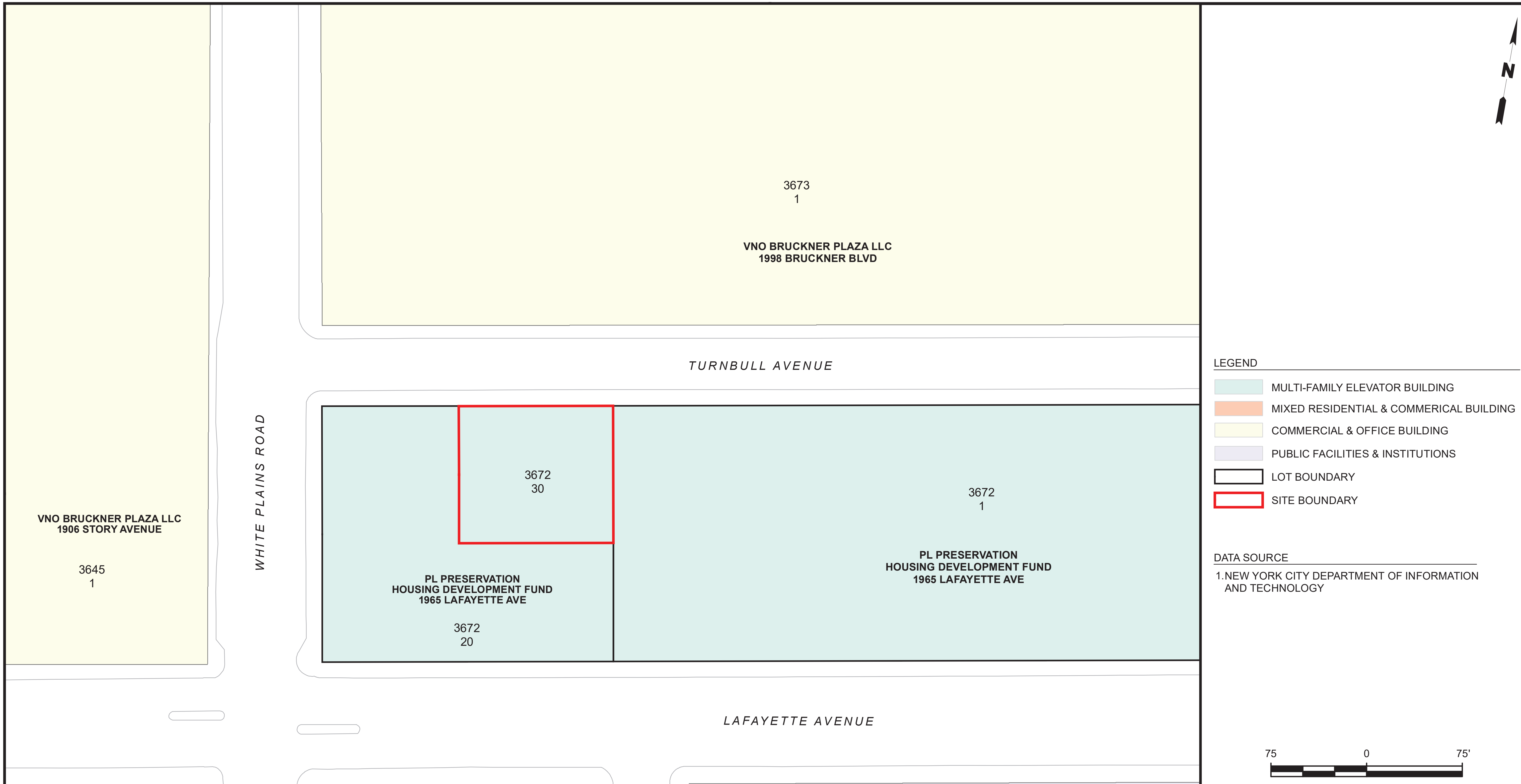
Prepared for:

PL SARA LLC

ROUX

Compiled by: C.H.	Date: 07/28/21	FIGURE
Prepared by: M.S.R.	Scale: AS SHOWN	
Project Mgr: K.S.	Project: 3475.0001Y000	1
File: 3475.0001Y117.1.mxd		

V:\GIS\PROJECTS\3475\0001Y117\3475.0001Y117.1.MXD



Title:

TAX AND SITE LAYOUT MAP

SITE MANAGEMENT PLAN

1940 TURNBULL AVENUE, BRONX, NEW YORK, 10473

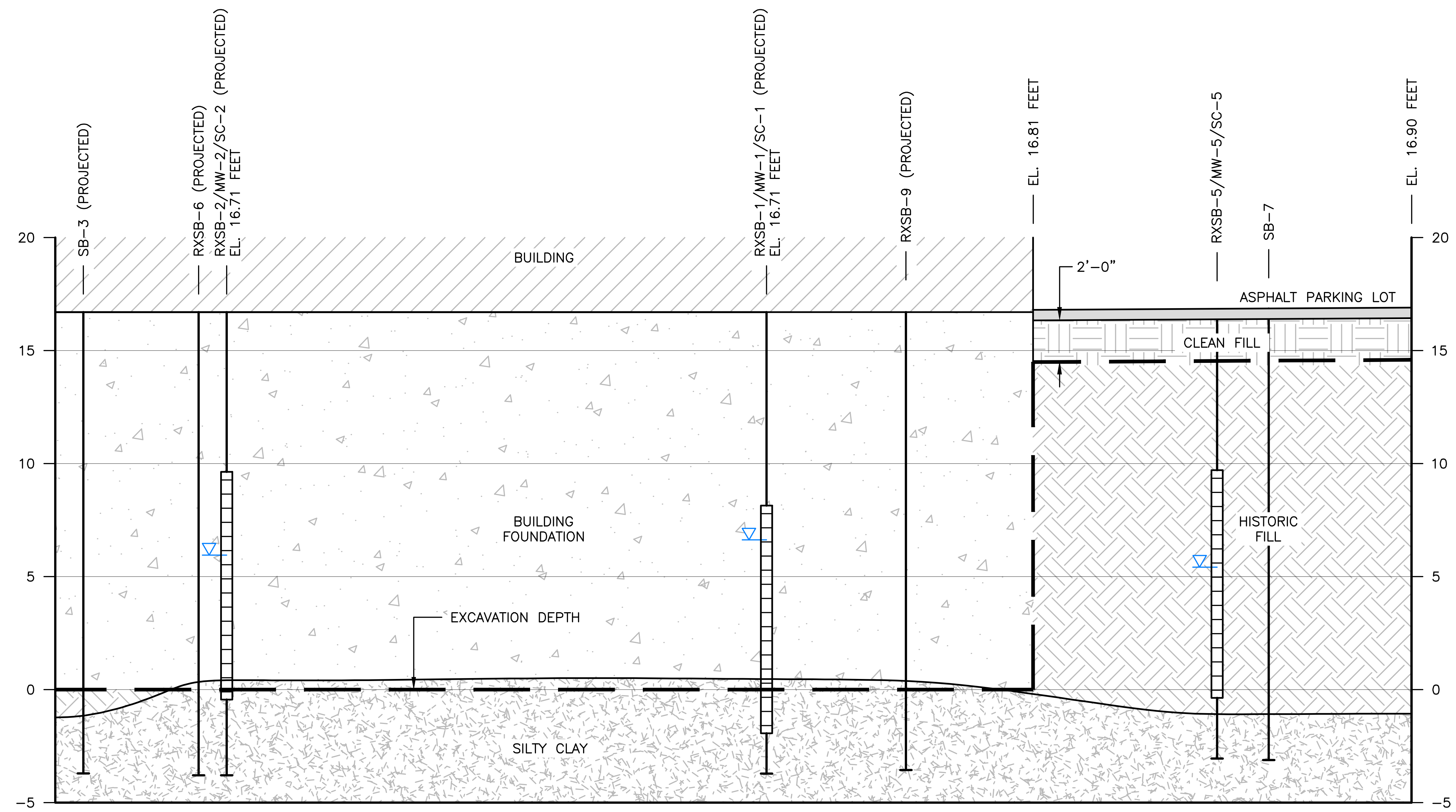
Prepared for:

PL SARA LLC

ROUX

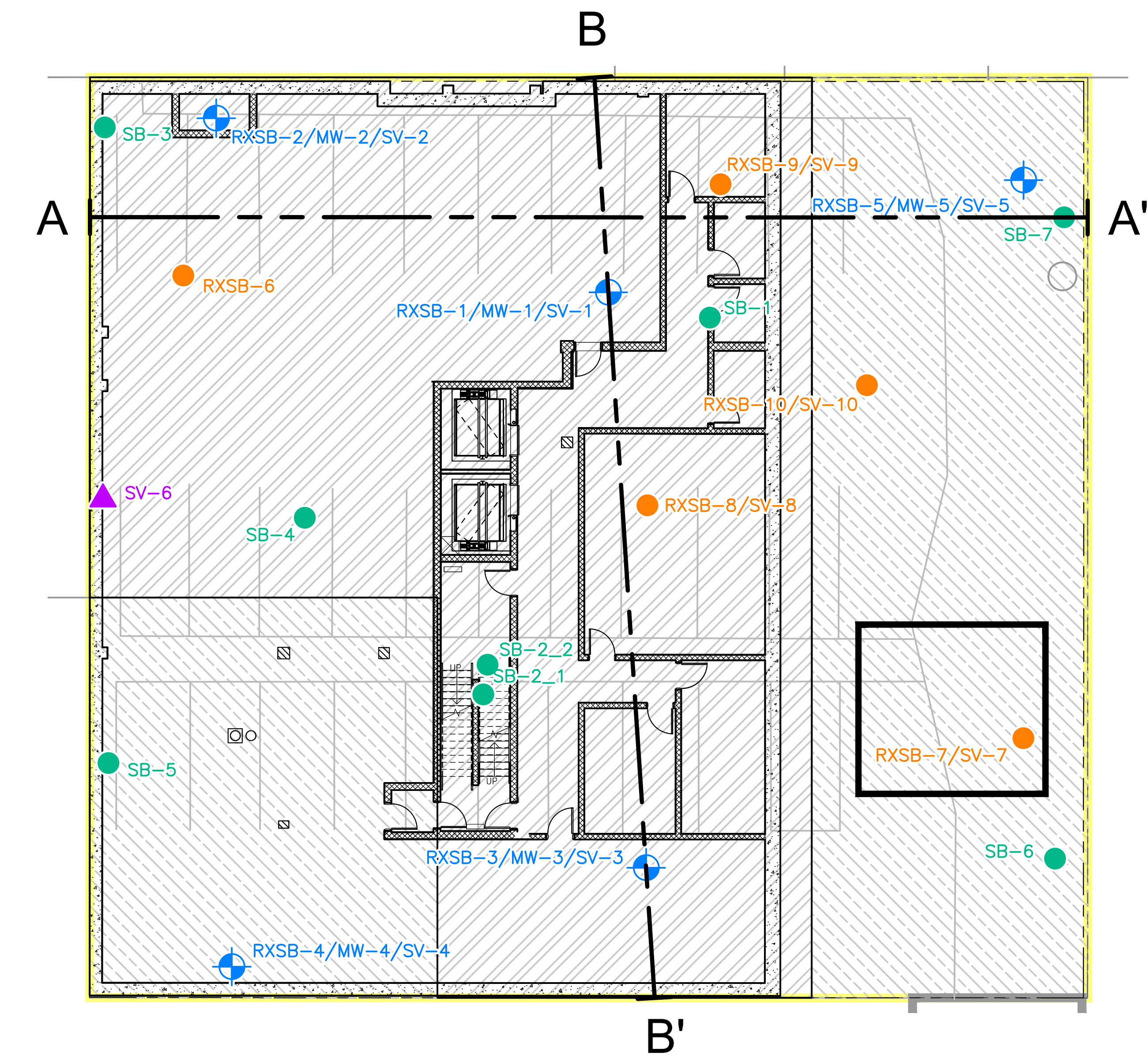
Compiled by: C.H.	Date: 07/28/21	FIGURE
Prepared by: M.S.R.	Scale: AS SHOWN	2
Project Mgr: K.S.	Project: 3475.0001Y000	
File: 3475.0001Y117.4.mxd		

V:\GIS\PROJECTS\3475.0001Y\117\3475.0001Y117.4.MXD



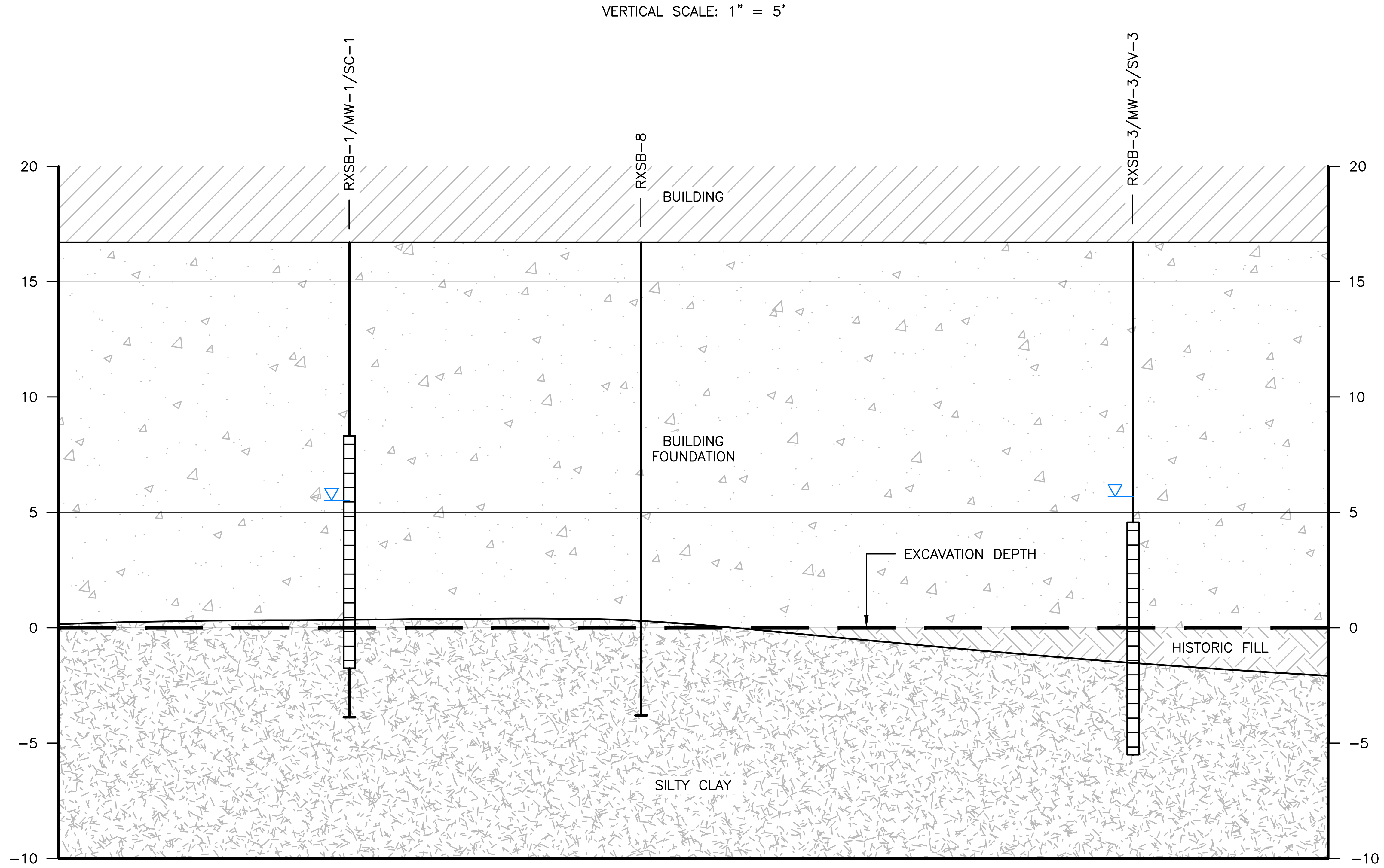
SECTION A–A'

HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 5'



SITE PLAN

SCALE: 1" = 20'



SECTION B–B'

HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 5'

LEGEND

RXSB-1/ MW-1/ SV-1	LOCATION AND DESIGNATION OF REMEDIAL INVESTIGATION SOIL BORING, SOIL VAPOR POINT AND MONITORING WELL
RXSB-7/ SV-7	LOCATION AND DESIGNATION OF REMEDIAL INVESTIGATION SOIL BORING AND SOIL VAPOR POINT
SV-6	LOCATION AND DESIGNATION OF REMEDIAL INVESTIGATION SOIL VAPOR POINT
SB-5	LOCATION AND DESIGNATION OF PHASE II ESA SOIL BORING
	SITE BOUNDARY
	WATER TABLE

NOTE

ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

Title:

GEOLOGIC CROSS SECTIONS

SITE MANAGEMENT PLAN
PARK LANE SENIOR
1940 TURNBULL AVENUE
BRONX, NEW YORK 10473

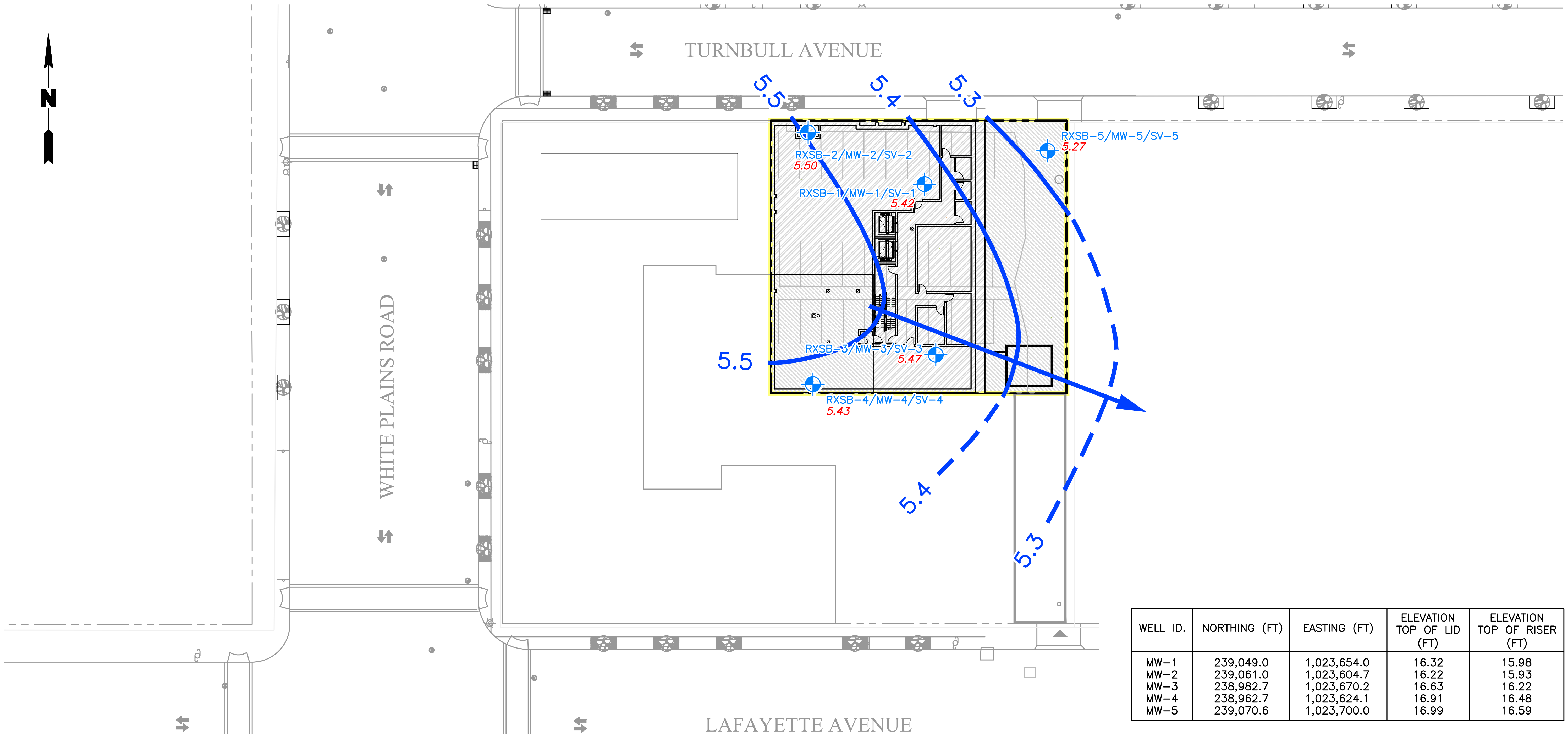
Prepared for:

PL SARA LLC

ROUX

Compiled by: C.H.	Date: 22NOV23	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	3
Project Mgr: C.H.	Project: 3475.0001Y002	
File: 3475.0001Y135.01.DWG		

V:\CAD\PROJECTS\3475Y\0001Y\135\3475.0001Y135.01.DWG



WELL ID.	NORTHING (FT)	EASTING (FT)	ELEVATION TOP OF LID (FT)	ELEVATION TOP OF RISER (FT)
MW-1	239,049.0	1,023,654.0	16.32	15.98
MW-2	239,061.0	1,023,604.7	16.22	15.93
MW-3	238,982.7	1,023,670.2	16.63	16.22
MW-4	238,962.7	1,023,624.1	16.91	16.48
MW-5	239,070.6	1,023,700.0	16.99	16.59

LEGEND

RXSB-1/ MW-1/ SV-1 — LOCATION AND DESIGNATION OF REMEDIAL INVESTIGATION SOIL BORING, SOIL VAPOR POINT AND MONITORING WELL

5.42 — GROUNDWATER ELEVATION

5.4 — CONTOUR ELEVATION IN FEET

DIRECTION OF GROUNDWATER FLOW

NOTES

1. HORIZONTAL LOCATIONS ARE BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM, LONG ISLAND ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
2. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
3. GROUNDWATER ELEVATIONS WERE CALCULATED BASED ON DEPTH TO WATER MEASUREMENTS TAKEN DURING A GROUNDWATER GAUGING EVENT, PRIOR TO IMPLEMENTATION OF THE REMEDIAL ACTION, ON JUNE 21, 2021.

SOURCE

MEGA ENGINEERING & LAND SURVEYING P.C. WELL LOCATION GRADE SHEET FOR 1940 TURNBULL AVENUE, BRONX, NEW YORK, JUNE 14, 2021.

40' 0 40'

Title:
GROUNDWATER CONTOUR MAP

SITE MANAGEMENT PLAN
PARK LANE SENIOR
1940 TURNBULL AVENUE
BRONX, NEW YORK 10473

Prepared for:
PL SARA LLC

ROUX

Compiled by: C.H. | Date: 13NOV23
Prepared by: G.M. | Scale: AS SHOWN
Project Mgr: C.H. | Project: 3475.0001Y002
File: 3475.0001Y135.02.DWG

FIGURE 4

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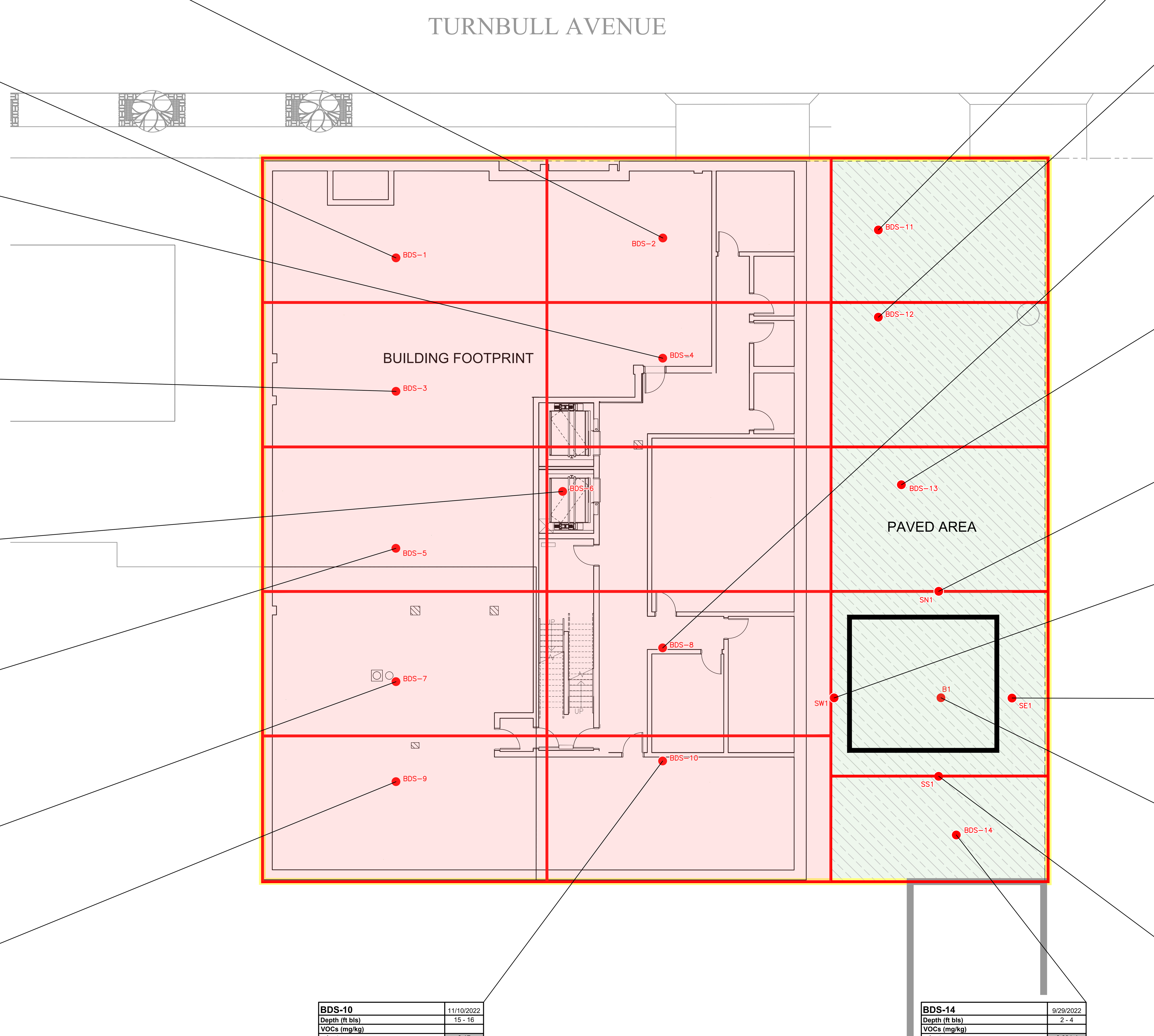
REMAINING SOIL SAMPLE EXCEEDANCES



BDS-2	12/8/2022
Depth (ft bls)	15 - 17
VOCs (mg/kg)	
Acetone	0.23 J-
SVOCs (mg/kg)	
Benzo(A)Anthracene	3.6 J-
Benzo(A)Pyrene	3.4 J-
Benzo(B)Fluoranthene	4.2 J-
Chrysene	3.7 J-
Dibenz(A,H)Anthracene	0.56 J-
Indeno(1,2,3-C,D)Pyrene	2.6 J-
Metals (mg/kg)	
Barium	945
Copper	314
Lead	1040
Mercury	8.2

BDS-1	11/22/2022
Depth (ft bls)	15 - 17
VOCs (mg/kg)	
Acetone	0.42 J-
SVOCs (mg/kg)	
Benzo(B)Fluoranthene	1.1 J
Metals (mg/kg)	
Barium	719
Lead	700
Mercury	1

BDS-4	11/22/2022
Depth (ft bls)	15 - 17
SVOCs (mg/kg)	
Benzo(A)Anthracene	6 J
Benzo(A)Pyrene	5.9 J
Benzo(B)Fluoranthene	6.4 J
Benzo(K)Fluoranthene	2.5
Chrysene	5.7 J
Dibenz(A,H)Anthracene	0.86 J
Indeno(1,2,3-C,D)Pyrene	4 J
Metals (mg/kg)	
Barium	3020
Cadmium	8.9
Copper	563
Lead	3940
Zinc	4240

BDS-3	11/22/2022
Depth (ft bls)	15 - 17
VOCs (mg/kg)	
Acetone	0.44 J-
SVOCs (mg/kg)	
Benzo(A)Anthracene	2.6 J
Benzo(A)Pyrene	2.3 J
Benzo(B)Fluoranthene	3.4 J
Chrysene	2.5 J
Indeno(1,2,3-C,D)Pyrene	1.2 J
Metals (mg/kg)	
Barium	751
Copper	2030
Lead	743
Mercury	2.3

BDS-6	11/8/2022
Depth (ft bls)	19 - 20
VOCs (mg/kg)	
Acetone	0.41
Metals (mg/kg)	
Arsenic	19.6
Barium	1310
Cadmium	8.6
Copper	358
Lead	1240
Mercury	1.1
Zinc	2680

BDS-5	11/18/2022
Depth (ft bls)	15 - 17
VOCs (mg/kg)	
Acetone	0.24
SVOCs (mg/kg)	
Benzo(A)Anthracene	1.8
Benzo(A)Pyrene	1.5 J
Benzo(B)Fluoranthene	2.1 J
Chrysene	1.8
Indeno(1,2,3-C,D)Pyrene	1.1
Metals (mg/kg)	
Barium	1090
Lead	983
Mercury	4.5

BDS-7	11/17/2022
Depth (ft bls)	15 - 17
VOCs (mg/kg)	
Acetone	0.15
Metals (mg/kg)	
Barium	1310
Lead	1040
Mercury	3.3

BDS-9	11/17/2022
Depth (ft bls)	15 - 17
VOCs (mg/kg)	
Acetone	0.092
SVOCs (mg/kg)	
Indeno(1,2,3-C,D)Pyrene	0.64 J
Metals (mg/kg)	
Barium	3380
Copper	296
Lead	2690
Mercury	1.5

BDS-10	11/10/2022
Depth (ft bls)	15 - 16
VOCs (mg/kg)	
Acetone	0.17
SVOCs (mg/kg)	
Benzo(A)Anthracene	7.1 J
Benzo(A)Pyrene	7.1 J
Benzo(B)Fluoranthene	10 J
Benzo(K)Fluoranthene	3.4 J
Chrysene	7.1 J
Dibenz(A,H)Anthracene	0.92 J
Indeno(1,2,3-C,D)Pyrene	3.6 J
Metals (mg/kg)	
Arsenic	28.4
Barium	1600
Cadmium	21
Copper	635
Lead	7110
Mercury	9.5
Zinc	2940

BDS-14	9/29/2022
Depth (ft bls)	2 - 4
VOCs (mg/kg)	
Acetone	0.091 J
SVOCs (mg/kg)	
Benzo(B)Fluoranthene	1.1
Indeno(1,2,3-C,D)Pyrene	0.65 J

BDS-11	9/29/2022	9/29/2022
		FD
Depth (ft bls)	2 - 4	2 - 4
SVOCs (mg/kg)		
Benzo(A)Anthracene	4.2 J	4.3 J
Benzo(A)Pyrene	3.7 J	3.5 J
Benzo(B)Fluoranthene	4.6 J	4.5 J
Chrysene	4	3.6 T
Dibenz(A,H)Anthracene	0.57	0.59
Indeno(1,2,3-C,D)Pyrene	2.6 J	2.8 J

BDS-12	3/1/2023
Depth (ft bls)	2 - 4
SVOCs (mg/kg)	
Benzo(A)Anthracene	4.3 J
Benzo(A)Pyrene	3.7 J
Benzo(B)Fluoranthene	5 J
Benzo(K)Fluoranthene	1.8 J
Chrysene	4.2
Dibenz(A,H)Anthracene	0.56
Indeno(1,2,3-C,D)Pyrene	2.5 J

BDS-8	11/17/2022
Depth (ft bls)	15 - 17
VOCs (mg/kg)	
Acetone	0.2
SVOCs (mg/kg)	
Benzo(A)Anthracene	1.5
Benzo(B)Fluoranthene	1.8 J
Benzo(A)Pyrene	1.3 J
Chrysene	1.7
Indeno(1,2,3-C,D)Pyrene	1
Metals (mg/kg)	
Barium	619
Lead	605
Mercury	2.1

BDS-13	3/1/2023
Depth (ft bls)	2 - 4
SVOCs (mg/kg)	
Indeno(1,2,3-C,D)Pyrene	0.63 J
Metals (mg/kg)	
Barium	1200
Lead	1090
Mercury	28.1

SN1	8/30/2022
Depth (ft bls)	7 - 8
VOCs (mg/kg)	
Acetone	0.058
SVOCs (mg/kg)	
Benzo(A)Anthracene	1.4
Benzo(A)Pyrene	1.3 J
Benzo(B)Fluoranthene	1.8
Chrysene	1.4
Indeno(1,2,3-C,D)Pyrene	1.1
Metals (mg/kg)	
Barium	1070
Lead	782
Mercury	0.94

SW1	8/30/2022
Depth (ft bls)	7 - 8
SVOCs (mg/kg)	
Benzo(A)Anthracene	2.6
Benzo(A)Pyrene	2.3 J
Benzo(B)Fluoranthene	3
Chrysene	2.4
Dibenz(A,H)Anthracene	0.38
Indeno(1,2,3-C,D)Pyrene	1.5
Metals (mg/kg)	
Barium	1030
Lead	859
Mercury	1.5

SE1	8/30/2022
Depth (ft bls)	5 - 7
SVOCs (mg/kg)	
Benzo(A)Anthracene	1.4
Benzo(A)Pyrene	1.2 J
Benzo(B)Fluoranthene	1.7
Chrysene	1.2
Indeno(1,2,3-C,D)Pyrene	1
Metals (mg/kg)	
Barium	435
Lead	446

B1	8/31/2022
Depth (ft bls)	13 - 14
SVOCs (mg/kg)	
Benzo(B)Fluoranthene	1.3
Indeno(1,2,3-C,D)Pyrene	0.61
Metals (mg/kg)	
Barium	1200
Lead	1440
Mercury	4.4
Silver	11.7
Pesticides (mg/kg)	
P,P'-DDE	46
P,P'-DDT	54

SS1	8/30/2022
Depth (ft bls)	7 - 8
SVOCs (mg/kg)	
Benzo(A)Anthracene	18
Benzo(A)Pyrene	16 J
Benzo(B)Fluoranthene	16
Benzo(K)Fluoranthene	6.6
Chrysene	21
Dibenz(A,H)Anthracene	2.7
Indeno(1,2,3-C,D)Pyrene	8.6
Metals (mg/kg)	
Lead	500

LEGEND

BDS-1 — LOCATION AND DESIGNATION OF REMEDIAL ENDPOINT SAMPLE

TRACK 2 EXCAVATION FOOTPRINT (15 FT BLS) – BUILDING EXTENT

TRACK 4 EXCAVATION AND SITE COVER SYSTEM FOOTPRINT (2 FT BLS) – PAVED

HOTSPOT EXCAVATION FOOTPRINT (VARIES BETWEEN 5 FT BLS AND 13 FT BLS)

SITE BOUNDARY

DETENTION TANK

Parameter	NYSDEC Part 375 Restricted Residential Soil Cleanup Objectives	NYSDEC Part 375 Protection of Groundwater Soil Cleanup Objectives
VOCs		
Acetone	100	0.05
SVOCs		
Benzo(A)Anthracene	1	1
Benzo(A)Pyrene	1	22
Benzo(B)Fluoranthene	1	1.7
Benzo(K)Fluoranthene	3.9	1.7
Chrysene	3.9	1
Dibenz(A,H)Anthracene	0.33	1000
Indeno(1,2,3-C,D)Pyrene	0.5	8.2
Metals		
Arsenic	16	16
Barium	400	820
Cadmium	4.3	7.5
Copper	270	1720
Lead	400	450
Mercury	0.81	0.73
Silver	180	8.3
Zinc	10000	2480
Pesticides		
P,P'-DDE	8.9	17
P,P'-DDT	7.9	136

NOTES

1. HORIZONTAL LOCATIONS ARE BASED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM, LONG ISLAND ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
2. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
3. GROUNDWATER ELEVATIONS WERE CALCULATED BASED ON DEPTH TO WATER MEASUREMENTS TAKEN DURING A GROUNDWATER GAUGING EVENT, PRIOR TO IMPLEMENTATION OF THE REMEDIAL ACTION, ON JUNE 21, 2021.

SOURCE

MEGA ENGINEERING AND LAND SURVEYING P.C. WELL LOCATION GRADE SHEET FOR 1940 TURNBULL AVENUE, BRONX, NEW YORK, JUNE 14, 2021.

N

10' 0 10'

Title:

REMAINING SOIL SAMPLE EXCEEDANCES

SITE MANAGEMENT PLAN
PARK LANE SENIOR
1940 TURNBULL AVENUE
BRONX, NEW YORK 10473

Prepared for:

PL SARA LLC

ROUX

Compiled by: C.H.	Date: 13NOV23	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	5
Project Mgr: C.H.	Project: 3475.0001Y002	
File: 3475.0001Y135.03.DWG		

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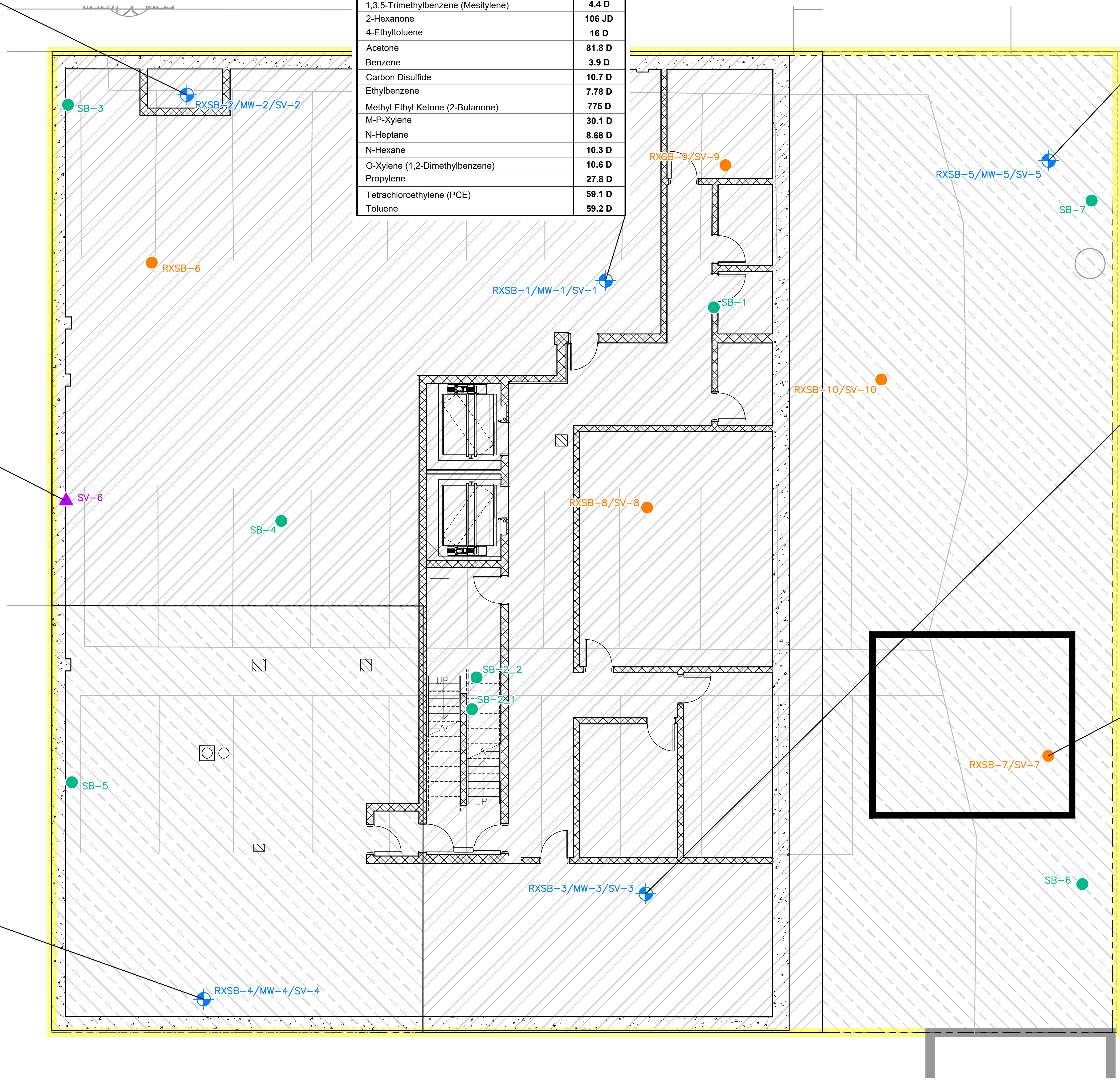
SV-2	06/02/2021
VOCs	
1,2,4-Trimethylbenzene	**15.2 D**
2-Hexanone	**139 JD**
4-Ethyltoluene	**15.2 D**
Acetone	**126 D**
Carbon Disulfide	**5.08 D**
Ethylbenzene	**7.09 D**
Isopropanol	**35.7 D**
Methyl Ethyl Ketone (2-Butanone)	**1140 D**
M-P-Xylene	**29.1 D**
N-Heptane	**8.03 D**
N-Hexane	**7.48 D**
O-Xylene (1,2-Dimethylbenzene)	**9.92 D**
Propylene	**41 D**
Tetrachloroethylene (PCE)	**16.6 D**
Toluene	**41.2 D**

SV-1	06/02/2021
VOCs	
1,2,4-Trimethylbenzene	**16.8 D**
1,3,5-Trimethylbenzene (Mesitylene)	**4.4 D**
2-Hexanone	**106 JD**
4-Ethyltoluene	**16 D**
Acetone	**81.8 D**
Benzene	**3.9 D**
Carbon Disulfide	**10.7 D**
Ethylbenzene	**7.78 D**
Methyl Ethyl Ketone (2-Butanone)	**775 D**
M-P-Xylene	**30.1 D**
N-Heptane	**8.68 D**
N-Hexane	**10.3 D**
O-Xylene (1,2-Dimethylbenzene)	**10.6 D**
Propylene	**27.8 D**
Tetrachloroethylene (PCE)	**59.1 D**
Toluene	**59.2 D**

SV-5	06/02/2021	06/02/2021 DUP
VOCs		
1,2,4-Trimethylbenzene	**14.6 D**	**19.6 D**
1,3,5-Trimethylbenzene (Mesitylene)	**3.21 D**	**6.69 D**
2-Hexanone	**36.9 JD**	**35.6 JD**
4-Ethyltoluene	**13.4 D**	**19.3 D**
Acetone	**21.5 D**	**21.7 D**
Benzene	**1.8 D**	**2.02 D**
Chloroform	**3.77 D**	**4.02 D**
Cyclohexane	ND	**2.29 D**
Dichlorodifluoromethane	**2.2 D**	**2.19 D**
Ethylbenzene	**4.12 D**	**4.95 D**
Methyl Ethyl Ketone (2-Butanone)	**191 D**	**195 D**
M-P-Xylene	**18.8 D**	**29.1 D**
N-Heptane	**5.35 D**	**7.26 D**
N-Hexane	**3.97 D**	**8.92 D**
O-Xylene (1,2-Dimethylbenzene)	**6.05 D**	**11.8 D**
Propylene	**9.14 D**	**9.75 D**
Tetrachloroethylene (PCE)	**31 D**	**32.2 D**
Toluene	**40.2 D**	**47.2 D**

SV-6	06/02/2021
VOCs	
1,2,4-Trimethylbenzene	**16.3 D**
1,3,5-Trimethylbenzene (Mesitylene)	**3.58 D**
2-Hexanone	**87.1 JD**
4-Ethyltoluene	**15 D**
Acetone	**60.7 D**
Benzene	**3.39 D**
Ethylbenzene	**6.33 D**
Methyl Ethyl Ketone (2-Butanone)	**619 D**
M-P-Xylene	**26.5 D**
N-Heptane	**372 D**
N-Hexane	**625 D**
O-Xylene (1,2-Dimethylbenzene)	**8.92 D**
Tetrachloroethylene (PCE)	**75.5 D**
Toluene	**43.2 D**

SV-3	06/02/2021
VOCs	
1,2,4-Trimethylbenzene	**8.02 D**
2-Hexanone	**98.7 JD**
4-Ethyltoluene	**5.35 D**
Acetone	**65.2 D**
Benzene	**12.4 D**
Carbon Disulfide	**21.3 D**
Chloroform	**153 D**
Cyclohexane	**5.35 D**
Ethylbenzene	**7.42 D**
Isopropanol	**7.45 D**
Methyl Ethyl Ketone (2-Butanone)	**709 D**
M-P-Xylene	**11.1 D**
N-Heptane	**11.5 D**
N-Hexane	**38.4 D**
O-Xylene (1,2-Dimethylbenzene)	**4.05 D**
Tetrachloroethylene (PCE)	**41.1 D**
Toluene	**22.8 D**



SV-7	06/02/2021
VOCs	
1,2,4-Trimethylbenzene	**6.24 D**
2-Hexanone	**90 D**
4-Ethyltoluene	**3.9 JD**
Acetone	**37.7 D**
Chloroform	**31.7 D**
Methyl Ethyl Ketone (2-Butanone)	**710 D**
N-Hexane	**6.15 D**
Propylene	**14.3 D**
Tetrachloroethylene (PCE)	**19.4 D**
Toluene	**19.4 D**

SV-4	06/02/2021
VOCs	
1,2,4-Trimethylbenzene	**18.1 D**
1,3,5-Trimethylbenzene (Mesitylene)	**4.86 D**
2-Hexanone	**24.8 JD**
4-Ethyltoluene	**16.2 D**
Acetone	**12.5 D**
Benzene	**1.4 D**
Carbon Disulfide	**27.7 D**
Chloroform	**26.4 D**
Cyclohexane	**0.893 D**
Dichlorodifluoromethane	**2.17 D**
Ethylbenzene	**7.61 D**
Methyl Ethyl Ketone (2-Butanone)	**145 D**
M-P-Xylene	**35.4 D**
N-Heptane	**3.79 D**
N-Hexane	**2.46 D**
O-Xylene (1,2-Dimethylbenzene)	**11.5 D**
Propylene	**9.44 D**
Styrene	**0.691 D**
Tetrachloroethylene (PCE)	**35.8 D**
Tetrahydrofuran	**1.72 D**
Toluene	**77.4 D**
Trichloroethylene (TCE)	**0.261 D**
Trichlorofluoromethane	**1.46 D**

LEGEND

RXSB-1/MW-1/SV-1 — LOCATION AND DESIGNATION OF REMEDIAL INVESTIGATION SOIL BORING, SOIL VAPOR POINT AND MONITORING WELL

RXSB-7/SV-7 — LOCATION AND DESIGNATION OF REMEDIAL INVESTIGATION SOIL BORING AND SOIL VAPOR POINT

SV-6 — LOCATION AND DESIGNATION OF REMEDIAL INVESTIGATION SOIL VAPOR POINT

SB-5 — LOCATION AND DESIGNATION OF PHASE II ESA SOIL BORING

SITE BOUNDARY

DETENTION TANK

CONCENTRATIONS IN $\mu g/m^3$

$\mu g/m^3$ — MICROGRAMS PER CUBIC METER

VOCs — VOLATILE ORGANIC COMPOUNDS

ND — COMPOUND WAS ANALYZED FOR BUT NOT DETECTED

D — DILUTION

J — ESTIMATED VALUE

10' 0 10'

Title:

REMAINING SOIL VAPOR DETECTIONS

SITE MANAGEMENT PLAN
PARK LANE SENIOR
1940 TURNBULL AVENUE
BRONX, NEW YORK 10473

Prepared for:

PL SARA LLC

ROUX

Compiled by: C.H.	Date: 13NOV23	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	6
Project Mgr: C.H.	Project: 3475.0001Y002	
File: 3475.0001Y135.04.DWG		

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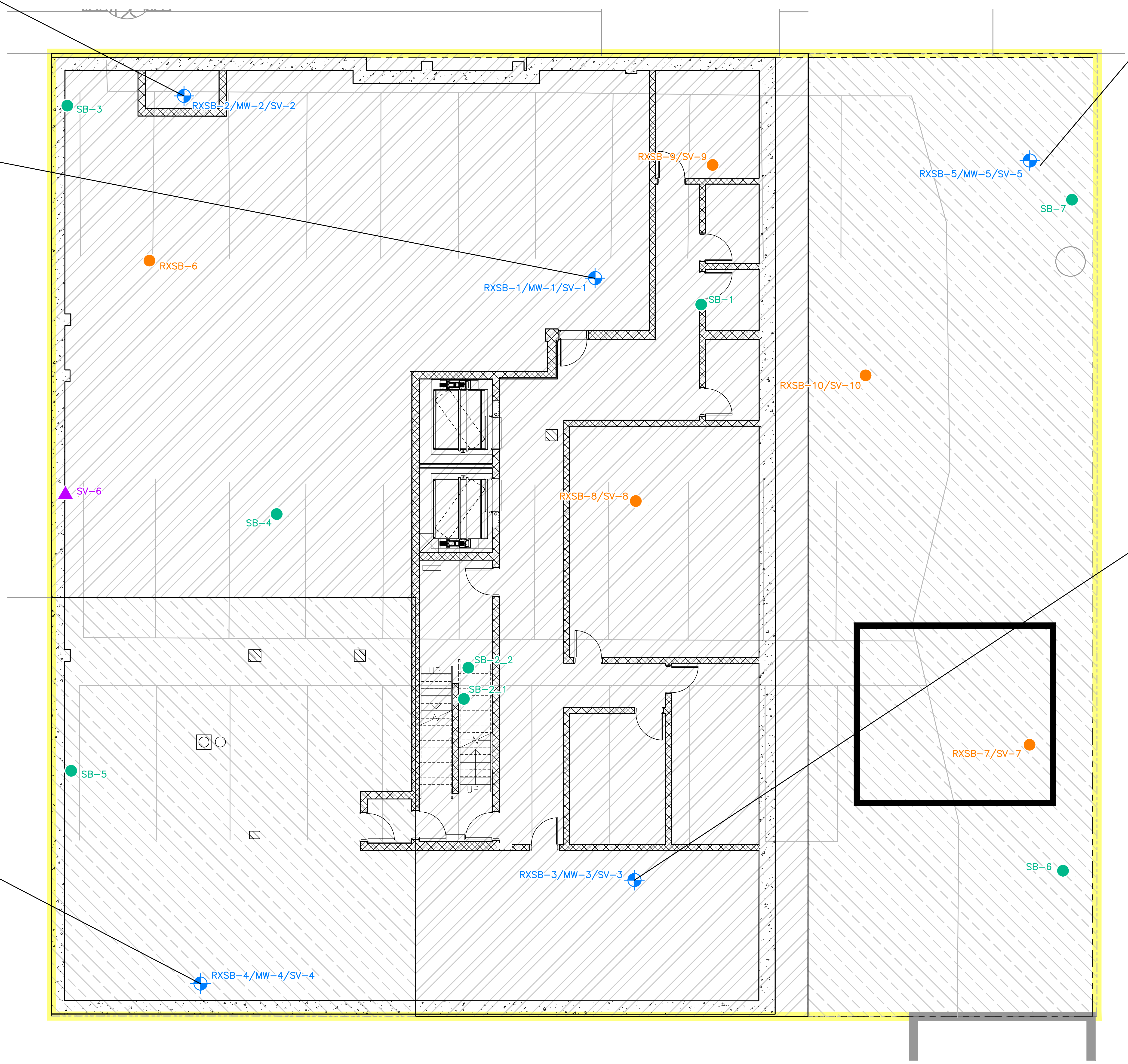
MW-2	06/14/2021
Metals, Total	
Iron	4180
Manganese	398
Sodium	248000
Metals, Filtered	
Manganese	396
Sodium	279000
PFAS	
Perfluorooctanoic acid (PFOA)	18.4

MW-1	06/14/2021	06/14/2021 DUP
Metals, Total		
Iron	21100	19700
Magnesium	39300	43200
Manganese	435	473
Sodium	222000	257000
Metals, Filtered		
Magnesium	37500	37200
Manganese	451	446
Sodium	233000	226000
PFAS		
Perfluorooctanoic acid (PFOA)	20.4	20.4

MW-4	06/14/2021
Metals, Total	
Iron	13800
Magnesium	45300
Manganese	614
Sodium	250000
Metals, Filtered	
Magnesium	43400
Manganese	641
Sodium	262000
PFAS	
Perfluorooctanoic acid (PFOA)	21.3



MW-5	06/14/2021
SVOCs	
Benzo(A)Anthracene	0.1
Benzo(A)Pyrene	0.0778
Benzo(B)Fluoranthene	0.0667
Benzo(K)Fluoranthene	0.0667
Chrysene	0.0778
Metals, Total	
Iron	6450
Manganese	522
Sodium	179000
Metals, Filtered	
Manganese	509
Sodium	190000
PFAS	
Perfluorooctanoic acid (PFOA)	18.8

MW-3	06/14/2021
SVOCs	
Benzo(A)Anthracene	0.2
Benzo(A)Pyrene	0.156
Benzo(B)Fluoranthene	0.122
Benzo(K)Fluoranthene	0.133
Chrysene	0.178
Indeno(1,2,3-C,D)Pyrene	0.0778
Metals, Total	
Iron	25600
Magnesium	36100
Manganese	312
Sodium	155000
Metals, Filtered	
Magnesium	35900
Sodium	165000
PFAS	
Perfluorooctanoic acid (PFOA)	18.1

LEGEND

RXSB-1/ MW-1/ SV-1	LOCATION AND DESIGNATION OF REMEDIAL INVESTIGATION SOIL BORING, SOIL VAPOR POINT AND MONITORING WELL
RXSB-7/ SV-7	LOCATION AND DESIGNATION OF REMEDIAL INVESTIGATION SOIL BORING AND SOIL VAPOR POINT
SV-6	LOCATION AND DESIGNATION OF REMEDIAL INVESTIGATION SOIL VAPOR POINT
SB-5	LOCATION AND DESIGNATION OF PHASE II ESA SOIL BORING
	SITE BOUNDARY
	DETENTION TANK

Parameter	NYSDEC AWQSGV	Units
VOCs	NE	UG/L
SVOCs		
Benzo(A)Anthracene	0.002	UG/L
Benzo(A)Pyrene	0	UG/L
Benzo(B)Fluoranthene	0.002	UG/L
Benzo(K)Fluoranthene	0.002	UG/L
Chrysene	0.002	UG/L
Indeno(1,2,3-C,D)Pyrene	0.002	UG/L
Metals, Total		
Iron	300	UG/L
Magnesium	35000	UG/L
Manganese	300	UG/L
Sodium	20000	UG/L
Metals, Filtered		
Magnesium	35000	UG/L
Manganese	300	UG/L
Sodium	20000	UG/L
PCBs	ND	UG/L
Pesticides	ND	UG/L
PFAS		
Perfluorooctanoic acid (PFOA)	10	NG/L

ng/l – NANOGRAMS PER LITER
ug/l – MICROGRAMS PER LITER
NYSDEC – NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AWQSGVs – AMBIENT WATER-QUALITY STANDARDS AND GUIDANCE VALUES
-- – NOT DETECTED ABOVE NYSDEC AWQAGV ESTIMATED VALUE DILUTION
B – FOUND IN LABORATORY BLANK
E – EXCEEDS CALIBRATION LIMIT DUPLICATE SAMPLE
VOCs – VOLATILE ORGANIC COMPOUNDS
SVOCs – SEMIVOLATILE ORGANIC COMPOUNDS
PCBs – POLYCHLORINATED BIPHENYLS
PFAS – PER-AND POLYFLUOROALKYL SUBSTANCES
NE – NO EXCEEDANCE
ND – NO DETECTION

N

10' 0 10'

Title:

REMAINING GROUNDWATER EXCEEDANCES

SITE MANAGEMENT PLAN
PARK LANE SENIOR
1940 TURNBULL AVENUE
BRONX, NEW YORK 10473

Prepared for:

PL SARA LLC

ROUX

Compiled by: C.H.	Date: 13NOV23	FIGURE
Prepared by: G.M.	Scale: AS SHOWN	7
Project Mgr: C.H.	Project: 3475.0001Y002	
File: 3475.0001Y135.04.DWG		

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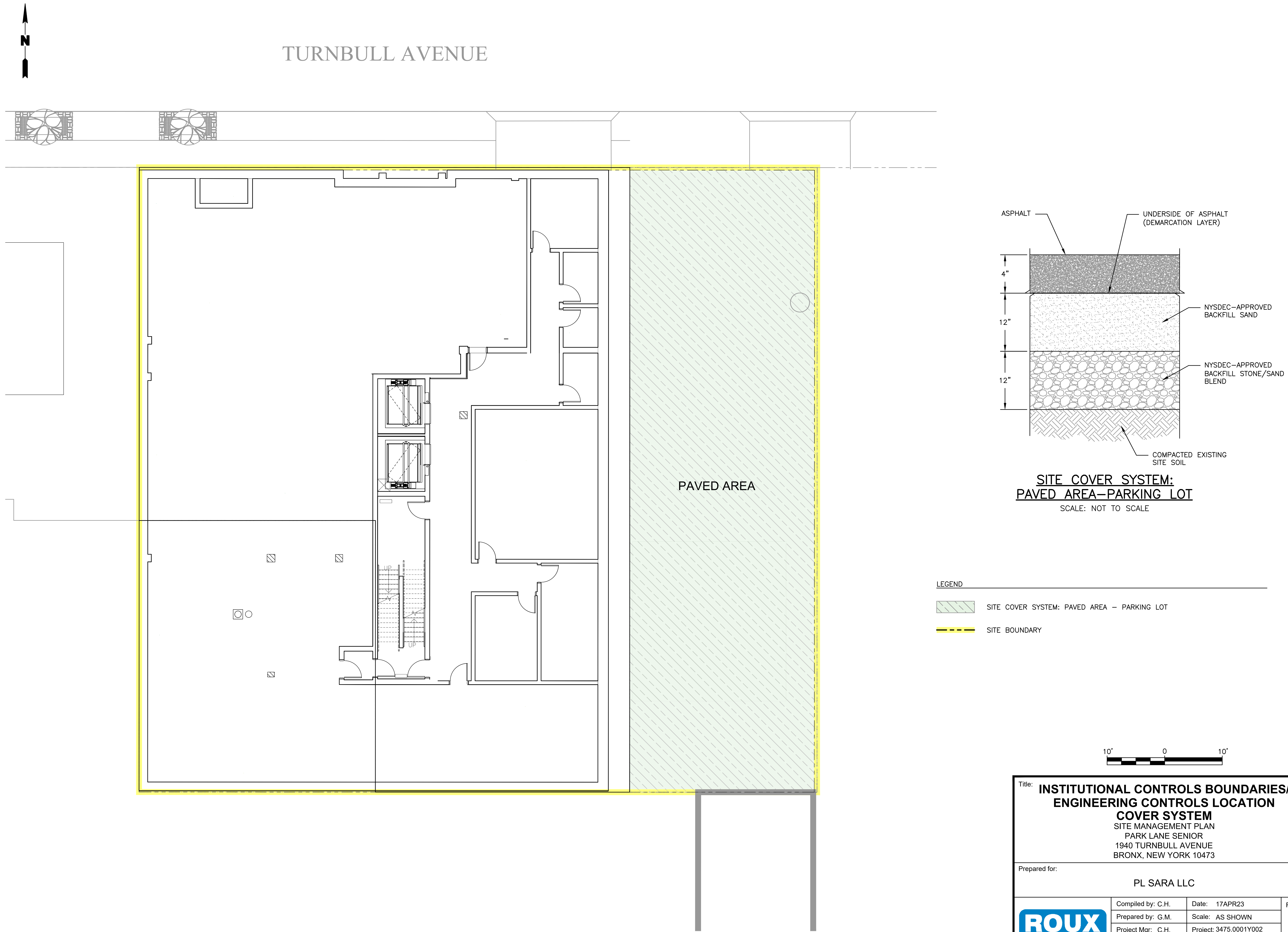

Title: **INSTITUTIONAL CONTROLS BOUNDARIES/ ENGINEERING CONTROLS LOCATION COVER SYSTEM**

SITE MANAGEMENT PLAN
PARK LANE SENIOR
1940 TURNBULL AVENUE
BRONX, NEW YORK 10473

Prepared for:

PL SARA LLC

ROUX	Compiled by: C.H.	Date: 17APR23	FIGURE
	Prepared by: G.M.	Scale: AS SHOWN	8
	Project Mgr: C.H.	Project: 3475.0001Y002	
	File: 3475.0001Y135.03.DWG		

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APPENDICES

A. Environmental Easement

B. List of Site Contacts

C. Excavation Work Plan

D. Responsibilities of Owner and Remedial Party

E. Health and Safety Plan

F. Site Management Forms

G. Request to Import/Reuse Fill Material Form

H. Field Sampling Plan

I. Quality Assurance Project Plan

APPENDIX A

Environmental Easement

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

This page is part of the instrument. The City Register will rely on the information provided by you on this page for purposes of indexing this instrument.The information on this page will control for indexing purposes in the event of any conflict with the rest of the document.

2023110800370001002E7CDE

RECORDING AND ENDORSEMENT COVER PAGE

Document ID: 2023110800370001 Document Date: 11-03-2023 Preparation Date: 11-14-2023
Document Type: EASEMENT
Document Page Count: 10

PRESENTER:
SIVE PAGET & RIESEL, P.C.
560 LEXINGTON AVENUE, 15TH FLOOR
NEW YORK, NY 10022
212-421-2150
NDUNCAN@SPRLAW.COM

RETURN TO:
SIVE PAGET & RIESEL, P.C.
560 LEXINGTON AVENUE, 15TH FLOOR
NEW YORK, NY 10022
212-421-2150
NDUNCAN@SPRLAW.COM

PROPERTY DATA

Borough	Block	Lot	Unit	Address
BRONX	3672	30 Entire Lot		1940 TURNBULL AVENUE

Property Type: APARTMENT BUILDING Easement

CROSS REFERENCE DATA

CRFN_______ *or* DocumentID________ *or* _______ Year_____ Reel____ Page_____ *or* File Number__________

PARTIES

GRANTOR/SELLER:
HP PARK LANE SENIOR HOUSING DEVELOPMENT FUND
COMPANY, INC. - 253 WEST 35TH STREET, 3RD FLOOR

☒ Additional Parties Listed on Continuation Page

GRANTEE/BUYER:
PEOPLE OF THE STATE OF NEW YORK BY DEPT. ENVIRONMENTAL CONSERVATION, 625 BROADWAY
ALBANY, NY 12233

FEES AND TAXES

Mortgage :

Mortgage Amount:	$	0.00
Taxable Mortgage Amount:	$	0.00
Exemption:		
TAXES: County (Basic):	$	0.00
City (Additional):	$	0.00
Spec (Additional):	$	0.00
TASF:	$	0.00
MTA:	$	0.00
NYCTA:	$	0.00
Additional MRT:	$	0.00
TOTAL:	$	0.00
Recording Fee:	$	87.00
Affidavit Fee:	$	0.00

Filing Fee:	$	100.00
NYC Real Property Transfer Tax:	$	0.00
NYS Real Estate Transfer Tax:	$	0.00

RECORDED OR FILED IN THE OFFICE OF THE CITY REGISTER OF THE CITY OF NEW YORK

Recorded/Filed 11-17-2023 10:23
City Register File No.(CRFN):
2023000300656

Colette McClain-Jacques

City Register Official Signature

NYC DEPARTMENT OF FINANCE
OFFICE OF THE CITY REGISTER

2023110800370001002C7E5E

RECORDING AND ENDORSEMENT COVER PAGE (CONTINUATION)

Document ID: 2023110800370001 Document Date: 11-03-2023 Preparation Date: 11-14-2023
Document Type: EASEMENT

PARTIES

GRANTOR/SELLER:
PL SARA LLC
70 EAST 55TH STREET, 7TH FLOOR
NEW YORK, NY 10022

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made as of ~~this~~ 3rd day of November, 2023 between Owners, HP Park Lane Senior Housing Development Fund Company Inc., having an office at 253 West 35th Street, 3rd Floor, County of New York, State of New York, and PL SARA LLC, having an office at 70 East 55th Street, 7th Floor, County of New York, State of New York (collectively, the "Grantor") and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 1940 Turnbull Avenue in the City of New York, County of Bronx and State of New York, known and designated on the tax map of the New York City Department of Finance as tax map parcel number: Block 3672 Lot 30, being the same as that property conveyed to Grantor by deed dated March 31, 2022 and recorded in the City Register of the City of New York as CRFN 2022000166771. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.2933 +/- acres, and is hereinafter more fully described in the Land Title Survey dated January 21, 2016 and revised on February 9, 2022, March 25, 2022, and October 6, 2023, prepared by Robert Fehringer, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Brownfield Cleanup Agreement Index Number: C203138-09-20, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Restricted Residential as described in 6 NYCRR Part 375-1.8(g)(2)(ii), Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

(4) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the New York City Department of Health and Mental Hygiene to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential purposes as defined in 6NYCRR 375-1.8(g)(2)(i), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation

pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: C203138
Office of General Counsel
NYSDEC
625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

11. Consistency with the SMP. To the extent there is any conflict or inconsistency between the terms of this Environmental Easement and the SMP, regarding matters specifically addressed by the SMP, the terms of the SMP will control.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

HP Park Lane Senior Housing Development Fund Company, Inc.:

By: Adam Gold

Print Name: Adam Gold

Title:Treasurer Date: October 24, 2023

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF NEW YORK)

On the 24th day of October, in the year 2023, before me, the undersigned, personally appeared Adam Gold, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/ their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - State of New York

THERESA A OMANSKY
Notary Public, State of New York
Reg. No. 02OM6427050
Qualified in Kings County
Commission Expires December 20, 2025

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

PL SARA, LLC:

By: ______________________________

Print Name: Joshua Siegel

Title: V.P Date: 10/24/23

Grantor's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF New York)

On the 24th day of October, in the year 2023, before me, the undersigned, personally appeared Joshua Siegel, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Rose M. Hernandez
Notary Public - State of New York

Rose M. Hernandez
Notary Public, State of New York
No. 01HE4873117
Qualified in New York County
Commission Expires 6-1-2027

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting by and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: Andrew Guglielmi
Andrew O. Guglielmi, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 3rd day of November in the year 2023 before me, the undersigned, personally appeared Andrew O. Guglielmi, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Cheryl A. Salem
Notary Public - State of New York

Cheryl A. Salem
Notary Public State of New York
Registration No. 01SA0002177
Qualified in Albany County
My Commission Expires March 3, 2027

SCHEDULE "A" PROPERTY DESCRIPTION

ALL THAT CERTAIN plot, piece or parcel of land, situate, lying and being in the Borough and County of the Bronx, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of Turnbull Avenue distant 106.75 feet easterly from the intersection of the southerly side of Turnbull Avenue and the Easterly side of White Plains Road;

RUNNING THENCE southerly along a line forming an angle on the East with the southerly side of Turnbull Avenue of 90 Degrees 0 Minutes 9 Seconds and parallel with White Plains Road a distance of 108.50 feet to a point;

THENCE easterly along a line forming an angle on the North with the last described course of 89 Degrees 59 Minutes 51 Seconds and parallel with Turnbull Avenue a distance of 117.75 feet to a point;

THENCE northerly along a line forming an angle on the West with the last described course of 90 Degrees 0 Minutes 9 Seconds and parallel with White Plains Road a distance of 108.50 feet to the southerly side of Turnbull Avenue;

THENCE westerly along the southerly side of Turnbull Avenue a distance of 117.75 feet to the point or place of BEGINNING.

For Information Only: Said premises are known as 1940 Turnbull Avenue, Bronx, NY and designated as Block 3672 Lot 30 as shown on the Tax Map of the City of New York, County of the Bronx.

Metes/Bounds

Description

LEGAL DESCRIPTIONS

Easement Area A Track 2 Restricted Residential

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough and County of the Bronx, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of Turnbull Avenue distance 106.75 feet easterly from the intersection of the southerly side of Turnbull Avenue and the Easterly side of White Plains Road;

RUNNING THENCE southerly along a line forming an angle on the East with the southerly side of Turnbull Avenue of 90 Degrees 00 Minutes 09 Seconds and parallel with White Plains Road, a distance of 108.50 feet;

THENCE easterly along a line forming an angle on the North with the last described course of 89 Degrees 59 Minutes 51 Seconds and parallel with Turnbull Avenue, a distance of 84.85 feet;

THENCE northerly along a line forming an angle on the West with the last described course of 90 Degrees 00 minutes 09 Seconds and parallel with White Plains Road, a distance of 108.50 feet to the southerly side of Turnbull Avenue;

THENCE westerly along the southerly side of Turnbull Avenue, a distance of 84.85 feet to the point or place of BEGINNING.

CONTAINING WITHIN SAID BOUNDS 3,559 Sq. Feet.

Easement Area B Track 4 Restricted Residential

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough and County of the Bronx, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of Turnbull Avenue distance 191.60 feet easterly from the intersection of the southerly side of Turnbull Avenue and the Easterly side of White Plains Road;

RUNNING THENCE southerly along a line forming an angle on the East with the southerly side of Turnbull Avenue of 90 Degrees 00 Minutes 09 Seconds and parallel with White Plains Road, a distance of 108.50 feet;

THENCE easterly along a line forming an angle on the North with the last described course of 89 Degrees 59 Minutes 51 Seconds and parallel with Turnbull Avenue, a distance of 32.90 feet;

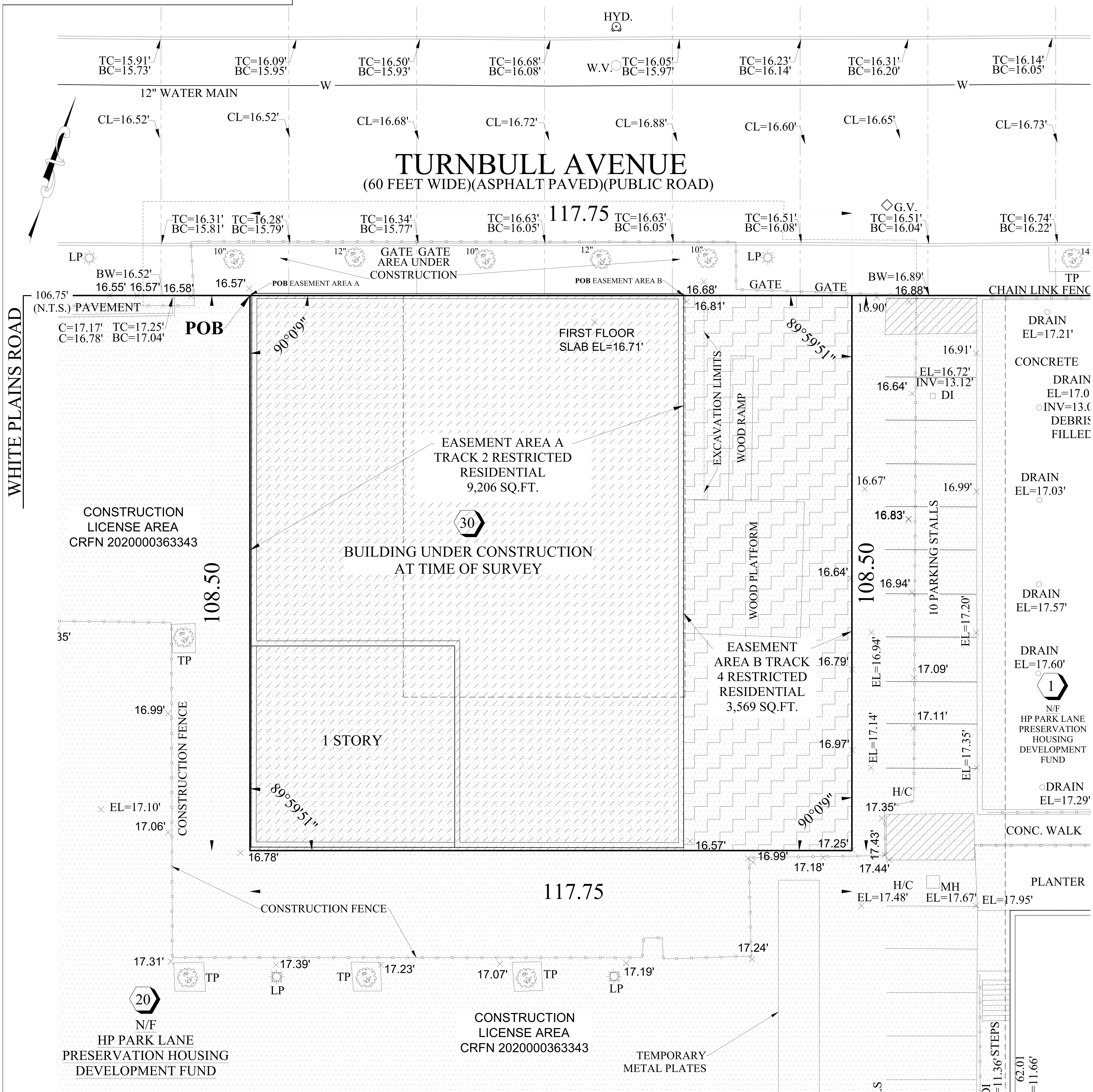
THENCE northerly along a line forming an angle on the West with the last described course of 90 Degrees 00 minutes 09 Seconds and parallel with White Plains Road, a distance of 108.50 feet to the southerly side of Turnbull Avenue;

THENCE westerly along the southerly side of Turnbull Avenue, a distance of 32.90 feet to the point or place of BEGINNING.

CONTAINING WITHIN SAID BOUNDS 9,206 Sq. Feet.

Site Survey

TITLE SURVEY



LEGAL DESCRIPTIONS

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BEGINNING at a point on the southerly side of Turnbull Avenue distant 106.75 feet easterly from the intersection of the southerly side of Turnbull Avenue and the Easterly side of White Plains Road;

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THENCE westerly along the southerly side of Turnbull Avenue a distance of 117.75 feet to the point or place of BEGINNING.

CONTAINING WITHIN SAID BOUNDS 12,775.87 Sq. Feet or 0.2933 Acres.

Easement Area A Track 2 Restricted Residential

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough and County of the Bronx, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of Turnbull Avenue distance 106.75 feet easterly from the intersection of the southerly side of Turnbull Avenue and the Easterly side of White Plains Road;

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THENCE northerly along a line forming an angle on the West with the last described course of 90 Degrees 00 minutes 09 Seconds and parallel with White Plains Road, a distance of 108.50 feet to the southerly side of Turnbull Avenue;

THENCE westerly along the southerly side of Turnbull Avenue, a distance of 84.85 feet to the point or place of BEGINNING.

CONTAINING WITHIN SAID BOUNDS 3,559 Sq. Feet.

Easement Area B Track 4 Restricted Residential

ALL that certain plot, piece or parcel of land, situate, lying and being in the Borough and County of the Bronx, City and State of New York, bounded and described as follows:

BEGINNING at a point on the southerly side of Turnbull Avenue distance 191.60 feet easterly from the intersection of the southerly side of Turnbull Avenue and the Easterly side of White Plains Road;

RUNNING THENCE southerly along a line forming an angle on the East with the southerly side of Turnbull Avenue of 90 Degrees 00 Minutes 09 Seconds and parallel with White Plains Road, a distance of 108.50 feet;

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THENCE northerly along a line forming an angle on the West with the last described course of 90 Degrees 00 minutes 09 Seconds and parallel with White Plains Road, a distance of 108.50 feet to the southerly side of Turnbull Avenue;

THENCE westerly along the southerly side of Turnbull Avenue, a distance of 32.90 feet to the point or place of BEGINNING.

CONTAINING WITHIN SAID BOUNDS 9,206 Sq. Feet.

This property is subject to an environmental easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the New York Environmental Conservation Law. The engineering and institutional controls for this Easement are set forth in the Site Management Plan (SMP). A copy of the SMP must be obtained by any party with an interest in the property. The SMP can be obtained from NYS Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233 or at derweb@dec.ny.gov

ALL ELEVATIONS ARE IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

EASEMENT AREA A TRACK 2 RESTRICTED RESIDENTIAL

EASEMENT AREA B TRACK 4 RESTRICTED RESIDENTIAL

CONSTRUCTION LICENSE AREA CRFN 2020000363343

METERS

3 M 5 M 8 M

0 3 M 8 M 16 M

LEGEND

HYD	FIRE HYDRANT		OVERHEAD UTILITY WIRES
T.P.	TREE PIT	W	WATER
DC	DROP CURB	E	ELECTRIC
CB	CATCH BASIN	G	GAS
MM	MUNI-METER	S	SEWER
EB	ELECTRIC BOX	ST	STEAM
TSP	TRAFFIC SIGN POLE	T	TELEPHONE
LP	LIGHT POLE	CE MH	CON ED MANHOLE COVER
TC	TOP OF CURB	EMH	ELECTRIC MANHOLE COVER
BC	BOTTOM OF CURB	WMH	WATER MANHOLE COVER
BW	BACK OF WALK	SMH	SEWER MANHOLE COVER
CLF	CHAIN LINK FENCE	TMH	TELEPHONE MANHOLE COVER
WIF	WROUGHT IRON FENCE	CO MH	CLEAN OUT MANHOLE COVER
WSF	WOOD STOCKADE FENCE	WV	WATER VALVE
PRF	POST AND RAIL FENCE	GV	GAS VALVE
CE	CELLAR ENTRANCE	UP	UTILITY POLE
PA	PLANTED AREA	AS	AUTO SPRINKLER
	SIGN	SP	STAND PIPE
	TAX LOT	OF	OIL FILL

UPDATED: OCTOBER 6, 2023
UPDATED: FEBRUARY 9, 2022
UPDATED: MARCH 25, 2022

FEHRINGER SURVEYING, P.C.
ROBERT FEHRINGER
LICENSED LAND SURVEYOR
WWW.FEHRINGERSURVEYING.COM
2200 JACKSON AVENUE
SEAFORD, N.Y. 11783
(516) 763 - 5515 FAX NO. (516) 763 - 5525
FS@FEHRINGERSURVEYING.COM

SURVEYED: JANUARY 21, 2016		BLOCK: 3672
SCALE: 1" = 10'	DRAWN BY: MF	LOT: 30
5.00' 10.00' 15.00' / 0 5 15 30		TOTAL LOT AREA: SQ. FT.:12,775.87 ACRES: 0.2933

UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW.

COPIES OF THIS SURVEY MAP NOT BEARING THE LAND SURVEYOR'S INKED SEAL OR EMBOSSED SEAL SHALL NOT BE CONSIDERED TO BE A VALID TRUE COPY

GUARANTEES INDICATED HEREON SHALL RUN ONLY TO THE PERSON FOR WHOM THE SURVEY IS PREPARED, AND ON HIS BEHALF TO THE TITLE COMPANY, GOVERNMENTAL AGENCY AND LENDING INSTITUTION LISTED HEREON, AND TO THE ASSIGNEES OF THE LENDING INSTITUTION. GUARANTEES ARE NOT TRANSFERABLE TO ADDITIONAL INSTITUTIONS OR SUBSEQUENT OWNERS.

SURVEY OF PROPERTY SITUATED IN:

1940 TURNBULL AVENUE

BOROUGH OF THE BRONX
COUNTY OF BRONX
CITY OF NEW YORK
STATE OF NEW YORK

APPENDIX B

List of Site Contacts

APPENDIX B – LIST OF SITE CONTACTS

Name	Phone/Email Address
Site Owner and Remedial Party: Joshua Siegel (PL SARA LLC)	(917) 364-7148 j.siegel@dvln.com
Site Operator: Grenadier Realty Corporation	(917) 240-4512 wharr@grcrealty.com
Qualified Environmental Professional: Frank Cherena, P.G. Roux Environmental Engineering and Geology, D.P.C.	(631) 232-2600 (office) (631) 445-0357 (mobile) fcherena@rouxinc.com
Remedial Engineer: Charles McGuckin, P.E. Roux Environmental Engineering and Geology, D.P.C.	(631) 232-2600 (office) (631) 921-6857 (mobile) cmcguckin@rouxinc.com
NYSDEC Project Manager: Christopher Allan	(718) 482-4065 Christopher.Allan@dec.ny.gov
NYSDEC Regional Remediation Engineer: Jane O'Connell	(718) 482-4599 Jane.OConnell@dec.ny.gov
NYSDEC Project Manager's Supervisor: Cris-Sandra Maycock	(718) 482-4679 Cris-Sandra.Maycock@dec.ny.gov
NYSDEC Site Control	(518) 402-9553 DERSiteControl@dec.ny.gov
NYSDOH Project Manager: Sally Rushford	(518) 402-7860 Sally.Rushford@health.ny.gov
Remedial Party Attorney: Sive, Paget & Riesel P.C. % Michael Bogin	(212) 421-2150 ext. 210 mbogin@sprlaw.com

APPENDIX C

Excavation Work Plan

APPENDIX C – EXCAVATION WORK PLAN (EWP)

C-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the site's cover system, the site owner or their representative will notify the NYSDEC contacts listed in the table below. Table C-1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table C-1: Notifications*

NYSDEC Project Manager: Christopher Allan	Phone: (718) 482-4065 Email: Christopher.Allan@dec.ny.gov
NYSDEC Regional Remediation Engineer: Jane O'Connell	Phone: (718) 482-4599 Email: Jane.OConnell@dec.ny.gov
NYSDEC Project Manager's Supervisor: Cris-Sandra Maycock	Phone: (718) 482-4679 Email: Cris-Sandra.Maycock@dec.ny.gov
NYSDEC Site Control	Phone: (518) 402-9553 Email: DERSiteControl@dec.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, and any work that may impact an engineering control;

- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;

- A schedule for the work, detailing the start and completion of all intrusive work, and submittals (e.g., reports) to the NYSDEC documenting the completed intrusive work;

- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix E of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

C-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will perform the screening. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Sections C-6 and C-7 of this Appendix.

C-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

C-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements). Trucks transporting contaminated soil must have either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides.

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

C-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with either tight-fitting opaque covers that are secured on the sides and/or back, or opaque covers that are locked on all sides. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes are as follows:

From Site:

- Head west on Turnbull Avenue.
- Turn right onto White Plains Road
- Turn left onto Bruckner Boulevard
- Take ramp onto Bruckner Expressway

To Site:

- From Bruckner Expressway take Exit 53 (White Plains Road)
- Head south on White Plains Road towards Story Avenue
- Turn left onto Turnbull Avenue and proceed to the Site

All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

C-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed off-site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-site management of materials from this site will not occur without formal NYSDEC project manager approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility). Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 360-15 registered or permitted facility).

C-7 MATERIALS REUSE ON-SITE

The qualified environmental professional, as defined in 6 NYCRR Part 375, will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e. contaminated) does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below the demarcation layer or impervious surface, and will not be reused within the cover system or within landscaping berms. Contaminated on-site material may only be used beneath the site cover as backfill for subsurface utility lines with prior approval from the DEC project manager.

Proposed materials for reuse on-site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)10 unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances April 2023 guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-site will be segregated and staged as described in Sections C-2 and C-3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of site excavation activities and proximity to nearby site features. Material reuse on-site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

C-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed off-site at a permitted facility in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e., a local pond, stream or river) will be performed under a SPDES permit.

Liquids discharged into the New York City sewer system will be addressed through approval by the New York City Department of Environmental Protection (NYCDEP).

C-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the RAWP. The existing cover system is comprised of a minimum of:

- Parking lot comprised of asphalt paving underlain by 24 inches of sub-base aggregate backfill.

The demarcation layer, consisting of sub-base aggregate backfill, will be replaced to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP. The alteration, restoration and modification of engineering controls must conform with Article 145 Section 7209 of the Education Law regarding the application professional seals and alterations.

C-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review. A copy of the form is presented in Appendix G.

Material from industrial sites, spill sites, other environmental remediation sites, or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for Restricted Residential Use. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table 9. Soils that meet 'general' fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

C-11 STORMWATER POLLUTION PREVENTION

Erosion and sediment controls to be installed during future disturbance of residual contamination, if required, will be in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. As required, silt fence, barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

C-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The NYSDEC project manager will be promptly notified of the discovery.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes [TAL metals, TCL volatiles and semi-volatiles (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone within two hours to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

C-13 COMMUNITY AIR MONITORING PLAN

The CAMP is included within Appendix C of the HASP, which is located in Appendix E of this SMP.

C-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site and on-site. Specific odor control methods to be used on a routine basis will include limiting open excavation areas and covering excavated soil (i.e., with polyethylene sheeting or covered in roll-off containers). If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

C-15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Appendix C of the HASP, which is included as Appendix E of this SMP. If particulate levels at the site exceed the thresholds listed in the CAMP or if airborne dust is observed on the site or leaving the site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the site.

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved using a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

C-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX D

Responsibilities of Owner and Remedial Party

Responsibilities

The responsibilities for implementing the Site Management Plan ("SMP") for the Park Lane Senior site (the "site"), number C203138, are divided between the site owner(s) and a Remedial Party, as defined below. The owner(s) is/are currently listed as:

PL SARA LLC (the "owner")
Joshua Siegel
j.siegel@dvln.com
(917) 364-7148

Solely for the purposes of this document and based upon the facts related to a particular site and the remedial program being carried out, the term Remedial Party ("RP") refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation ("NYSDEC") is carrying out remediation or site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

PL SARA LLC
Joshua Siegel
j.siegel@dvln.com
(917) 364-7148

Nothing on this page shall supersede the provisions of an Environmental Easement, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the site.

Site Owner's Responsibilities:

1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the site.

2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in an Environmental Easement remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the site's Periodic Review Report (PRR) certification to the NYSDEC.

3) In the event the site is delisted, the owner remains bound by the Environmental Easement and shall submit, upon request by the NYSDEC, a written certification that the Environmental Easement is still in place and has been complied with.

4) The owner shall grant access to the site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.

5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. If damage to the remedial components or vandalism is evident, the owner shall notify the site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1.3-Notifications.

6) If some action or inaction by the owner adversely impacts the site, the owner must notify the site's RP and the NYSDEC in accordance with the time frame indicated in Section 1.3-Notifications and coordinate the performance of necessary corrective actions with the RP.

7) The owner must notify the RP and the NYSDEC of any change in ownership of the site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A change of use includes, but is not limited to, any activity that may increase direct human or environmental exposure (e.g., day care, school or park). A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html.

8) The owner will maintain fences, conduct mowing, etc. on behalf of the RP. The RP remains ultimately responsible for maintaining the engineering controls.

Remedial Party Responsibilities

1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the site.

2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.

3) Before accessing the site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the site visit and/or any final report produced.

4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).

5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at http://www.dec.ny.gov/chemical/76250.html .

6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under Section 1.3- Notifications of the SMP.

7) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.

8) Any change in use, change in ownership, change in site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the NYSDEC project manager to discuss the need to update such documents.

Change in RP ownership and/or control and/or site ownership does not affect the RP's obligations with respect to the site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX E

Health and Safety Plan

ROUX

Site-specific Health and Safety Plan

Site Name: Park Lane Senior
NYSDEC BCP Site No. C203138

Site Address: 1940 Turnbull Avenue
Bronx, New York
Tax Block 3672, Tax Lot 30

May 18, 2020

Prepared for:

PL Sara LLC
70 East 55th Street
Bronx, New York

Prepared by:

Roux Environmental Engineering and Geology, D.P.C.
209 Shafter Street
Islandia, New York 11749

3475.0001Y108/CV

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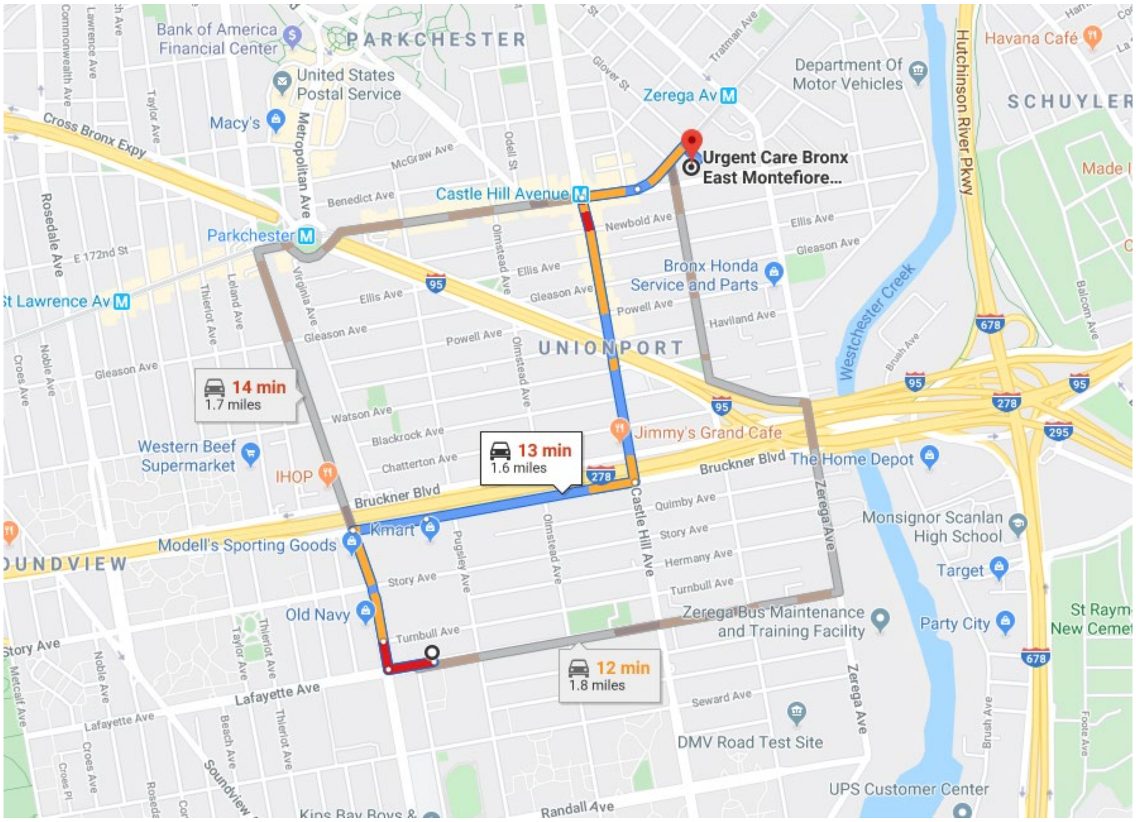
Site-Specific Emergency Information

Emergency Phone Numbers

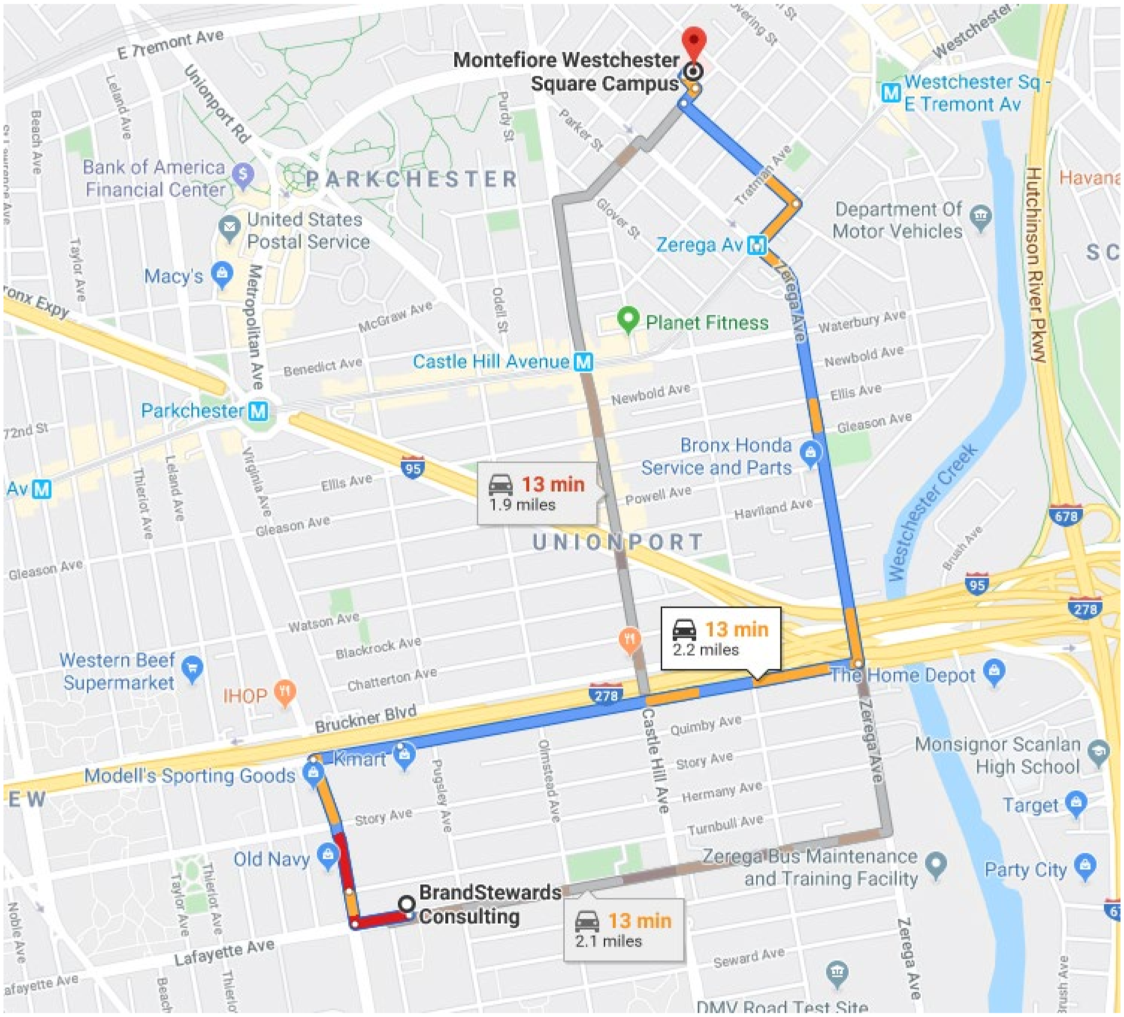
Most emergency services can be obtained by calling **911**. Where 911 service is not available, use the telephone numbers provided in the below table. The following is a master emergency phone list for use by the project management personnel. A more condensed version of the emergency numbers listed below will be posted throughout project work areas. Emergencies encountered on the site will be responded to by a combination of off-site emergency services and site personnel.

Emergency Contact Information			
Site Personnel			
Title	Contact		Telephone
Project Manager (PM)	Kathryn Sommo		Main: (631)232-2600 Direct: (631)630-2390 Mobile: (631)214-0929
Project Principal (PP)	Frank Cherena		Main: (631)232-2600 Direct: (631)630-2388 Mobile: (631)445-0357
Site Supervisor (SS)	Kathryn Sommo		Main: (631)232-2600 Direct: (631)630-2390 Mobile: (631)214-0929
Site Health and Site Safety Officer (SHSO)	To be Determined (TBD)		Main: (631)232-2600 Direct: TBD Mobile: TBD
Office Health and Safety Manager (OHSM)	Kristina DeLuca		Main: (631)232-2600 Direct: (631)630-2406 Mobile: (516)830-1189
Corporate Health and Safety Manager (CHSM)	Brian Hobbs, CIH, CSP		Main: (631)232-2600 Direct: (631)630-2419 Mobile: (631)807-0193
Client Emergency Contact	Joshua Siegel		Main: (212)350-9900 Direct: (212)527-9903 Mobile: (917)364-7148
Outside Assistance			
Agency	Contact	Telephone	Address/Location
Ambulance/emergency medical services (EMS)	Police Dispatches	911	2300 Westchester Ave, The Bronx, NY 10462
Police	NYPD 43rd Precinct	911/ (718)542-0888	900 Fteley Ave, The Bronx, NY 10473
Fire	FDNY Engine 96, Ladder 54	911/(212)639-9675	1689 Story Ave, The Bronx, NY 10473
Site Address	1940 Turnbull Avenue, Bronx, New York		



Directions to Urgent Care Bronx East Montefiore Medical Group:

1. Head west on Lafayette Ave toward Stickball Blvd
2. Use the middle lane to turn right onto White Plains Rd
3. Continue straight to stay on White Plains Rd
4. Turn right onto Bruckner Blvd
5. Keep right to stay on Bruckner Blvd
6. Turn left onto Castle Hill Ave
7. Use the middle lane to turn right onto Westchester Ave
8. Turn right onto Glover St
9. Turn right
10. Slight left



Directions to Westchester Square Medical Center (General Hospital):

1. Head west on Lafayette Ave toward Stickball Blvd
2. Use the middle lane to turn right onto White Plains Rd
3. Continue straight to stay on White Plains Rd
4. Turn right onto Bruckner Blvd
5. Keep right to stay on Bruckner Blvd
6. Turn left onto Zerega Ave
7. Turn right onto Westchester Ave
8. Turn left onto Rowland St
9. Turn right onto St Raymond Ave
10. Turn left onto Seddon St
11. Turn right

1. Introduction

This Site-specific Health and Safety Plan (HASP) has been prepared by Roux Environmental Engineering and Geology, D.P.C. (Roux) for use during the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) eligibility investigation at the PL SENIOR LLC Turnbull Avenue property (“the Site”), located at 1940 Turnbull Avenue (Block 3672, Lot 30) in the Bronx, New York (see **Figure 1**). These activities fall within the scope of operations covered by the Occupational Safety and Health Administration (OSHA) standards promulgated at 29 CFR 1910.120 and 29 CFR 1926.65, both commonly referred to as the Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard. In accordance with the HAZWOPER Standard, this Site-specific HASP was prepared to address the safety and health hazards associated with the sampling activities being performed at the Site by Roux and to provide requirements and procedures for the protection of Roux employees, subcontractor personnel, government oversight personnel, Site personnel, and the general public. It also addresses client- and Site-specific requirements for health and safety.

Implementation of this HASP is the joint responsibility of the Project Manager (PM), the Site Health and Safety Officer (SHSO), and all field staff, with assistance from the Project Principal (PP), Office Health and Safety Manager (OHSM), and Corporate Health and Safety Manager (CHSM). The PM for this project is Frank Cherena/Kathryn Sommo. The Site Supervisor (SS) is Kathryn Sommo and Site Health and Safety Officer (SHSO) is yet to be determined.

This HASP will be introduced to, reviewed, and signed off on by all Roux personnel through a formal training session prior to commencing work. A copy of the HASP will be kept at the Site at all times. The Roux SHSO or PM will be responsible for posting any changes, amendments, memos, etc. to the HASP. Any revisions to this HASP will be signed by appropriate personnel, which can include Roux’s PP, CHSM, and SS. Any changes will be announced to all workers at the next safety meeting.

1.1 Roles and Responsibilities

Overall Roles and Responsibilities (R&Rs) of Roux personnel are provided in Roux’s Policies and Procedures Manual. Only those R&Rs specific to HASP requirements are listed below.

Project Manager (PM)

The PM has responsibility and authority to direct all work operations. The PM coordinates safety and health functions with the Site Health and Safety Officer (SHSO), has the authority to oversee and monitor the performance of the SHSO, and bears ultimate responsibility for the proper implementation of this HASP. The specific duties of the PM are:

- preparing and coordinating the Site work plan;
- providing Site supervisor(s) with work assignments and overseeing their performance; Coordinating safety and health efforts with the SSHO;
- ensuring effective emergency response through coordination with the Emergency Response Coordinator (ERC);
- serving as primary Site liaison with public agencies and officials and Site contractors.

Site Health and Safety Officer (SHSO)

The SHSO has full responsibility and authority to develop and implement this HASP and to verify compliance. The SHSO reports to the Project Manager. The SHSO is on Site or readily accessible to the Site during all work operations and has the authority to halt Site work if unsafe conditions are detected. The specific responsibilities of the SHSO include:

- managing the safety and health functions on this Site;
- serving as the Site's point of contact for safety and health matters;
- ensuring Site monitoring, worker training, and effective selection and use of PPE;
- assessing Site conditions for unsafe acts and conditions and providing corrective action;
- assisting the preparation and review of this HASP;
- maintaining effective safety and health records as described in this HASP; and
- coordinating with the Site Supervisor(s) and others as necessary for safety and health efforts.

Site Supervisor

The Site Supervisor is responsible for field operations and reports to the Project Manager (PM). The Site Supervisor ensures the implementation of the HASP requirements and procedures in the field. The specific responsibilities of the Site Supervisor include:

- executing the work plan and schedule as detailed by the PM;
- coordination with the SHSO on safety and health; and
- ensuring Site work compliance with the requirements of this HASP.

Employees

All Roux employees are responsible for reading and following all provisions of the Corporate Health and Safety Manual, including this HASP. Employees report to the SS at the project Site. Each employee is also responsible for the following:

- wearing all appropriate PPE as outlined within this HASP;
- attending all safety meetings;
- inspecting tools and equipment prior to use, and taking any defective tools or equipment out of service;
- appropriately documenting field events as they occur within a logbook or equivalent;
- properly operating machinery and/or equipment only if trained to do so;
- stopping work operations if unsafe conditions exist;
- identifying and mitigating hazards when observed;
- reporting all incidents and near misses to the Roux SHSO and SS immediately; and
- knowing where emergency equipment is located (e.g. first aid kit, fire extinguisher).

Subcontractors and Visitors

Subcontractors and visitors are responsible for complying with the same health and safety requirements. It is the responsibility of all to make sure subcontractors and visitors comply and uphold the HASP.

Subcontractors and visitors have the following additional responsibilities:

- designating a qualified safety representative for the project that can make the necessary changes in work practices, as necessary;
- attending all safety meetings while participating in Roux Site work activities;
- reporting all incidents and near misses to Roux SHSO and SS immediately;
- conducting initial and periodic equipment inspections in accordance with manufacturer and regulatory guidelines; and
- providing copies of all Safety Data Sheets (SDS) to Roux SHSO for materials brought to the Site.

2. Background

Relevant background information is provided below, including a general description of the Site; a brief review of the Site's history with respect to hazardous material use, handling, and/or storage; and a review of known and potential releases of hazardous substances at the Site.

2.1 Site Description

The Site is located at 1940 Turnbull Avenue (Block 3672, Lot 30) in the Bronx, New York. The Scope of Work will focus on the affordable senior housing development project which will be approximately 12,000 square feet (SF). The proposed development Site is located east of the existing basketball courts, north and east of the parking lot and west of a Mitchell Lama building and the associated recreational space (playground and pools).

3. Scope of Work

A specific scope of work will be prepared for different project tasks and will vary depending on the task and the objectives for that task. In general, the scope of work may include the following:

- Site survey;
- Site inspections;
- Site maintenance;
- BCP Remedial Investigation (RI) advancement of soil borings and soil sample collection;
- BCP RI groundwater sample collection.
- BCP RI soil vapor sample collection.

If there are any changes with the scope a revision of the HASP will be required to address any new hazards.

4. Site Control

This Site control program is designed to reduce the spread of hazardous substances from contaminated areas to clean areas, to identify and isolate contaminated areas of the Site, to facilitate emergency evacuation and medical care, to prevent unauthorized entry to the Site, and to deter vandalism and theft.

4.1 Site Map

A map of this Site, showing Site boundaries, designated work zones, and points of entry and exit is provided in **Figure 2**.

4.2 Site Access

Access to the Site is restricted to reduce the potential for exposure to its safety and health hazards. During hours of Site operation, Site entry and exit is authorized only at the points identified in **Figure 2**. Entry and exit at these points are controlled by the following: guarded gates. When the Site is not operating, access to the Site is controlled by the following: guarded gates.

4.3 Buddy System

This section is not applicable for all components of the SOW described in Section 3.0. Some Site inspections are completed by a single Roux employee. However, when completing these tasks, the single Roux employee is accompanied either by Roux subcontractors or the Site caretaker/other representatives from PL Senior LLC. Any time Roux is on-site, PL Senior LLC is made aware and communications with PL Senior LLC and the Roux PM is maintained via cellular phone.

While working in the Exclusion Zone, Site workers use the buddy system. The buddy system means that personnel work in pairs and stay in close visual contact to be able to observe one another and summon rapid assistance in case of an emergency. The responsibilities of workers using the buddy system include:

- Remaining in close visual contact with partner;
- Providing partner with assistance as needed or requested;
- Observing partner for signs of heat stress or other difficulties;
- Periodically checking the integrity of partner's PPE; and
- Notifying the Site manager or other Site personnel if emergency assistance is needed.

4.4 Site Communications

The following communication equipment is used to support on-site communication: cell phones, and visual hand signals

As applicable, hand signals will be used according to the following:

Hand Signals

SIGNAL	MEANING
Hand gripping throat	Out of air, can't breathe
Grip partner's wrist	Leave area immediately
Hands on top of head	Need assistance
Thumbs up	I'm alright, okay
Thumbs down	No, negative

4.5 Site Work Zones

This Site is divided into three (3) major zones, described below. These zones are characterized by the presence or absence of biological, chemical, or physical hazards and the activities performed within them. Zone boundaries are clearly marked at all times and the flow of personnel among the zones is controlled. The Site is monitored for changing conditions that may warrant adjustment of zone boundaries. Zone boundaries are adjusted as necessary to protect personnel and clean areas. Whenever boundaries are adjusted, zone markings are also changed, and workers are immediately notified of the change.

Exclusion Zone

The area where contamination exists is the Exclusion Zone (EZ). All areas where excavation and handling of contaminated materials take place are considered the EZ. This zone will be delineated by orange high visibility fencing. Safety tape may be used as a secondary delineation within the EZ. The zone delineation markings may be opened in areas for varying lengths of time to accommodate equipment operation or specific construction activities. The SHSO may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Personnel are not allowed in the EZ without:

- A buddy (co-worker)
- Required minimum level PPE
- Medical Authorization
- Training certification
- Requirement to be in the zone

Contamination Reduction Zone

A Contamination Reduction Zone (CRZ) is established between the exclusion zone and the support zone. The CRZ contains the Contamination Reduction Corridor (CRC) and provides an area for decontamination of personnel and equipment. The CRZ will be used for general Site entry and egress in addition to access for heavy equipment and emergency support services. Personnel are not allowed in the CRZ without:

- A buddy (co-worker)
- Appropriate PPE
- Medical authorization
- Training certification
- Requirement to be in the zone

Support Zone

The Support Zone (SZ) is an uncontaminated area that will be the field support area for the Site operations. If required, The SZ will be determined before the start of work. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

5. Job Hazard Evaluation

Roux's work at the Site is expected to entail a variety of physical, chemical, and biological hazards, all of which must be sufficiently managed to allow the work to be performed safely. Some of the hazards are Site-specific, i.e., they are associated with the nature, physical characteristics, and/or routine operation of the Site itself, while others are activity-specific, i.e., they are associated with (or arise from) the particular activity being performed. The various hazards can be grouped into the following categories:

Caught/Crushed – the potential to become caught in, under, between, or by an object or parts of an object, such as equipment with parts that open and close or move up and down ("pinch points") or equipment that rotates, and the accompanying potential to have body parts cut, mangled, or crushed thereby.

Contact – the potential to be struck by or against moving or stationary objects that can cause physical injury, such as heavy machinery, overhead piping, moving vehicles, falling objects, and equipment (including tools and hand-held equipment) or infrastructure with the ability to cut or impale.

Energy Sources – the potential for bodily harm associated with energy sources, most notably electricity, but also including latent energy sources such as compressed air and equipment under tension (which when released could cause injurious contact or a fall).

Ergonomics – the potential for musculoskeletal injury associated with lifting/carrying, pushing/pulling, bending, reaching, and other physical activity attributable to poor body position/mechanics, repetitive motion, and/or vibration.

Exposure – the potential for injury/illness due to physical, chemical, or biological exposures in the work environment, including but not limited to temperature extremes, solar radiation, and noise (physical), chemical splashes and hazardous atmospheres (chemical), and animal/insect bites and poisonous plants (biological).

Falls – the potential to slip or trip and thus fall or drop a load, resulting in bodily injury to oneself or others.

The foregoing is intended to provide Roux employees with a general awareness of the hazards involved with Site work. A more detailed review of the potential hazards associated with each specific activity planned for the Site (or ongoing activity, as the case may be) is provided in the activity-specific Job Safety Analysis (JSA) forms in **Appendix A**. As can be seen in the JSA forms, the hazards are identified by category per the above, and specific measures designed to mitigate/manage those hazards are also identified. In preparing the JSA forms, all categories of hazards were considered, and all anticipated potential hazards were identified to the extent possible based on the experience of the personnel preparing and reviewing the JSA forms. However, there is always the possibility for an unanticipated hazard to arise, potentially as condition change over the course of the workday. Roux personnel must maintain a continual awareness of potential hazards in the work zone, regardless of whether the hazard is identified in the JSA form. Particular attention should be paid to hazards associated with exposure to hazardous substances (see Table 1 for a listing of the hazardous substances most likely to be encountered in environmental media at the Site) and to Site personnel being located "in the line of fire" with respect to moving equipment, pinch points, and latent energy, e.g., being located or having body parts located within the swing radius of an excavator, between two sections of pipe being connected, below a piece of suspended equipment, or adjacent to a compressed air line.

5.1 Hazard Communication and Overall Site Information Program

The information in the JSAs and safety data sheets is made available to all employees and subcontractors who could be affected by it prior to the time they begin their work activities. Modifications to JSAs are communicated during routine pre-work briefings.

The information in the JSAs and Safety Data Sheets (SDSs) is made available to all employees and subcontractors who could be affected by an exposure to the hazards covered in them prior to the time they begin their work activities. Modifications to JSAs are communicated during routine pre-work briefings, and periodically updated as needed in the HASP. SDSs will be maintained by the SHSO/SS for new chemicals brought on-site as needed.

6. Emergency Response Plan

This emergency response plan details actions to be taken in the event of Site emergencies. The PM and SHSO is responsible for the implementation of emergency response procedures onsite. The SHSO/PM provides specific direction for emergency action based upon information available regarding the incident and response capabilities and initiates emergency procedures and notification of appropriate authorities. In the event of an emergency, Site personnel are evacuated and do not participate in emergency response activities, response is facilitated through external emergency services.

6.1 Emergency Response

The SHSO, after investigating the incident and relevant information, shall determine the level of response required for containment, rescue and medical care. Limited on-site emergency response activities could occur therefore the SHSO is responsible for notifying external emergency response agencies. The SHSO provides relevant information to the responding organizations, including but not limited to the hazards associated with the emergency incident, potential containment problems, and missing Site personnel.

6.2 Emergency Alerting and Evacuation

If evacuation notice is given, Site workers leave the worksite, if possible, by way of the nearest exit. Appropriate primary and alternate evacuation routes and assembly areas have been identified and are shown on the Site Plan with Emergency Muster Area **Figure 2**. The routes and assembly area will be determined by conditions at the time of the evacuation based on wind direction, the location of the hazard source, and other factors as determined by SHSO/PM.

Personnel exiting the Site gather at a designated assembly point. To determine that everyone has successfully exited the Site, personnel will be accounted for at the assembly Site. If any worker cannot be accounted for, notification is given to so that appropriate action can be initiated. Subcontractors on this Site have coordinated their emergency response plans to ensure that these plans are compatible and potential emergencies are recognized, alarm systems are clearly understood, and evacuation routes are accessible to all personnel relying upon them.

6.3 Emergency Medical Treatment and First Aid

In the event of a work-related injury or illness, employees are required to follow the procedures outlined below. All work-place injury and illness situations require Roux's Project and Corporate Management Team to be notified when an injury/illness incident occurs, and communication with the contracted Occupational Health Care Management Provider, AllOne Health (AOH), is initiated. The Injury/Illness Notification Flowchart is provided below and within Roux's Incident Investigation and Reporting program included within Roux's Corporate Health and Safety Manual.

If on-site personnel require any medical treatment, the following steps will be taken:

a. Notify Roux's Project and Corporate Management Team for any work-related injury and/or illness occurrence and communicate with the contracted Occupational Health Care Management Provider, AOH, immediately following the notifications provided above.

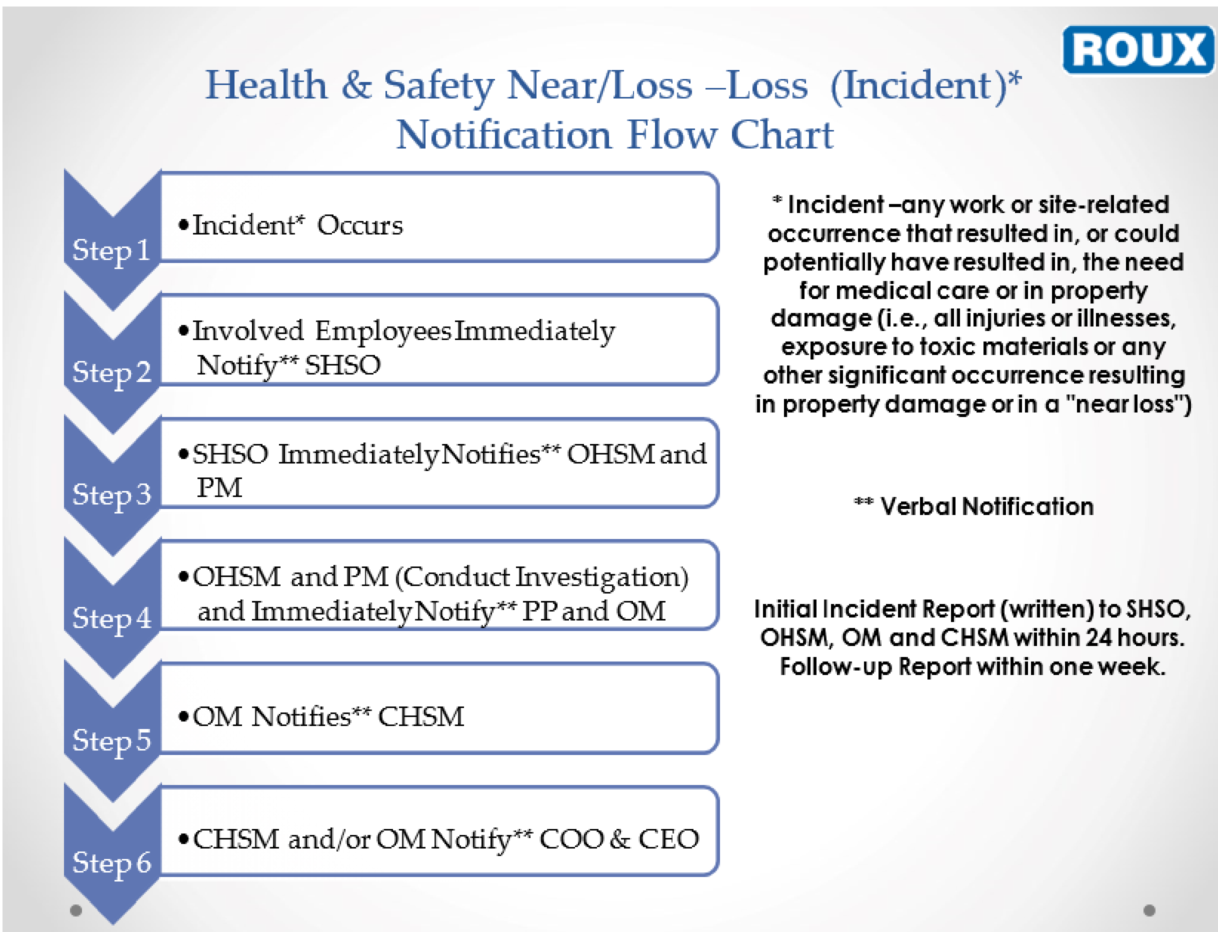
b. Based on discussions with the Project Team, Corporate Management and the AOH evaluation, if medical attention beyond onsite First Aid is warranted, transport the injured / ill person (IP) to the

Urgent Care Center, or notify the Fire Department or Ambulance Emergency service and request an ambulance or transport the victim to the hospital, and continue communications with Corporate Management Team. An Urgent Care/Hospital Route map with location to Urgent Care Bronx East Montefiore Medical Group and Montefiore Westchester Square is included on Page 2 of this HASP.

c. Decontaminate to the extent possible prior to administration of first aid or movement to medical or emergency facilities.

d. First aid medical support will be provided by onsite personnel trained and certified in First Aid, Cardio Pulmonary Resuscitation (CPR), Automatic External Defibrillation (AED), and Blood-Borne Pathogens (BBP) Awareness, until relieved by emergency medical services (EMS).

e. The SHSO and Project Manager will perform a Loss Investigation (LI) and the Project Team will complete the final Loss Report. If a Roux employee is involved in a vehicular incident, the employee must also complete the Acord Automobile Loss Notice.



6.4 Adverse Weather Conditions

In the event of adverse weather conditions, the SHSO or project principal will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.

- Treacherous weather-related conditions.
- Limited visibility.
- Electrical storm potential.

Site activities will be limited to daylight hours and acceptable weather conditions. Inclement working conditions include heavy rain, fog, high winds, and lightning. Observe daily weather reports and evacuate if necessary in case of inclement weather conditions.

6.5 Electrical Storm Guidelines

In the event that lightning and/or thunder are observed while working onsite, all onsite activities shall stop and personnel shall seek proper shelter (e.g., substantial building, enclosed vehicle, etc.). Work shall not resume until the threat of lighting has subsided and no lightning or thunder has been observed for 30 minutes. If the possibility of lightning is forecast for the day, advise the onsite personnel on the risks and proper procedure at the pre-work safety briefing. Continuously monitor for changing weather conditions and allow enough time to properly stop work if lightning is forecast.

7. Safety Procedures

This section of the HASP presents the specific safety procedures to be implemented during Roux's activities at the Site in order to protect the health and safety of various on-site personnel. Minimum OSHA-mandated procedures are presented first, followed by client- and Site-specific procedures. Lastly, activity-specific procedures are discussed. These Site and activity-specific procedures supplement the general safety procedures included in Roux's Corporate Health and Safety Manual, which also must be followed in their entirely.

7.1 Training

At a minimum, Site personnel who will perform work in areas where there exists the potential for toxic exposure will be health and safety-trained prior to performing work onsite per OSHA 29 CFR 1910.120(e) and 29 CFR 1926.65(e). More specifically, all Roux, subcontractor, and other personnel engaged in sampling and remedial activities at the Site and who are exposed or potentially exposed to hazardous substances, health hazards, or safety hazards must have received at a minimum the 40 hour initial HAZWOPER training consistent with the requirements of 29CFR 1910.120(e)(3)(i) training and a minimum of 3 days' actual field experience under the direct supervision of a trained experienced supervisor, plus 8 hours of refresher training on an annual basis. Depending on tasks performed, less training may be permitted. Evidence of such training must be maintained at the Site at all times. Furthermore, all onsite management and supervisory personnel directly responsible for or who supervise the employees engaged in Site remedial operations, must have received an additional 8 hours of specialized training at the time of job assignment on topics including, but not limited to, the employer's safety and health program and the associated employee training program, personal protective equipment program, spill containment program, and health hazard monitoring procedure and techniques, plus 8 hours of refresher training on an annual basis.

Roux personnel training records are maintained in a corporate database with records available upon request from either the OHSM/SHSO/CHSM or Human Resources Department.

7.2 Site-Specific Safety Briefings for Visitors

A site-specific briefing is provided to all site visitors who enter this site beyond the site entry point. For visitors, the site-specific briefing provides information about site hazards, the site lay-out including work zones and places of refuge, the emergency alarm system and emergency evacuation procedures, and other pertinent safety and health requirements as appropriate.

7.3 HASP Information and Site-Specific Briefings for Workers

Site personnel review this HASP and are provided a site-specific tailgate briefing prior to the commencement of work to ensure that employees are familiar with this HASP and the information and requirements it contains as well as relevant JSAs. Additional briefings are provided as necessary to notify employees of any changes to this HASP as a result of information gathered during ongoing site characterization and analysis. Conditions for which we schedule additional briefings include but are not limited to: changes in site conditions, changes in the work schedule/plan, newly discovered hazards, and incidents occurring during site work.

7.4 Medical Surveillance

The medical surveillance section of the Health and Safety Plan describes how worker health status is monitored at this site. Medical surveillance is used when there is the potential for worker exposure to hazardous substance at levels above OSHA permissible exposure limits or other published limits. The purpose of a medical surveillance program is to medically monitor worker health to ensure that personnel are not adversely affected by site hazards. The provisions for medical surveillance at this site are based on the site characterization and job hazard analysis found in Section 4 of this HASP and are consistent with OSHA requirements in 29 CFR 1910.120(f) as applicable.

7.4.1 Site Medical Surveillance Program

Medical surveillance requirements are based on a worker's potential for exposure as determined by the site characterization and job hazard analysis documented in Section 4 and JSAs within **Appendix A** of this HASP and in compliance with the requirements of 29 CFR 1910.120(f)(2). Based on site information and use of direct reading instruments, limited use of respirators (less than 30 days per year), and the absence of an employee-staffed HAZMAT team, a limited medical surveillance program is required and implemented at this site. The medical surveillance program provides that:

1. Workers assigned to tasks requiring the use of respirators receive medical examinations in accordance with 29 CFR 1910.134(e) to ensure they are physically capable to perform the work and use the equipment, and
2. If a worker is injured, becomes ill, or develops signs or symptoms of possible over-exposure to hazardous substance or health hazards, medical examinations are provided to that worker as soon as possible after the occurrence and as required by the attending physician.
3. These medical examinations and procedures are performed by or under the supervision of a licensed physician and are provided to workers free of cost, without loss of pay, and at a reasonable time and place. In addition, the need to implement a more comprehensive medical surveillance program will be re-evaluated after any apparent over-exposure.

7.4.2 Medical Recordkeeping Procedures

Medical recordkeeping procedures are consistent with the requirements of 29 CFR 1910.1020 and are described in the company's overall safety and health program. A copy of that program is available at our Islandia, NY office.

The following items are maintained in worker medical records:

- Respirator fit test and selection
- Physician's medical opinion of fitness for duty (pre-placement, periodic, termination)
- Physician's medical opinion of fitness for respirator protection (pre-placement, periodic)
- Exposure monitoring results

7.4.3 Program Review

The medical program is reviewed to ensure its effectiveness. The Corporate Health and Safety Manager in coordination with the Human Resources Director is responsible for this review. At minimum, this review consists of:

- Review of accident and injury records and medical records to determine whether the causes of accidents and illness were promptly investigated and whether corrective measures were taken wherever possible;
- Evaluation of the appropriateness of required medical tests based on site exposures; and
- Review of emergency treatment procedures and emergency contacts list to ensure they were site-specific, effective, and current.

7.5 Personnel Protection

Site safety and health hazards are eliminated or reduced to the greatest extent possible through engineering controls and work practices. Where hazards are still present, a combination of engineering controls, work practices and PPE are used to protect employees. Appropriate personal protective equipment (PPE) shall be worn by Site personnel when there is a potential exposure to chemical hazards or physical hazards (e.g., falling objects, flying particles, sharp edges, electricity and noise), as determined by the SHSO. The level of personal protection, type and kind of equipment selected will depend on the hazardous conditions and in some cases cost, availability, compatibility with other equipment, and performance. An accurate assessment of all these factors will be made before work can be safely executed.

Roux maintains a comprehensive written PPE program that addresses proper PPE selection, use, maintenance, storage, fit and inspection. Roux's PPE program can be found within **Appendix B**. PPE to be used at the Site will meet the appropriate American National Standards Institute (ANSI) standards and the following OSHA (General/Construction Industry) standards for minimum PPE requirements.

The minimum level of PPE for entry onto the Site is Level D. The following equipment shall be worn:

- Work uniform (long pants, sleeved shirt)
- Hard hat
- Steel or composite toe work boots
- Safety Glasses (must comply with one of the following ANSI/ISEA Z87.1-2010, ANSI Z87.1-2003, ANSI Z87.1-2003)
- Boot Covers (as needed)
- Hearing Protection (as needed)
- High visibility clothing (shirt/vest)
- Hand Protection (e.g., minimum cut resistance meeting ANSI 105-2000 Level 2)

Note that jewelry shall be removed or appropriately secured to prevent it from becoming caught in rotating equipment or unexpectedly snagged on a fixed object. (e.g., wrist watches bracelets, rings, chains and necklaces, open earrings). Do not wear loose clothing and all shoulder length hair should be tied back.

Site specific PPE ensembles and materials are identified within task specific JSAs located within **Appendix A**, and any upgrades or downgrades of the level of protection (i.e., not specified in the JSA) must be approved by the PP and immediately communicated to all Roux personnel and subcontractors as applicable. PPE is used in accordance with manufacturer's recommendations.

7.5.1 Hearing Conservation

Hearing protection is made available when noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 dBA. Hearing protection is required when the 8-hour time weighted average sound level $\geq$ 90 dBA. Where noise exposure meets or exceeds this level, noise is listed as a physical hazard in the JSA for the tasks/operation, and hearing protection is included as one of the control measures (PPE).

7.6 Monitoring

An air monitoring program is important to the safety of on- and off-Site personnel, and the surrounding area. A preliminary survey, to establish background conditions in the immediate sampling area, may be made prior to the initiation of Site work including, but not limited to, monitoring wind direction (e.g. wind socks) and approximate temperature during all invasive Site activities. This survey will be conducted with the appropriate pre-calibrated air monitoring instrument(s), as warranted by the field activity. Once this survey has been complete, any changes in the type of PPE will be determined and relayed to those working on-Site.

Work zone air monitoring will be performed to verify that the proper level of PPE is used, and to determine if increased protection or work stoppage is required. The following equipment shall be used to monitor conditions:

- A Photoionization Detector (PID) with a lamp energy of 10.6 eV will be used to provide direct readings of organic vapor concentrations during intrusive activities to determine that personnel protection is adequate. Concentrations shall be recorded during intrusive activities with the potential to encounter contaminant vapors.

Personal exposure monitoring utilizing activated charcoal tubes may be considered based on whether or not the area sample results are at or above half of the PEL. The decision to perform the monitoring will be made by, and under the control of, the CHSM.

Below are monitoring action levels for Site-specific chemicals of concern. In the event that PID readings above the thresholds identified below are sustained for 5 minutes in the breathing zone, worker protection will require upgrading following notification to the OHSM and applicable parties (e.g., client, board of health, regulators, etc.).

7.6.1 Action Levels for Air Monitoring

PPE can remain at Level D if breathing zone VOC concentrations are less than 5 ppm and benzene is non-detect. Personnel are required to evacuate the Site when breathing zone VOC readings exceed 25 ppm.

The following tables include summaries of the air monitoring, work practices, and action levels for the expected contaminants. The action levels to initiate testing with colorimetric tubes for airborne volatiles is 1 ppm (PID reading) and is based on the Permissible Exposure Limit (PEL) for benzene (1 ppm). The colorimetric tubes are used to confirm the presence or absence of specific constituents, and they do not provide a measured concentration.

Air Monitoring Summary and Action Levels Organic Vapors	
PID Reading in Breathing Zone (ppm)[1]	**Action**
0-1 ppm above background[2]	Continue monitoring
1-5 ppm sustained 60 seconds	Continue monitoring, if applicable initiate additional collection of benzene using colorimetric tubes.
<5 ppm and no presence of benzene	Continue Monitoring, ventilate space
$\geq$ 5 ppm - $\leq$ 25 ppm and no presence of benzene	Ventilate space until PID reads < 5 ppm. If < 25 ppm cannot be achieved, upgrade to Level C[3].
$\geq$ 25 ppm	Ventilate space and evacuate area.

1 Based on relative response/sensitivity of PID to benzene.

2 Background concentrations should be established at the beginning of each workday. It may be necessary to re-establish background concentrations and ambient conditions vary through the day.

3 Measured air concentrations of known organic vapors will be reduced by the respirator to one half of the PEL or lower, and the individual and combined compound concentrations shall be within the service limit of the respirator cartridge.

7.6.2 Air Monitoring Equipment and Calibration

A PID calibrated to an appropriate calibration mixture will be used to detect organic vapors in and around the work areas. Monitoring will be conducted in and around all work areas and at the workers breathing zone before activities commence to establish a background level, then at 15-minute intervals throughout the day. All equipment will be calibrated according to the manufacturer's recommendation. A calibration log will be maintained and will include the name of the person who performed the calibration, the date and time calibrated, and the instrument reading at the time of calibration. A manual bellows pump or equivalent with colorimetric tubes for formaldehyde will be utilized to determine the course of action related to upgrading or downgrading the level of respiratory protection, as applicable.

If air monitoring data indicate safe levels of potentially harmful constituents at consistent intervals (5-minute intervals), then monitoring can be conducted less frequently (every 30 minutes). This determination will be made by the onsite SHSO. Monitoring data, including background readings and calibration records, will be documented. Work to be performed on-Site will conform to Roux's Standard Operating Procedures (SOPs). Conformance with these guidelines as well as the guidelines described in this HASP will aid in mitigating the physical and chemical hazards mentioned throughout this HASP. Further details regarding air monitoring are provided in the Community Air Monitoring Plan in **Appendix C**.

7.7 Tailgate Safety Meetings

A designated Site worker will provide daily safety briefings (e.g., tailgate meetings) including, but not limited to, the following scenarios:

- When new operations are to be conducted;

- Whenever changes in work practices must be implemented; and
- When new conditions are identified and/or information becomes available.

Daily safety briefings shall be recorded on the Roux Daily Tailgate Health and Safety Meeting Log/Daily Site Safety Checklist, and all completed forms will become a part of the project file.

7.8 Spill Containment

Spill containment equipment and procedures should, at a minimum, meet the requirements of the facility's Spill Prevention, Control and Countermeasure Plan, if applicable. Otherwise, spill containment equipment and procedures must be considered depending on the task including, but no limited to, chemical/product transfer points and handling.

7.8.1 Initial Spill Notification and Response

Any worker who discovers a hazardous substance spill will immediately notify Frank Cherena (Project Principal). The worker will, to his/her best ability, report the hazardous substance involved, the location of the spill, the estimated quantity of material spilled, the direction/flow of the spill material, related fire/explosion incidents, and any associated injuries without compromising their own safety.

7.8.2 Spill Evaluation and Response

Frank Cherena (Project Principal)is responsible for evaluating spills and determining the appropriate response. When this evaluation is being made, the spill area will be isolated and demarcated to the extent possible. If necessary to protect nearby community members, notification of the appropriate authorities is made by the PM as appropriate. On-site response is limited to small spills (e.g., <10 gallons), large spills require external emergency responders who will be contacted by the SHSO.

7.9 Decontamination

The decontamination section of the HASP describes how personnel and equipment are decontaminated when they leave the Exclusion Zone. This section also describes how residual waste from decontamination processes is disposed. The site decontamination procedures are designed to achieve an orderly, controlled removal or neutralization of contaminants that may accumulate on personnel or equipment. These procedures minimize worker contact with contaminants and protect against the transfer of contaminants to clean areas of the site and off-site. They also extend the useful life of PPE by reducing the amount of time that contaminants contact and can permeate PPE surfaces. Decontamination is facilitated within the contamination reduction zone at this site.

7.9.1 Decontamination Procedures for Personnel and PPE

The following are general decontamination procedures established and implemented at this site.

1. Decontamination is required for all workers exiting a contaminated area. Personnel may re-enter the Support Zone only after undergoing the decontamination procedures described below in the next section.
2. Protective clothing is decontaminated, cleaned, laundered, maintained and/or replaced as needed to ensure its effectiveness.
3. PPE used at this site that requires maintenance or parts replacement is decontaminated prior to repairs or

4. PPE used at this site is decontaminated or prepared for disposal on the premises. Personnel who handle contaminated equipment have been trained in the proper means to do so to avoid hazardous exposure.
5. This site uses an off-site laundry for decontamination of PPE. The site has informed that facility of the hazards associated with contaminated PPE from this site.
6. The site requires and trains workers that if their permeable clothing is splashed or becomes wetted with a hazardous substance, they will immediately exit the work zone, perform applicable decontamination procedures, shower, and change into uncontaminated clothing.
7. Procedures for disposal of decontamination waste meet applicable local, State, and Federal regulations.

7.9.2 Decontamination Procedures for Equipment

All tools, equipment, and machinery from the Exclusion Zone or CRZ are decontaminated in the CRZ prior to removal to the Support Zone. Equipment decontamination procedures are designed to minimize the potential for hazardous skin or inhalation exposure and to avoid cross-contamination and chemical incompatibilities.

General Equipment Decontamination Procedures:

1. Decontamination is required for all equipment exiting a contaminated area. Equipment may re-enter the Support Zone only after undergoing the equipment decontamination procedures.
2. Vehicles that travel regularly between the contaminated and clean areas of the site are carefully decontaminated each time they exit the Exclusion Zone and the effectiveness of that decontamination is monitored to reduce the likelihood that contamination will be spread to other parts of the site.
3. Particular attention is given to decontaminating tires, scoops, and other parts of heavy equipment that are directly exposed to contaminants and contaminated soil.

The following items may be used to decontaminate equipment:

- Fresh water rinse;
- Non-phosphorus detergent wash;
- Distilled water rinse;
- Acetone rinse;
- Distilled water rinse; and
- A steam cleaner or pressure washer (heavy equipment only)

7.9.3 Monitoring the Effectiveness of Decontamination Procedures

Visual examination and sampling are used to evaluate the effectiveness of decontamination procedures. Visual examination is used to ensure that procedures are implemented as described and that they appear to control the spread of contaminants under changing site conditions. Visual examination is also used to inspect for signs of residual contamination or for contaminant permeation of PPE.

Personnel who work in contaminated areas of the site, either the Contamination Reduction Zone (CRZ) or the Exclusion Zone, are trained in the principles and practices of decontamination described in this section of the HASP and in related SOPs. If site procedures are changed as a result of inspection and monitoring, all affected employees are notified of these changes.

7.10 Confined Space Entry

Confined Space entry is not anticipated to be performed at the Site. If required, the following is a list of the safety requirements for confined space entry at the Site:

- **ROUX PERSONNEL ARE NOT AUTHORIZED TO ENTER AN OSHA PERMIT REQUIRED CONFINED SPACE;**
- Currently the scope of work **DOES NOT** require personnel to enter permitted confined space for this project; and
- Any changes to the field activities that may necessitate confined space entry will be reported to the Project Principal and OHSM.

Confined space is defined as any space, depression, or enclosure that:

- Has limited opening for entry and egress;
- Is large enough for and employee to enter and perform assigned work; and
- Is not intended for continuous occupancy.

A permit required confined space is one that meets the definition of a confined space and has one or more of the following characteristics:

- May contain or produce life-threatening atmospheres due to oxygen deficiency the presence of toxic, flammable, or corrosive contaminants;
- Contains a material that has the potential for engulfment;
- Has an internal configuration that may cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section; and
- Contains any other serious safety or health hazards.

Although Roux personnel will not perform confined space entry, it is expected that subcontractors performing cleaning and mitigation and/or remedial measures activities may be required to enter structures that are considered to be a permit required confined space. Permitting of the confined space as well as hazard mitigation for entry will be completed by the subcontractor in accordance with 1910.146.

7.11 Client and Site-Specific

In addition to the OSHA-specific procedures discussed above, there may be client and site-specific safety procedures that must be adhered to during the performance of remedial activities at the Site.

7.12 Unusual or Significant Risks

Field activities that appear to have unusual or significant risks that cannot be adequately managed with existing risk tools such as LPS, HASPs, traffic safety plans, work permits, design and O&M practices, equipment HAZOPS or other safety tools must be referred to the CHSM to help with the assessment and management of the associated potential safety risks. Examples include the use of explosives for demolition, use of firearms to control wildlife, rappelling, demolition over water, etc.

7.13 Activity-Specific

In addition to the general hazards discussed above, there are activity-specific hazards associated with each work activity planned for the Site. An activity specific JSA has been completed for each of the activities planned for the Site. JSAs are provided in **Appendix A**. In the event that new work activities or tasks are planned, JSAs will be developed and implemented prior to performing the new activities. In the absence of a JSA, the personnel performing work must prepare a field JSA and receive clearance from a designated competent safety official prior to performing any task with significant risk. In emergency situations where time is critical SPSAs will be utilized to identify the task, associated hazards and mitigative actions to take. For lower risk activities (as deemed by the discretion of a Competent Person) where a JSA is determined to not be needed, the individual(s) conducting the activities must perform SPSAs prior to and during the work.

7.13.1 Electrical and Other Utility Assessment and Accommodations

Roux shall perform a site walk to identify any potential overhead electrical or utility lines. All applicable guidelines will be followed in the vicinity of overhead power and utility lines (see Section 7.13.3 below).

A One-Call will be made prior to any subsurface work to identify any buried utility lines to identify potential hazards.

Roux has also reviewed all available Site maps showing buried utility lines to identify potential hazards, which revealed that no underground hazards are known to exist in the vicinity of the areas of the Site pertinent to this HASP.

7.13.2 Subsurface Work

Subsurface work activities will require adherence to Roux's Corporate Subsurface Utility Clearance Management program found within **Appendix D**.

7.13.3 Heavy Equipment

Use of heavy equipment at the Site will require adherence to Roux's Corporate Heavy Equipment Exclusion Zone Management Program found within **Appendix E**. Additionally, operation of the drill rig/other heavy equipment will maintain clearances from overhead power lines in accordance with OSHA 29 CFR1926.1408 Table A Minimum Clearance Distances provided below.

Minimum Required Clearances for Energized Overhead Power Lines

Nominal System Voltage of Power Line (K V)	Minimum Required Clearance (feet)
0-50	10
51-100	12
101-200	15
201-300	20
301-500	25
501-750	35
751-1000	45

1 kilovolt (KV) = 1,000 volts

7.14 Heat Stress

The National Oceanic and Atmospheric Administration records average minimum/maximum temperatures of 17-97 degrees Fahrenheit during the year in the Bronx, New York.

7.14.1 Heat Stress

Heat stress is a significant potential hazard and can be associated with heavy physical activity and/or the use of personal protective equipment in hot weather environments. Heat cramps are brought on by prolonged exposure to heat. As an individual sweats, water and salts are lost by the body resulting in painful muscle cramps. The signs and symptoms of heat stress are as follows:

- Severe muscle cramps, usually in the legs and abdomen;
- Exhaustion, often to the point of collapse; and
- Dizziness or periods of faintness.

First aid treatment includes, but is not limited to, shade, rest, and fluid replacement. Typically, the individual should recover within one-half hour while being monitored constantly. If the individual has not improved substantially within 30 minutes and the body temperature has not decreased, the individual should be transported to a hospital for medical attention.

7.14.2 Heat Exhaustion

Heat exhaustion may occur in a healthy individual who has been exposed to excessive heat while working or exercising. The circulatory system of the individual fails as blood collects near the skin to rid the body of excess heat through transference. The signs and symptoms of heat exhaustion are as follows:

- Rapid and shallow breathing;
- Weak pulse;
- Cold and clammy skin with heavy perspiration;
- Skin appears pale;

- Fatigue and weakness;
- Dizziness; and
- Elevated body temperature.

First aid treatment includes, but is not limited to, cooling the victim, elevating the feet, and replacing fluids.

If the individual is not substantially improved within 30 minutes and the body temperature has not decreased, the individual should be transported to the hospital for medical attention.

7.14.3 Heat Stroke

Heat stroke occurs when an individual is exposed to excessive heat and stops sweating. This condition is classified as a MEDICAL EMERGENCY requiring immediate cooling of the victim and transport to a medical facility. The signs and symptoms of heat stroke are as follows:

- Dry, hot red skin;
- Body temperature approaching or above 105 degrees F;
- Confusion, altered mental state, slurred speech;
- Seizures;
- Large (dilated) pupils; and
- Loss of consciousness – the individual may go into a coma.

First aid treatment requires immediate cooling and transportation to a medical facility. Heat stress is a significant hazard if any type of protective equipment (semi-permeable or impermeable) that prevents evaporative cooling is worn in hot weather environments.

7.15 Cold Stress

Cold stress is a danger at low temperatures and when the wind-chill factor is low. Prevention of cold-related illnesses is a function of whole-body protection. Adequate insulating clothing must be used when the air temperature is below 60°F. A work/rest regimen will be initiated when ambient temperatures and protective clothing cause a stressful situation. In addition, reduced work periods followed by rest in a warm area may be necessary in extreme conditions. The signs and symptoms of cold stress include the following:

- Severe shivering;
- Abnormal behavior;
- Slowing;
- Weakness;
- Stumbling or repeated falling;
- Inability to walk;
- Collapse; and/or
- Unconsciousness.

First aid requires removing the victim from the cold environment and seeking medical attention immediately. Also, prevent further body heat loss by covering the victim lightly with blankets. Do not cover the victim's face. If the victim is still conscious, administer hot drinks and encourage activity such as walking, wrapped in a blanket.

7.16 COVID-19

Measures for protecting workers from exposure to, and infection with, SARS-CoV-2, the virus that causes Coronavirus Disease 2019 (COVID-19), depend on the type of work being performed and exposure risk, including potential for interaction with people with suspected or confirmed COVID-19 and contamination of the work environment. Roux has performed an analysis of these risks based upon published government agency guidelines. Roux has developed health and safety guidance specific to COVID-19 which is provided as **Appendix F**.

8. Field Team Review

Each person performing work at or visiting this site shall sign this section after site-specific training is completed and before being permitted to access the CRZ or Exclusion Zone.

I have read and understand this Site-Specific Health and Safety Plan. I will comply with the provision contained therein.

Site/Project: PL Senior LLC – 1940 Turnbull Avenue, Bronx, NY

Name & Company	Signature	Date

9. Approvals

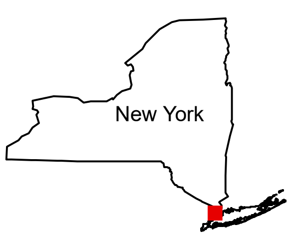
By their signature, the undersigned certify that this HASP is approved and will be utilized at the Turnbull Avenue Site.

Site Health and Safety Officer	Date
Kristina DeLuca - Office Health and Safety Manager	Date
Kathryn Sommo – Project Manager	Date
Frank Cherena – Project Principal	Date

FIGURES

1. Site Location Map
2. Site Plan with Emergency Muster Area

QUADRANGLE LOCATION



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1,000 0 1,000'

Title:

SITE LOCATION MAP

1940 TURNBULL AVENUE
BRONX, NY

Prepared for:

PL SENIOR LLC

ROUX

Compiled by: A.N.	Date: 0413/20	FIGURE
Prepared by: J.R.	Scale: AS SHOWN	1
Project Mgr: K.S.	Project: 3475.0001Y000	
File: 3475.0001Y109.1.mxd		

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LEGEND

- LOT BOUNDARY
- SITE BOUNDARY
- EMERGENCY MUSTER AREA

N

75 0 75'

Title:

SITE PLAN WITH EMERGENCY MUSTER AREA

1940 TURNBULL AVENUE
BRONX, NY

Prepared for:

PL SENIOR LLC

ROUX

Compiled by: A.N.	Date: 02/17/20	FIGURE
Prepared by: J.R.	Scale: AS SHOWN	2
Project Mgr: K.S.	Project: 3475.0001Y000	
File: 3475.0001Y109.2.mxd		

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APPENDICES

A. Job Safety Analysis (JSA) Forms
B. Personal Protective Equipment (PPE) Management Program
C. Community Air Monitoring Program
D. Subsurface Utility Clearance Management Program
E. Heavy Equipment Exclusion Zone Policy
F. COVID-19 Interim Health and Safety Guidance

APPENDIX A

Job Safety Analysis (JSA) Forms

JOB LOSS ANALYSIS	**Ctrl. No. GEN-005**	DATE 1/4/2018	☐ NEW ☒ REVISED	

JLA TYPE CATEGORY: **Generic**	WORK TYPE: **Drilling**	WORK ACTIVITY (Description): **Direct Push Soil Borings / Well Installation**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Timothy Zei	Project Hydrogeologist	Raymond Olson	Staff Assistant Geologist
		Christine Pietrzyk	Office Health & Safety Manager
		Brian Hobbs	Senior Health & Safety Manager
		Joe Gentile	Corporate Health & Safety Manager

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION: (as needed) ☒ SAFETY SHOES: Composite-toe or steel toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing, Long Sleeve Shirt	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Insect Repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Geoprobe or Truck-Mounted Direct Push Drill Rig, Hand Tools, Photoionization Detector, Multi-Gas Meter (or equivalent), Macrocore liners, Liner Opening Tool, 20 lb. Type ABC Fire Extinguisher, 42” Cones & Flags, “Work Area” Signs, Water

COMMITMENT TO LPS- All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing LPSAs

EXCLUSION ZONE (EZ) – All non-essential personnel will maintain a distance of 10 feet from drilling equipment while equipment is moving/engaged

“SHOW ME YOUR HANDS”
Driller and helper should show that hands are clear from controls and moving parts

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization of drilling rig (ensure the Subsurface Clearance Protocol and Drill Rig Checklist are completed)	**1a. CONTACT:** Equipment/property damage. **1b. FALL:** Slip/trip/fall hazards. **1c. CONTACT:** Crushing from roll-over.	1a. The drill rig's tower/derrick will be lowered and secured prior to mobilization. 1a. A spotter should be utilized while moving the drill rig. If personnel move into the path of the drill rig, the drill rig will be stopped until the path is again clear. Use a spotter for all required backing operations. 1a. Set-up the work area and position equipment in a manner that eliminates or reduces the need for backing of support trucks and trailers. 1a. When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. 1a. Inspect the driving path for uneven terrain. Level or avoid if needed. 1a. Drill rig should have a minimum **exclusion zone of 10 feet** for non-essential personnel (i.e., driller helper, geologist) when the rig is moving/ in operation. 1b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. Do not climb over stored materials/equipment; walk around. Practice good housekeeping. 1b. Use established pathways and walk on stable, secure ground. 1c Geoprobe should cross all hills/obstructions head on with the mast down to reduce risk of roll-over.
2. Raising tower/derrick of drill rig	**2a. CONTACT:** Overhead hazards. **2b. CONTACT:** Pinch Points/Amputation Points when raising the rig and instability of rig	2a. Prior to raising the tower/derrick, the area above the drilling rig will be inspected for wires, tree limbs, piping, or other structures, that could come in contact with the rig's tower and/or drilling rods or tools. 2a. Maintain a safe distance of 10’ from overhead structures. 2b. Inspect the equipment prior to use and avoid pinch/amputation points. 2b. Lower outriggers to ensure stability prior to raising rig tower/derrick. 2b. If the rig needs to be mounted, be sure to use three points of contact.
3. Advancement of drilling equipment and well installation	**3a. CONTACT:** Flying debris **3b. EXPOSURE:** Noise and dust.	3a. Be aware of and avoid potential lines of fire and wear required PPE such as eye, ear, and hand protection. 3b. Wet borehole area with sprayer to minimize dust. 3b. Stand upwind and keep body away from rig. 3b. Dust mask should be worn if conditions warrant. 3b. Wear hearing protection when the drill rig is in operation.

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
3. Advancement of drilling equipment and well installation (Continued)	**3a. CONTACT:** Flying debris **3b. EXPOSURE:** Noise and dust. **3c. FALL:** Slip/trip/fall hazards. **3d. CAUGHT:** Limb/extremity pinching; abrasion/crushing. **3e. CONTACT:** Equipment imbalance during advancement of drill equipment. **3f. EXPOSURE:** Inhalation of contamination/vapors. **3g. EXERTION:** Potential for muscle strain/injury while lifting and installing well casings, lifting sand bags, and/or lifting rods.	3c. Contain drill cuttings and drilling water to prevent fall hazards from developing in work area. 3c. See 1b. 3d. Ensure all Emergency Safety Stop buttons function properly. 3d. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools. 3d. Inspect the equipment prior to use for potential pinch/amputation points. Keep hands away from pinch/amputation points and use of tools is preferable compared to fingers and hands. 3d. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt. 3d. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. 3d. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment. 3d. Drillers and helpers will understand and use the “Show Me Your Hands” Policy. 3d. Spinning rods/casing have an **exclusion zone of 10 feet** while in operation. 3e. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and/or tip. 3e. The blocking and leveling devices used to secure the rig will be inspected by drillers and Roux personnel regularly to see if shifting has occurred. 3e. In addition, personnel and equipment that are non-essential to the advancement of the borehole will be positioned away from the rig at a distance that is at least as far as the boom is high (**minimum exclusion zone of 10 feet**). 3f. Monitor ambient air for dangerous conditions using a calibrated photoionization detector (PID) to periodically monitor the breathing zone of the work area. 3f. If a reading of >5ppm is recorded, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux PM of the condition. The Roux PM will then recommend additional precautions in accordance with the site specific health and safety plan. 3f. Use a multi-gas meter to monitor ambient air for dangerous conditions (i.e. unsafe levels of carbon monoxide when drilling indoors or the presence of explosive vapors). 3g. Keep back straight and bend at the knees. 3g. Utilize team lifting for objects over 50lbs. 3g. Use mechanical lifting device for odd shaped objects.
4. Remove sample liner.	**4a. EXERTION:** Potential for muscle strain/injury while removing liner from probe rod. **4b. CONTACT:** Pinch points and cuts **4c. EXPOSURE:** Inhalation and/or dermal contact with contaminants.	4a Utilize team lifting for objects over 50lbs. 4a. Use hydraulic liner extruder if available. 4b. Place liner on sturdy surface when opening. 4b. Don cut-resistant gloves and use appropriate liner cutter when opening liners. 4b. Always cut away from the body. 4c. Wear chemical-resistant disposable gloves when handling liners. 4c. See 3e.
5. Decontaminate equipment.	**5a. EXPOSURE/CONTACT**: To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors). **5b. EXPOSURE:** To chemicals in cleaning solution including ammonia.	5a. Wear chemical-resistant disposable gloves and safety glasses. 5a. Contain decontamination water so that it does not spill. 5a. Use an absorbent pad to clean spills, if necessary. 5a. Spray equipment from side angle, not straight on, to avoid backsplash. 5a. See 3b. 5b. See 4a. Review SDS to ensure appropriate precautions are taken and understood.

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JOB LOSS ANALYSIS	Ctrl. No. GEN-011	DATE 1/4/2018	☐ NEW ☒ REVISED	PAGE 1 of 2

JLA TYPE CATEGORY **Generic**	WORK TYPE: **Gauging and Sampling**	WORK ACTIVITY (Description): **Gauging and Sampling**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Brandon Tufano	Staff Geologist	Brian Hobbs	Senior Health & Safety Manager
		Joe Gentile	Corporate Health & Safety Manager

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☒ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES: Spoggles required for winds >15 mph	☐ GOGGLES ☐ FACE SHIELD ☐ HEARING PROTECTION ☒ SAFETY SHOES: Composite-toe or steel toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest with long sleeved shirt or long sleeved high visibility clothing	☒ GLOVES: Nitrile and cut resistant ☒ OTHER: Knee pads, Insect Repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

42-inch Safety Cones, Caution Tape, Interface Probe and/or Water Level Meter, 20-lb., Type ABC Fire Extinguisher, Buckets. Tools as needed: Socket Wrench, Screw Driver, Crow Bar, Mallet, and Wire Brush.

COMMITMENT TO LPS- All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing LPSAs

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Mobilization to monitoring well(s).	**1a. FALL:** Personal injury from slip/trip/fall due to uneven terrain and/or obstructions.	1a. Inspect pathway and plan for most suitable designated pathway prior to mobilization. 1a. Use established pathways, walk and/or drive on stable, secure ground and avoid steep hills or uneven terrain. 1a. If working near open water with an unguarded edge, wear life vest.
	1b. CONTACT: With traffic/third parties.	1b. Identify potential traffic sources and delineate work area with 42-inch traffic safety cones. Position vehicle to protect against oncoming traffic. Use caution tape to provide a more visible delineation of the work area if necessary. 1b. Wear appropriate PPE including high visibility clothing or reflective vest. 1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route.
	1c. EXERTION: Muscle strain from lifting equipment	1c. Use proper lifting techniques when handling/moving equipment; bend knees and keep back straight. 4c. Use mechanical assistance or team lifting techniques when equipment is 50 lbs. or heavier. 4c. Make multiple trips to carry equipment.
	1d. EXPOSURE: To biological hazards.	1d. Inspect work area for bees and insects. 1d. Use insect/tick repellent as necessary.
2. Open/close well.	**2a. EXERTION:** Muscle strain.	2a. Use proper lifting techniques; keep back straight, lift with legs and bend knees when reaching to open/close well.
	2b. CAUGHT: Pinch/crush points associated with removing/replacing manholes and working with hand tools.	2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools. 2b. Use proper tools (ratchet and pry bar for well cover) and inspect before use. 2b. Do not put fingers under well cover.
	2c. CAUGHT: Pinch points associated with placing J-plug back onto PVC pipe.	2c. See 2b. 2c. Keep fingers out of line-of-fire when securing cap.
	2d. EXPOSURE: To potential hazardous vapors.	2d. No open flames/heat sources. 2d. To minimize exposure to vapors, allow well to vent after opening it and before sampling activities begin. 2d. Stand up-wind, if possible, to avoid inhaling vapors.
3. Gauge well.	**3a. CONTACT:** With contamination (e.g. contaminated groundwater).	3a. Wear chemical-resistant disposable gloves (over cut-resistant gloves) and safety glasses when gauging well. 3a. Insert and remove probe slowly to avoid splashing. 3a. Use an absorbent pad to clean probe.
	3b. CONTACT: With traffic.	3b. See 1b.

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
4. Purge and sample well	**4a. EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors) and/or sample preservatives. **4b. CONTACT:** Personal injury from cuts, abrasions, or punctures by glassware or sharp objects. **4c. EXERTION:** Muscle strain while carrying equipment. **4d. CONTACT:** With traffic. **4e. CONTACT:** Pinch points with groundwater pump components (i.e., wheel, line, clamps). **4f. EXERTION:** Muscle strain from repetitive motion of bailing and sampling a well.	4a. Open and fill sample jars slowly to avoid splashing and contact with preservatives. 4a. Wear cut-resistant gloves and chemical-resistant disposable gloves when sampling. 4a. Fill sample containers over purge container to avoid spilling water onto the ground. 4a. Use an absorbent pad to clean spills. 4a. When using a bailer to purge a well, pull the bailer slowly from the well to avoid splash hazards. 4a. When sampling or purging the water using a bailer, pour out water slowly to reduce the potential for splash hazards with groundwater. 4a. When using a tubing valve always remove the valve slowly after sample collection to release any pressure and avoid pressurized splash hazards. 4a. When collecting a groundwater sample always point sampling apparatus (tubing, bailer, etc.) away from face and body. 4b. To avoid spills or breakage, place sample ware on even surface. 4b. Do not over tighten caps on glass sample ware. 4b. Wear chemical-resistant nitrile disposable gloves over cut-resistant (i.e., Kevlar) gloves when sampling and handling glassware (i.e., VOA vials) or when using cutting tools. 4c. Use proper lifting techniques when handling/moving equipment, bend knees and keep back straight. 4c. Use mechanical assistance or team lifting techniques when equipment is 50 lbs. or heavier. 4c. Make multiple trips to carry equipment. 4d. See 1b. 4e. Wear leather gloves when working with groundwater pumps. 4e. Never place hands on or near pinch points such as the wheel, clamps or other moving parts during pump operations. 4e. Use the correct mechanisms, such as a pump reel, to lower pump into well. 4e. Never attempt to manually stop any moving part of equipment including hose reels and/or tubing. 4f. See 4c. 4f. Include a stretch break when repetitive motions are part of the task.
5. Management of purge water.	**5a. EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors). **5b. EXERTION:** Muscle strain from lifting/carrying and moving containers.	5a. Do not overfill container and pour liquids slowly so that they do not splash. 5a. Properly dispose of used materials/PPE in appropriate container in designated storage area. 5b. Use proper lifting techniques when lifting / carrying or moving container(s) (see 4c.). 5b. Do not overfill container(s).
6. Decontaminate equipment.	**6a. EXPOSURE/CONTACT:** To contamination (e.g., SPH, contaminated groundwater, vapors). **6b. CAUGHT:** Pinch points associated with handling hand tools	6a. Work on the upwind side, where possible, of decon area. 6a. Wear chemical-resistant disposable gloves and safety glasses. 6a. Use an absorbent pad to clean spills. 6b. See 2b. 6b. Inspect hand tools for sharp edges before decontaminating.

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JOB LOSS ANALYSIS	Ctrl. No. GEN-016	DATE: 1/4/2018	☐NEW ☒REVISED	

JLA TYPE CATEGORY **GENERIC**	WORK TYPE **Site Recon**	WORK ACTIVITY (Description) **Site Walk and Inspection**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Sara Barrientos	Staff Geologist	Brian Hobbs	Senior Health and Safety Manager
		Joe Duminuco	Vice President
		Joe Gentile	Corporate Health and Safety Manager

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION: ear plugs as necessary ☒ SAFETY SHOES: Steel or composite toed	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: High-visibility vest with long sleeved shirt or long sleeved high-vis outerwear	☒ GLOVES: Leather/cut-resistant/chemical resistant ☒ OTHER: Tyvek and rubber boots as necessary, dust mask as necessary

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Required Equipment: Site map, emergency contact list, documentation of urgent care/hospital routes and / or guide familiar with Site, operating cell phone or walkie-talkie if Site allows.

Commitment to LPS – All personnel onsite will actively participate in LPSA performance by verbalizing LPSAs throughout the day.

EXCLUSION ZONE (EZ): A minimum 10' exclusion zone will be maintained around equipment.

SITE SECURITY: Prior to site inspection verify appropriate method to address Site Security concerns as it relates to potential criminal activity, homeless population, and/or isolation concerns. Work with the Project Principal and/or Project Manager to address appropriately.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Check in with Site contact.	**1a. CONTACT/EXPOSURE/FALL:** Personal injury caused by lack of site specific hazards.	1a. Inquire about hazards and other activities taking place at the Site. 1a. Inform Site contact of work scope, timeline and location(s). 1a. Discuss emergency evacuation procedures and muster points with Site contact.
2. Traversing the Site	**2a. CONTACT:** Property damage and personal injury caused by obstructions/vehicles or unauthorized personnel at remote Sites.	2a. All equipment must be stowed and secured prior to moving. 2a. Maintain speed limit as posted on-site. 2a. When possible drive on established roadways. 2a. Yield to all pedestrians. 2a. Use pull-through spots or back into parking spots. 2a. Don high visibility clothing/safety vest. If working at remote Site, add orange accessories during hunting season.
	2b. FALL: Uneven terrain and weather conditions. Overgrown shrubs and vines. Equipment in the work zone.	2b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 2b. When possible, use established pathways and walk on stable, secure ground. 2b. Communicate traversing hazards with others.
	2c. OVEREXERTION: Muscle strain while carrying equipment.	2c. When carrying equipment to/from work area, use proper lifting techniques; keep back straight, lift with legs, keep load close to body, never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Use mechanical assistance or make multiple trips to carry equipment.
	2d. EXPOSURE: Biological hazards – ticks; bees/wasps; poison ivy; insects; (Ticks are most active any time the temperature is above freezing, typically from March to November.)	2d. Inspect area to avoid contact with biological hazards. 2d. Ticks: • Treat outer clothing including pants, shirts, socks, boots and hats the evening before with Permethrin (allowing at least two hours before use). • Apply DEET to exposed skin before travelling to the Site and reapply after two hours. • Check for ticks during and after work. 2d. Bees:

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	2e. **EXPOSURE:** Heat Stress & Cold Stress. Personal injury from working in inclement weather conditions.	• Use bee spray as appropriate to deter/eliminate bees. • Protect exposed skin with insect repellent. 2d. Poison Ivy: • Identify areas of poison ivy and spray with weed killer. Don Tyvek and rubber boots while traversing poison ivy areas. • If skin contacts poison ivy, wash skin thoroughly with soap and water. 2e. Wear sunscreen with SPF 15 or greater on exposed skin whenever 30 minutes or more of sun exposure is expected. 2e. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed. 2e. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed. 2e. Wear appropriate rain gear as needed. 2e. Take frequent breaks if tired, wet, or cold/hot. Drink water. 2e. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.
3. Walking near heavy equipment and machinery.	3a. **CONTACT:** Personal injury from Site and roadway traffic. Personal injury from flying debris 3b. **OVEREXERTION:** Personal injury from lifting/moving/rotating equipment. 3c. **EXPOSURE:** Hearing damage from noise generating equipment/processes. Inhalation/exposure to hazardous vapors and or dust. 3d. **EXPOSURE:** Working in a remote area.	3a. See 2a. 3a. Maintain an exclusion zone of at least 10'-25' feet from all engaged equipment. 3a. Keep body parts out of the line of fire of pinch points. 3a. Wear appropriate PPE always. 3b. See 2c. 3c. Wear hearing protection if >85 dBA. (i.e. noise levels which require you to raise your voice to communicate) 3c. Always wear leather gloves when handling any tools or equipment. 3c. Always wear appropriate PPE based off chemicals present. 3d. Use the "buddy system" whenever possible. If working alone, contact PM upon arrival/departure, as well as during work activities prior to commencing work if applicable. 3d. Always carry a communication (i.e., cell phone, walkie-talkie) or directional (i.e., map, compass, etc.) device when traversing remote areas.
4. Working in adverse weather conditions.	4a. **EXPOSURE:** Heat Stress & Cold Stress. Personal injury from working in inclement weather conditions.	4a. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed. 4a. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed. 4a. Wear appropriate rain gear as needed. 4a. Take frequent breaks if tired, wet, or cold/hot. Drink water. 4a. If lightning is observed, wait 30 minutes after last thunder boom/lightning bolt in a sheltered location (car acceptable) before starting work again.
5. Departing Site.	5a. **EXPOSURE:** Exposure to unnecessary hazards should personnel believe Roux is on-Site during an emergency and conduct a search.	5a. Sign out or notify Site contact and Roux Project Manager of your departure.

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JOB LOSS ANALYSIS	Ctrl. No. GEN-017	DATE: 1/4/2018	☐NEW ☒REVISED
JLA TYPE CATEGORY: **GENERIC**	WORK TYPE: **Gauging & Sampling**	WORK ACTIVITY (Description): **Soil Sampling**	

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
MaryBeth Lyons	Project Scientist	Brian Hobbs	Senior Health & Safety Manager
		Joe Gentile	Corporate Health and Safety Manager

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES ☒ FLAME RESISTANT CLOTHING (as needed)	☐ GOGGLES ☐ FACE SHIELD: ☒ HEARING PROTECTION: (as needed) ☒ SAFETY SHOES: Composite-toe or steel toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	☒ GLOVES: Leather, Nitrile and cut resistant ☒ OTHER: Insect repellant, sunscreen (as needed)

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Recommended Equipment: 42” traffic cones, caution tape, trowel

COMMITMENT TO LPS- All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing LPSAs.

EXCLUSION ZONE (EZ): A 10-foot exclusion zone will be maintained around moving equipment, if present.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Secure location	**1a. CONTACT:** Personnel and vehicular traffic may enter the work area.	1a. If in an area with foot or vehicle traffic, delineate the work area with 42” traffic cones and/or caution tape to prevent exposure to traffic and inform others of work activity. 1a. Wear reflective vest and/or high visibility clothing. 1a. Face the direction of any vehicular traffic. Position vehicle to protect worker from traffic. 1a. Communicate work activity with adjacent work areas.
	1b. FALL: Tripping/falling due to uneven terrain or entry/exit from excavations.	1b. Inspect pathways and work area for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions. 1b. Use established pathways and walk on stable, secure ground. 1b. Stage equipment and tools in a convenient, stable, and orderly manner. Store equipment at lowest potential energy. 1b. Roux employees should stay 5 feet from in-progress excavations and trenches. Should entry to an excavation be required (when stabilization is complete), ladders must be employed for steep embankments, excavations, pits, and trenches.
	1c. EXPOSURE: Exposure to sun and excessive heat, possibly causing sunburn, heat exhaustion or heat stroke. Exposure to cold temperatures possibly causing cold stress. Skin burn as a result of fire, if applicable. Exposure to explosive vapors due to tank farm operations. Exposure to airborne dust due to high wind speeds. Biological hazards - ticks, bees/wasps, poison ivy, thorns, insects, etc.	1c. Wear sunscreen with an SPF 15 or greater whenever 30 minutes or more of exposure is expected. 1c. Use a tent to shade the work area from direct sunlight particularly when warm temperatures are expected. 1c. Be aware of the location of all Site personnel. 1c. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). 1c. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). 1c. Take breaks for rest and water as necessary. Move to an area that is well shaded or a climate controlled area (i.e., car, site trailer, etc.). 1c. No open flames/heat sources. 1c. Flame retardant clothing must be worn when specified by Site policy. 1c. Cell phones should be disabled when specified by Site policy. 1c. Pre-treat field clothing with Permethrin prior to site visit to kill ticks and insects. 1c. Wear long sleeved shirts and tuck in (or tape) pant legs into socks or boots to prevent ticks from reaching skin. 1c. Spray insect repellant containing DEET on exposed skin when working in overgrown areas of the Site. 1c. Inspect area to avoid contact with biological hazards. 1c. Wear cut-resistant gloves when handling branches, shrubs, etc. that may lie within the walking path. 1c. Wear spoggles if the average wind speeds are above 15 mph. 1c. Personnel shall examine themselves and co-worker’s outer clothing for ticks periodically when onsite. 1c. If skin comes in contact with poison ivy, wash skin thoroughly with soap and water. If rash persists after washing, immediately notify your supervisor, the OM and OHSM for possible consultation with a physician at an approved Occupational Health Clinic.

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
2. Collect Soil Sample	**2a. CONTACT:** Personal injury from pinch points, cuts, and abrasions from sampling equipment tools, and material within soil sample. Personal injury from contact with moving equipment while sampling. Personal injury from contact with glass sample jars.	2a. Wear cut-resistant (i.e., Kevlar) gloves under chemical-resistant (nitrile) disposable gloves when handling soil samples and sampling jars. 2a. Where possible, use trowel or equivalent tool to avoid contact with soil. 2a. If sampling from bucket of heavy equipment, ensure all equipment is off and operator utilizes the "show me your hands" policy. 2a. See 1a.
	2b. EXPOSURE: Exposure to contamination (impacted soil) and/or lab preservatives.	2b. Wear chemical-resistant (nitrile) disposable gloves over cut resistant gloves to protect hands when handling samples; use containment material or plastic sheeting to protect surrounding areas. 2b. Wear safety glasses to protect eyes from dust or air-borne contaminants that may results from disturbing the soil. 2b. Where possible, remain upgradient from sample location if collecting soil sample from stockpile, drill rig, etc. to avoid breathing contaminant vapors, if they are present. 2b. When collecting soil sample from hand auger, put large zip lock bag over entire auger to prevent spillage of soil on to the ground. 2b. Open sample jars slowly and fill carefully to avoid contact with preservatives.
	2c. EXERTION: Exertion due to repetitive motion and ergonomics.	2c. Utilize a table or raised surface for soil sampling if multiple soil samples are going to be taken to minimize repetitive bending motion.
3. Decontaminate equipment	**3a. EXPOSURE/CONTACT:** Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated vapors and/or soil).	3a. Wear chemical-resistant (nitrile) disposable gloves and safety glasses. 3a. Use an absorbent pad to clean spills. 3a. Properly dispose of used materials/PPE in provided drums in designated drum storage area. 3a. Remain upwind of sample and avoid breathing contaminant vapors, if they are present.
	3b. EXPOSURE: Chemicals in cleaning solution including ammonia.	3b. Wear chemical-resistant (nitrile) disposable gloves and safety glasses. 3b. Work on the upwind side of decontamination area. 3b. Use an absorbent pad to clean spills. 3b. Properly dispose of used materials/PPE in provided drums in designated drum storage area. Ensure that all drums are properly labeled and secured.

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JOB LOSS ANALYSIS	Ctrl. No. GEN-018	DATE: 1/4/2018	☐ NEW ☒ REVISED	PAGE 1 of 2

JLA TYPE CATEGORY: **GENERIC**	WORK TYPE **Gauging and Sampling**	WORK ACTIVITY (Description) **Soil Vapor Sampling (Permanent Monitoring Points)**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Jeff Wills	Project Hydrogeologist	Brian Hobbs	Senior Health & Safety Manager
Julie Moriarity	Project Scientist	Joe Gentile	Corporate Health and Safety Manager

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☐ HEARING PROTECTION ☒ SAFETY SHOES: Steel-toe boots	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Fluorescent reflective vest with long sleeved shirt or long sleeved high visibility clothing	☒ GLOVES: Cut-resistant & Nitriles ☒ OTHER: Bug Spray, Sun Screen, Knee Pads or kneeling pad

REQUIRED AND / OR RECOMMENDED EQUIPMENT

9/16” Socket and Wrench, Non-Toxic Clay, Teflon-Lined Tubing, Masterflex Tubing, Air Pump with Low Flow, Dry Cal, Enclosure (Bucket with 2 holes), Helium Gas Canister, Summa Canisters and Flow Controllers, MultiRae Photo Ionization Detector (PID), Helium Detector, Tubing Cutter, 42-inch Safety Cones, Caution Tape or Retractable Cone Bars

COMMITMENT TO LPS- All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing LPSAs.

EXCLUSION ZONE (EZ): A 5-foot exclusion zone will be maintained for non-essential personnel.

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Define and secure work area.	**1a. FALL:** Potential tripping hazards. **1b. CONTACT:** Potential contact with moving vehicles or pedestrians. **1c. EXERTION:** Muscle strain while lifting and carrying equipment.	1a. Ensure work area is secure and inform others (third party) of work activity. 1a. Remove tripping hazards and inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. If working alongside roads, look both ways before entering roadways, face traffic, and utilize work vehicle to protect employees. 1b. Delineate work area (including vehicles) with traffic safety cones and caution tape or retractable cone bars. 1b. Maintain a 5-foot exclusion zone. 1b. Wear high visibility clothing or reflective safety vest. 1c. When carrying equipment to/from work area, keep back straight, lift with legs, keep load close to body, never reach with a load. Ensure that loads are balanced. Use mechanical assistance/make multiple trips to carry equipment.
2. Remove well cover / close well cover.	**2a. CONTACT/CAUGHT:** Pinch points and scrapes associated with hand tools and well covers. **2b. FALL:** Potential tripping hazards associated with installing bolts. **2c. EXERTION:** Physical exertion to remove bolts that were over torqued or stripped.	2a. Keep hands away from pinch points. 2a. Use hand tools with extensions to remove and replace well covers. 2a. Wear cut-resistant gloves. 2a. Use knee pads or kneeling pad when repetitive kneeling on rough ground is anticipated. 2b. Place security bolts in secure location so not to create tripping hazards. Replace security bolts so that they fit flush with monitoring well covers. 2c. Replace any security bolts that show signs of stripping. Do not over tighten. 2c. Use body positioning and bending techniques that minimize muscle strain; keep back straight, bend at the knees. 2c. See 2a.

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[3] Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
3. Screen vapor point with PID.	**3a. FALL:** Potential tripping hazards associated with equipment. **3b. EXPOSURE:** Inhalation of soil vapor	3a. Place equipment in one area close to the sampling location. 3b. Identify area where equipment is to be stored within the work area (away from main walking path). 3a. Don't leave equipment on the ground. Return equipment to storage area between uses. 3b. Replace brass caps immediately upon completion to avoid soil vapors migrating to the surface through sample tubing. 3b. Stand upwind of sample point during screening activities.
4. Remove / replace brass caps at the end of the sample tubing.	**4a. CONTACT:** Pinch points associated with hand tools and brass caps. **4b. EXPOSURE:** Potential pathway for vapors to migrate to land surface.	4a. Use wrench to remove and replace brass caps. 4a. Wear cut-resistant gloves to protect against pinch points and scrapes. 4b. See 3b. 4b. Stand up wind of sample point location.
5. Set up soil vapor sampling equipment and calibration of meters.	**5a. FALL:** Potential tripping hazards associated with equipment and tubing.5b. **5b. CONTACT:** Pinch points associated with handling equipment. **5c. EXPOSURE:** Inhalation of calibration gas and helium.	5a. See 3a. 5a. Keep tubing slack to a minimum and locate the summa canister as close to the sampling location as possible. 5a. Avoid stepping over equipment and tubing. 5b. Do not place fingers/hands under sampling equipment. 5b. Make multiple trips when unloading equipment in work area. 5b. Wear cut-resistant gloves to protect against pinch points while handling sampling equipment. 5c. Review SDS for each type of calibration gas used before calibrating. 5c. Calibrate meters in a well-ventilated area and keep air flow regulator away from face. 5c. Close valve on canisters after use to avoid inhalation of excess helium or calibration gas. 5c. Stand up wind of bucket during helium tracer gas test.
6. Cleaning Work Area.	**6a. FALL:** Potential tripping hazards associated with equipment and tubing. **6b. CONTACT:** Storing and transport of equipment in car.	6a. See 3a. 6a. See 3b. 6b. Ensure that equipment is placed securely in the vehicle. Do not stack equipment on top of each other. Secure equipment so that it will not slide while being transported. 6b. Wear cut-resistant gloves while handling/loading equipment.

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JOB LOSS ANALYSIS	Ctrl. No. GEN-020	DATE: 1/4/2019	☐ NEW ☒ REVISED	PAGE 1 of 2

JLA TYPE CATEGORY	WORK TYPE	WORK ACTIVITY (Description)	
Generic	**Construction**	**Spotting Heavy Machinery**	
DEVELOPMENT TEAM	**POSITION / TITLE**	**REVIEWED BY:**	**POSITION / TITLE**
Levi Curnutte	Project Scientist	Brian Hobbs	Senior Health & Safety Manager
		Joe Gentile	Corporate Health & Safety Manager

REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT

☐ LIFE VEST ☒ HARD HAT ☒ LONG SLEEVED SHIRT ☐ LIFELINE / BODY HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☐ HEARING PROTECTION ☒ SAFETY SHOES: Steel-/Composite-toe boots/shoes	☐ Particulate Respirator ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING: Long sleeved fluorescent reflective clothing or reflective vest with long sleeved shirt	☒ GLOVES: Cut resistant / leather ☐ OTHER:

REQUIRED AND / OR RECOMMENDED EQUIPMENT

Heavy Machinery (i.e. excavator, payloader, truck, forklift, etc.)

COMMITMENT TO LPS- All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing LPSAs

EXCLUSION ZONE (EZ): A 10-foot exclusion zone will be maintained around heavy equipment. Larger equipment with an increased operating or tip-over radius may need a larger exclusion zone. This should be defined prior to operating each piece of equipment

Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
1. Prepare for machine activity.	**1a. CONTACT:** Obstructions in the work area may create contact hazards from machinery. **1b. Fall :** Slip/Trip/Fall	1a. Cordon off the work area with safety barrels/cones and a rigid barrier (snow fence, traffic bar, etc.). Communicate that only necessary personnel should be in the work area. Spotter and equipment operator shall enforce the **10-ft (exclusion zone) EZ**. Operator will not operate but shall remain in the hands-off mode while personnel are within the exclusion zone. 1b. Ensure that work area is flat, level and clear of any obstructions or debris before setting up work zone.
2. Spotting.	**2a. CONTACT:** Machine or load contact with personnel, property, or machinery.	2a. Discuss the specifics of the work with the operator and be clear about any hand signals that will be used. Clearly discuss the limits of the assigned work area and the machine's Exclusion Zone. Maintain Exclusion Zone. The Exclusion Zone shall be delineated by using 42-inch traffic cones/barrels and a fixed rigid barrier. 2a. The Minimum Heavy Equipment Exclusion zone is 10ft. if it is a larger piece of equipment or has an increased swing or tip-over radius the exclusion zone will need to be increased to accommodate the full range of motion. 2a. Both the spotter and equipment operators shall have 2-way radios/cellular devices on their persons to ensure audible communication in the event any changes or new hazards may arise. 2a. All workers should stay outside of the Exclusion Zone of all equipment unless operator is stopped and in "Hands Off" mode. **(This includes the spotter unless an exception has been established in the Site-specific JLA).** If the Exclusion Zone must be reduced due to work area restrictions then the spotter and operator shall enforce the reduced Exclusion Zone. 2a. Spotters must make eye contact with the machine operator or all movement ceases until visual contact can be reestablished. 2a. Spotter shall keep an eye out for any issues with the machine the operator may not see and communicate with other work crews and spotters on behalf of the operator. 2a. If the spotter needs to take a break, he must find a replacement before leaving or have the machine stop operations. **No heavy equipment shall operate without a spotter under any circumstances.** 2a. Wear fluorescent clothing/safety vest.

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Assess [1]JOB STEPS	Analyze [2]POTENTIAL HAZARDS	Act [3]CRITICAL ACTIONS
	2b. FALL: Slip/Trip/Fall	2b. Look where walking to identify and avoid slip/trip/fall hazards. Avoid icy and/or wet surfaces. Remove obstacles if possible. 2b. Use designated walkways during spotting whenever possible.
	2c. CAUGHT: Caught between machinery and nearby objects.	2c. **Maintain Exclusion Zone.** Do not stand between large, loose or fixed objects or structures and the machinery while it is in motion. Keep in sight of operator at all times while being aware of surrounding structures.
	2d. EXPOSURE: Inhalation of exhaust from machinery.	2d. The spotter will position him/herself upwind of the working machinery, when possible. Spotter will also inform others working within the vicinity of the EZ of proper positioning, if applicable.

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APPENDIX B

Personal Protective Equipment (PPE) Management Program

PERSONAL PROTECTIVE EQUIPMENT MANAGEMENT PROGRAM

CORPORATE HEALTH AND SAFETY MANAGER	:	**Brian Hobbs, CIH, CSP**
EFFECTIVE DATE	:	**01/19**
REVISION NUMBER	:	**4**

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1. PURPOSE

Roux Associates, Inc. and its affiliated companies, Roux Environmental Engineering and Geology, D.P.C, and Remedial Engineering (collectively, "Roux") has instituted the following program to establish guidelines for the selection of personal protective equipment (PPE) for use by Roux personnel performing field activities in hazardous environments. PPE is not meant to be a substitute for engineering, work practice, and/or administrative controls, but PPE should be used in conjunction with these controls to protect the employees in the work place. Clothing, body coverings, and other accessories designed to prevent worker exposure to workplace hazards are all types of PPE. To ensure adequate PPE employee-owned PPE is evaluated on a case-by-case basis to insure its adequacy, maintenance and sanitation.

2. SCOPE AND APPLICABILITY

These guidelines apply to all PPE selection decisions to be made in implementing the Roux program. The foundations for this program are the numerous Occupational Health and Safety Administration (OSHA) standards related to PPE cited in 29 CFR 1910 Subpart I, 29 CFR 1926 Subpart E, and the hazardous environment work employee protection requirements under the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard at 29 CFR 1910.120 and 1926.65. To ensure hazard assessments are documented the levels of protection, types of protection and tasks requiring protection are covered in site-specific Health and Safety Plans (HASPs) and Job Safety Analyses (JSAs).

3. PROCEDURES

Due to the varied nature of site activities and the different potential hazards associated with different sites, several aspects must be considered when selecting PPE. The following text describes PPE selection logic and provides guidelines and requirements for the appropriate selection and use of PPE.

3.1 Introduction

To harm the body, chemicals must first gain entrance. The intact skin and the respiratory tract are usually the first body tissues attacked by chemical contaminants. These tissues provide barriers to some chemicals but in many cases, are damaged themselves or are highly permeable by certain chemical compounds. Personal protective equipment therefore is used to minimize or eliminate chemical compounds coming into contact with these first barrier tissues.

The proper selection of equipment is important in preventing exposures. The PM making the selection will have to take several factors into consideration. The level of protection, type and kind of equipment selected depends on the hazardous conditions and in some cases cost, availability, compatibility with other equipment, and performance. An accurate assessment of all these factors must be made before work can be safely carried out.

3.2 Types of PPE

The type and selection of PPE must meet certain general criteria and requirements as required under OSHA 29 CFR 1910.132 and 1926.95. In addition to these general requirements, specific requirements and specifications exist for some types of PPE that form the basis of the protective clothing scheme. Following is a list of the common types of specific PPE and the specific requirements for the PPE type, where applicable:

1. Hard Hats - Regulated by 29 CFR 1910.135 and 1926.100; and, specified in ANSI Z89.1.

2. Face Shields and Safety Glasses - Regulated by 29 CFR 1910.133 and 1926.102; and, specified in ANSI Z87.1.
3. Respiratory Protection - Regulated by 29 CFR 1910.134 and 1926.103.
4. Hand Protection - Not specifically regulated.
5. Foot Protection - Regulated by 29 CFR 1910.136 and 1926.96; and, specified in ANSI Z41.1.
6. Protective Clothing (e.g., fully encapsulated suits, aprons) - Not specifically regulated.

3.3 Protective Clothing Selection Criteria

3.3.1 Chemicals Present

The most important factor in selecting PPE is the determination of what chemicals the employee may be exposed to. On field investigations, the number of chemicals may range from a few to several hundred. The exact chemicals or group of chemicals present at the site (certain groups tend to require similar protection) can be determined by collecting and analyzing samples of the air, soil, water, or other site media. When data are lacking, research into the materials used or stored at the site can be used to infer chemicals possibly on the site.

Once the known or suspected chemicals have been identified, and taking into consideration the type of work to be performed, the most appropriate clothing shall be selected.

Protective garments are made of several different substances for protection against specific chemicals. There is no universal protective material. All will decompose, be permeated by, or otherwise fail to protect under given circumstances. Fortunately, most manufacturers make guides to the use of their products (i.e., Dupont's Tyvek™ Permeation Guide). These guides are usually for gloves and coveralls and typically provide information regarding chemical degradation rates (failure of the material to maintain structural integrity when in contact with the chemical), and may provide information on the permeation rate (whether or not the material allows the chemical to pass through). When permeation tables are available, they shall be used in conjunction with degradation tables to determine the most appropriate protective material.

During most site work, chemicals are usually in mixed combinations and the protective materials are not in continuous contact with pure chemicals for long periods of time; therefore, the selected material may be adequate for the particular chemical and type of work being performed, yet not the "best" protecting material for all site chemicals and activities. Selection shall depend upon the most hazardous chemicals based on their hazards and concentrations. Sometimes layering, using several different layers of protective materials, affords the best protection.

3.3.2 Concentration of the Chemical(s)

One of the major criteria for selecting protective material is the concentration of the chemical(s) in air, liquid, and/or solid state. Airborne and liquid chemical concentrations should be compared to the OSHA standards and/or American Conference of Governmental Industrial Hygienists (ACGIH) and National Institute for Occupational Safety and Health (NIOSH) guidelines to determine the level of skin or other absorptive surface (e.g., eyes) protection needed. While these standards are not designed specifically for skin exposed directly to the liquid, they may provide skin designations indicative of chemicals known to have significant skin or dermal absorption effects. For example, airborne levels of PCB on-site may be low because it is not very volatile, so the inhalation hazard may be minimal; however, PCB-containing liquid coming in direct contact with the skin may cause overexposure. Thus, PCB has been assigned a skin designation in both the OSHA and ACGIH exposure limit tables.

3.3.3 Physical State

The characteristics of a chemical may range from nontoxic to extremely toxic depending on its physical state. Inorganic lead in soil would not be considered toxic to site personnel, unless it became airborne, since it is generally not absorbed through the intact skin. Organic lead in a liquid could be readily absorbed. Soil is frequently contaminated with hazardous materials. Concentrations will vary from a few parts per million to nearly one hundred percent. The degree of hazard is dependent on the type of soil and concentration of the chemical. Generally speaking, "dry" soils do not cause a hazard to site personnel if they take minimal precautions such as wearing some type of lightweight gloves.

3.3.4 Length of Exposure

The length of time a material is exposed to a chemical increases the probability of breakthrough. Determinations of actual breakthrough times for short-term exposures indicate that several different materials can be used which would be considered inadequate under long-term exposures. It should be kept in mind that during testing, a pure (100% composition) liquid is usually placed in direct contact with the material producing a worst-case situation.

3.3.5 Abrasion

When selecting protective clothing, the job the employee is engaged in must be taken into consideration. Persons moving drums or performing other manual tasks may require added protection for their hands, lower chest and thighs. The use of leather gloves and a heavy apron over the other normal protective clothing will help prevent damage to the normal PPE and thus reduce worker exposures.

3.3.6 Dexterity

Although protection from skin and inhalation hazards is the primary concern when selecting PPE, the ability to perform the assigned task must be maintained. For example, personnel cannot be expected to perform work that requires fine dexterity if they must wear a thick glove. Therefore, the PPE selection process must consider the task being performed and provide PPE alternatives or techniques that allow dexterity to be maintained while still protecting the worker (e.g., wearing tight latex gloves over more bulky hand protection to increase dexterity).

3.3.7 Ability to Decontaminate

If disposable clothing cannot be used, the ability to decontaminate the materials selected must be taken into consideration. Once a chemical contacts the material, it must be cleaned before it can be reused. If the chemical has completely permeated the material, it is unlikely that the clothing can be adequately decontaminated and the material should be discarded.

3.3.8 Climactic Conditions

The human body works best with few restraints from clothing. Protective clothing adds a burden by adding weight and restricting movement as well as preventing the natural cooling process. In severe situations, a modified work program must be used.

Some materials act differently when they are very hot and very cold. For example, PVC becomes almost brittle in very cold temperatures. If there are any questions about the stability of the protective materials under different conditions, the manufacturer should be contacted.

3.3.9 Work Load

Like climactic conditions, the type of work activity may affect work duration and the ability or personnel to perform certain tasks. Similarly, the amount of protective materials a person wears will affect their ability to perform certain tasks. For example, a person in a total encapsulating suit, even at 72 ^{o}F, cannot work for more than a short period of time without requiring a break.

The work schedule should be adjusted to maintain the health of the employees. Special consideration should be given to the selection of clothing that both protects and adds the least burden when personnel are required to perform strenuous tasks. Excessive bodily stress frequently represents the most significant hazard encountered during field work.

3.4 Types of Protective Materials

1. Cellulose or Paper
2. Natural and Synthetic Fibers
    a. Tyvek™
    b. Nomex™
3. Elastomers
    a. Polyethylene
    b. Saran
    c. Polyvinyl Chloride (PVC)
    d. Neoprene
    e. Butyl Rubber
    f. Viton

3.5 Protection Levels

3.5.1 Level A Protection

Level A protection (a fully encapsulated suit) is used when skin hazards exist or when there is no known data that positively rule out skin and other absorption hazards. Since Level A protection is extremely physiologically and psychologically stressful, the decision to use this protection must be carefully considered. At no time will Level A work be performed without the consent of the OM. The following conditions suggest a need for Level A protection:

- confined facilities where probability of skin contact is high;
- sites containing known skin hazards;
- sites with no established history to rule out skin and other absorption hazards;
- atmosphere immediately dangerous to life and health (IDLH) through the skin absorption route;
- site exhibiting signs of acute mammalian toxicity (e.g., dead animals, illnesses associated with past entry into site by humans);

- sites at which sealed drums of unknown materials must be opened;
- total atmospheric readings on the Photoionization Detector (PID), Flame Ionization Detector (FID), and similar instruments indicate 500 to 1,000 ppm of unidentified substances; and
- extremely hazardous substances (e.g., cyanide compounds, concentrated pesticides, Department of Transportation Poison "A" materials, suspected carcinogens and infectious substances) are known or suspected to be present and skin contact is possible.

The following items constitute Level A protection:

- open circuit, pressure-demand self-contained breathing apparatus (SCBA);
- totally encapsulated suit;
- gloves, inner (surgical type);
- gloves, outer;
- chemical protective;
- boots, chemical protective, steel toe and shank;
- radiation detector (if applicable); and
- communications.

3.5.2 Level B Protection

Level B protection is utilized when the highest level of respiratory protection is needed but hazardous material exposure to the few unprotected areas of the body is unlikely.

The following conditions suggest a need for Level B protection:

- the type and atmospheric concentration of toxic substances have been identified and they require the highest level of respiratory protection;
- IDLH atmospheres where the substance or concentration in the air does not present a severe skin hazard;
- the type and concentrations of toxic substances do not meet the selection criteria permitting the use of air purifying respirators; and
- it is highly unlikely that the work being done will generate high concentrations of vapors, gases or particulates, or splashes of materials that will affect the skin of personnel.

Personal protective equipment for Level B includes:

- open circuit, pressure-demand SCBA;
- chemical protective clothing:
- overalls and long-sleeve jacket; or
- coveralls;
- gloves, inner (surgical type); gloves, outer, chemical protective;
- boots, chemical protective, steel toe and shank; and
- communications optional.

3.5.3 Level C Protection

Level C protection is utilized when both skin and respiratory hazards are well defined and the criteria for the use of negative pressure respirators have been fulfilled (i.e., known contaminants and contaminant concentrations, acceptable oxygen levels, approved filter/cartridge available, known cartridge service life, etc.). Level C protection may require carrying an emergency escape respirator during certain initial entry and site reconnaissance situations, or when applicable thereafter.

Personal protective equipment for Level C typically includes:

- full facepiece air-purifying respirator;
- emergency escape respirator (optional);
- chemical protective clothing:
  - overalls and long-sleeved jacket; or
  - coveralls;
- gloves, inner (surgical type);
- gloves, outer, chemical protective; and
- boots, chemical protective, steel toe and shank.

3.5.4 Level D Protection

Level D is the basic work uniform. Personal protective equipment for Level D includes:

- coveralls;
- safety boots/shoes;
- eye protection;
- hand protection;
- reflective traffic safety vest (mandatory for traffic areas or railyard);
- hard hat (with face shield is optional); and
- emergency escape respirator is optional.

3.5.5 Level E Protection

Level E protection is used when radioactivity above 10 mr/hr is detected at the site. Personal protective equipment for Level E includes:

- coveralls;
- air purifying respirator;
- time limits on exposure;
- appropriate dermal protection for the type of radiation present; and
- radiation dosage monitoring.

3.5.6 Additional Considerations

Field work will contain a variety of situations due to chemicals in various concentrations and combinations. These situations may be partially ameliorated by following the work practices listed below:

1. Some sort of foot protection is needed on a site. If the ground to be worked on is contaminated with liquid and it is necessary to walk in the chemicals, some sort of protective "booties" can be worn over the boots. This cuts down on decontamination requirements. They are designed with soles to help prevent them from slipping around. If non-liquids are to be encountered, a Tyvek™ bootie could be used. If the ground contains any sharp objects, the advantage of booties is questionable. Boots should be worn with either cotton or wool socks to help absorb the perspiration.
2. If the site situation requires the use of hard hats, chin straps should be used if a person will be stooping over where his/her hat may fall off. Respirator straps should not be placed over the hard hats. This will affect the fit of the respirator.

   Some types of protective materials conduct heat and cold readily. In cold conditions, natural material clothing should be worn under the protective clothing. Protective clothing should be removed prior to allowing a person "to get warm". Applying heat, such as a space heater, to the outside of the protective clothing may drive the contaminants through. In hot weather, under clothing will absorb sweat. It is recommended that workers use all cotton undergarments.
3. Body protection should be worn and taped to prevent anything from running into the top of the boot. Gloves should be worn and taped to prevent substances from entering the top of the glove. Duct tape is preferred, but masking tape can be used. When aprons are used, they should be taped across the back for added protection. However, this should be done in such a way that the person has mobility.
4. Atmospheric conditions such as precipitation, temperature, wind direction, wind velocity, and pressure determine the behavior of contaminants in air or the potential for volatile material getting into the air. These parameters should be considered in determining the need for and the level of protection.
5. A program must be established for periodic monitoring of the air during site operations. Without an air monitoring program, any changes would go undetected and might jeopardize response personnel. Monitoring can be done with various types of air pumps and filtering devices followed by analysis of the filtration media; personnel dosimeters; and periodic walk-throughs by personnel carrying real-time survey instruments.
6. For operations in the exclusion zone, different levels of protection may be selected, and various types of chemical-resistant clothing may be worn. This selection should be based on the job function, reason for being in the area, and the potential for skin contact with, or inhalation of, the chemicals present.
7. Escape masks must be readily available when levels of respiratory protection do not include a SCBA and the possibility of an IDLH atmosphere exists. Their use can be made on a case-by-case basis. Escape masks could be strategically located at the site in areas that have higher possibilities of vapors, gases or particulates.

APPENDIX C

Community Air Monitoring Program

APPENDIX C

New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area 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. 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 \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 for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the background level and provided that no visible dust is migrating from the work area. Periodic background readings will be recorded during the day.
2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the background level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the background 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.

APPENDIX D

Subsurface Utility Clearance Management Program

SUBSURFACE UTILITY CLEARANCE MANAGEMENT PROGRAM

CORPORATE HEALTH AND SAFETY MANAGER	:	**Brian Hobbs, CIH, CSP**
EFFECTIVE DATE	:	**01/19**
REVISION NUMBER	:	**2**

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1. PURPOSE

Roux Associates, Inc. and its affiliated companies, Roux Environmental Engineering and Geology, D.P.C, and Remedial Engineering (collectively, "Roux") has instituted the following program for completing proper utility mark-outs and for conducting subsurface clearance activities. This establishes a method to ensure, to the greatest extent possible, that utilities have been identified and contact and/or damage to underground utilities and other subsurface structures will be avoided.

2. SCOPE AND APPLICABILITY

The Subsurface Utility Clearance Management Program applies to all Roux employees, its contractors and subcontractors. Employees are expected to follow this program for all intrusive work involving Roux or other personnel (e.g., contractors/subcontractors) working for Roux unless the client's requirements are more stringent. Deviation from the program regardless of the specific work activity or work location must be pre-approved based on client's site knowledge, site experience and client's willingness for the use of this program. Any and all exceptions shall be documented and pre-approved by the Project Principal and the Office Manager.

3. PROCEDURES

3.1 Before Intrusive Activities

During the project kick-off meeting for intrusive activities the PM will review the Roux Subsurface Utility Clearance Checklist and Utility Verification (Appendix C) / Site Walkthrough Record (Appendix D) and the below bullet points with the project field team:

(Please note that these are intended as general reminders only and should not be solely relied upon.)

- Ensure the Mark-out / Stake-out Request Information Sheet (or one-call report) is complete and accurate for the site including address and cross streets and review for missing utilities. (Note: utility mark-out organizations do not have contracts with all utilities and it is often necessary to contact certain utilities separately such as the local water and sewer authorities).
- Have written confirmation prior to mobilizing to the site that the firm or Roux personnel performing the intrusive activity has correctly completed the mark-out notification process including requesting mark-outs, waiting for mark-outs to be applied to ground surfaces at the site, and receiving written confirmation of findings (via fax or email) from utility operators for all known or suspected utilities in the proposed area of intrusive activity, and provided utility owner written confirmation to Roux personnel for review and project files documentation.
- Do not begin any intrusive activity until all utilities mark-out has been completed (i.e., did all utilities mark-out the site?) and any unresolved mark-out issues are finalized. Perform a site walk to review the existing utilities and determine if said utilities have been located by the utility locators.

  (Note: The Tolerance Zone is defined as two feet plus half of the diameter or half of the greatest dimension (for elliptical sewers, duct banks and other non-cylindrical utilities) of a utility and two feet from the outside edge of any subsurface structure.)
- Install Pre-Clearance exploratory test holes (e.g., hand-dug test holes or other soft digging techniques) for the first 5-ft below land surface (BLS) at each location prior to conducting mechanized intrusive activities. The size of the pre-clearance exploratory test hole should be at a minimum twice the diameter of any downhole tool or boring device. (Note: Pre-Clearance exploratory test holes should be defined in the SOW/proposal provided to the client to prevent project delays and to allow adequate time for PM and PP to evaluate alternative approaches for the project. Alternative approaches will need to be pre-approved by the OM.

- For excavations, all utilities need to be marked and then exposed by hand following the protocols in this program. Pre-clearing for excavations may be performed by the "moat" technique (i.e., soft digging around the perimeter). In these cases, dig in small lifts (<12" for first 5 feet) using a dedicated spotter.) For Tolerance Zone work, unless otherwise agreed upon with the Utility Operator, work within the tolerance zone requires verification by means of hand-dug test holes performed to expose the utility. Once structures have been verified a minimum clearance of two feet must be maintained between the utility and any powered equipment.
- In addition, the following activities should be conducted:
  - Review the work scope to be performed with the site owner/tenant to determine if it may impact any utilities;
  - Attempt to procure any utility maps or historic drawings of subsurface conditions of the site;
  - **Determine the need for utility owner companies to be contacted or to have their representatives on site**;
  - Where mark-outs terminate at the property boundary, consider the use of private utility locating / GPR / geophysical-type services which may be helpful in locating utilities. Use of private utility locating firms, however, does not eliminate the legal requirement for the Excavator firm to submit a request for Public Utility Mark-outs. Also, the information provided by the service may be inaccurate and unable to locate subsurface utilities and structures in urban areas, landfills, urban fill areas and below reinforced slabs, etc. They should not be relied upon as the only means of performing utility clearance;
  - Documented description of the dig site which is included in the projects Health and Safety Plan (HASP) and one call report will be maintained in the field and distributed amongst Roux personnel its contractors and subcontractors; and
  - Documentation of the actual placement of mark outs in the field shall be collected using dated pictures, videos and/or sketches with distance from markings to fixed objects. All documentation shall be maintained within the project file.

3.2 During Intrusive Activities

The PM, field team lead or personnel performing oversight is to:

- Ensure the mark-out remains valid. (In certain states there are limits regarding the duration of time after the mark-out was applied to the ground surface work can be started or interrupted.) Additionally, the mark-outs must be maintained, documented, and in many cases refreshed periodically to be considered valid, this will be accomplished through calls to the one call center.
- Ensure intrusive activities are only performed within the safe boundaries of the mark-out as detailed in the One-Call Report.
- Halt all work if intrusive activities have resulted in discovery of an unmarked utility. Roux personnel shall notify the facility owner/operator and the one call center. All incidents such as this will be reported as per Roux Incident Investigation and Reporting Management Program.
- Halt all work if intrusive activities must take place outside of the safe boundaries of a mark-out and only proceed after new mark-outs are performed.
- Halt the intrusive activities and immediately consult with the PP if an unmarked utility is encountered.
- Completing any subsurface utility clearance incident reports that are necessary.

- If a utility cannot be found as marked Roux personnel shall notify the facility owner/operator directly or through the one call center. Following notification, the excavation may continue, unless otherwise specified in state law.
- Contractors/subcontractors must contact the one-call center to refresh the ticket when the excavation continues past the life of the ticket. Ticket life shall be dictated by state law however at a maximum ticket life shall not exceed 20 working days.

3.3 Stop Work Authority

Each Roux employee has Stop Work Authority which he or she will execute upon determination of any imminent safety hazard, emergency situation, or other potentially dangerous situation, such as hazardous weather conditions. This Stop Work Authority includes subsurface clearance issues such as the adequacy of a mark-out or identification during intrusive operations of an unexpected underground utility. Authorization to proceed with work will be issued by the PM/PP after such action is reviewed and resolved. The PM will initiate and execute all management notifications and contact with emergency facilities and personnel when this action is appropriate.

Appendix A - Definitions

Intrusive Work Activities	All activities such as digging or scraping the surface, including but not limited to, excavation, test pitting or trenching, soil vapor sampling or the installation of soil borings, soil vapor monitoring points and wells, or monitoring wells, and drilling within the basement slab of a recently demolished building.
Mark-out / Stake Out	The process of contracting with a competent and qualified company to confirm the presence or absence of underground utilities and structures. This process will clearly mark-out and delineate utilities that are identified so that intrusive work activities can be performed without causing disturbance or damage to the subsurface utilities and structures. After utility mark-outs are completed the soft digging will be completed prior to intrusive work.
Tolerance Zone	Defined as two feet on either side of the designated centerline of an identified utility, plus half of the diameter or half of the greatest dimension (for elliptical sewers, duct backs and other non-cylindrical utilities) of that utility and two feet from the outside edge of any subsurface structure.
Structure	For the purpose of this program a structure is defined as any underground feature that may a present potential source(s) of energy such as, but not limited to, utility vaults, bunkers, piping, electrical boxes, wires, conduits, culverts, utility lines, underground tanks and ducts.
Soft Digging	The safest way to remove material from unknown obstructions or services is by using tools such as a vactor or air knife, non-mechanical tools, or hand tools. The methods are clean and non-evasive and used for uncovering and exposing buried services, excavating and for providing a quick method of soil removal from sensitive areas.
Verification	Exploratory test-hole dug with hand tools within the Tolerance Zone to expose and verify the location, type, size, direction-of-run and depth of a utility or subsurface structure. Vacuum excavation (soft dig) methods can further facilitate exposure of a subsurface utility and accurately provide its location and identification prior to intrusive work approaching the Tolerance Zone.

Appendix B - Example of Completed One Call Report

Example Completed One-Call Report

New York 811

Send To: C_EMAIL Seq No: 744

Ticket No: 133451007 ROUTINE

Start Date: 12/16/13 Time: 7:00 AM Lead Time: 20

State: NY County: QUEENS Place: QUEENS
Dig Street: 46TH AVE Address:
Nearest Intersecting Street: VERNON BLVD
Second Intersecting Street: 11TH ST

Type of Work: SOIL BORINGS
Type of Equipment: GEOPROBE
Work Being Done For: ROUX

In Street: X On Sidewalk: X Private Property: Other:
On Property Location if Private: Front: Rear: Side:

Location of Work: MARK THE ENTIRE NORTH SIDE OF THE STREET AND SIDEWALK OF:
46TH AVE BETWEEN VERNON BLVD AND 11TH STREET

Remarks:

Nad: Lat: Lon: Zone:
ExCoord NW Lat: 40.7475399 Lon: -73.9534811 SE Lat: 40.7457406 Lon: -73.9493680

Company : ZEBRA ENVIROMENTAL Best Time: 6AM-5PM
Contact Name: DAVID VINES Phone: (516)596-6300
Field Contact: DAVID VINES Phone: (516)596-6300
Caller Address: 30 N PROSPECT AVE Fax Phone: (516)596-4422
LYNBROOK, NY 11563
Email Address: david@zebraenv.com

Additional Operators Notified:
ATTNY01 AT&T CORPORATION (903)753-3145
CEQ CONSOLIDATED EDISON CO. OF N.Y (800)778-9140
MCINY01 MCI (800)289-3427
PANYNJ01 PORT AUTHORITY OF NY & NJ (201)595-4841
VZQ VERIZON COMMUNICATIONS (516)297-1602

Link to Map for C_EMAIL: http://ny.itic.occinc.com/XGMZ-DF2-L23-YAY

Original Call Date: 12/11/13 Time: 1:15 PM Op: webusr
IMPORTANT NOTE: YOU MUST CONTACT ANY OTHER UTILITIES DIRECTLY

Appendix C - Roux Subsurface Utility Clearance Checklist

Roux Subsurface Utility Clearance Checklist ***Date of Revision – 12/3/14***

Work site set-up and work execution

ACTIVITY	Yes	No	N/A	COMMENTS INCLUDING JUSTIFICATION IF RESPONSE IS NO OR NOT APPLICABLE
Daily site safety meeting conducted, SPSAs performed, JSAs reviewed, appropriate work permits obtained.				
HASP is available and reviewed by site workers / visitors.				
Subsurface Utility Clearance Procedure has been reviewed with all site workers.				
Work area secured; traffic control established as needed. Emergency shut-off switch located. Fire extinguishers / other safety equipment available as needed.				
Utility mark-outs (public / private) clear and visible. Provide Excavator's Stake-Out Reference Number / Request Date / Time.				
Tolerance zone work identified.				
Work execution plan reviewed and adhered to (ground disturbance methods, clearance depths, any special utility protection requirements, or any other execution requirements; especially for Tolerance Zone work).				
Verbal endorsement received from Roux PM for any required field deviations to work execution plan.				

Key reminders for execution:

The Subsurface Utility Clearance Protocol should be referenced to determine all requirements while executing subsurface work. The bullet points below are intended as general reminders only and should not be solely relied upon.

- Tolerance zone is defined as two feet plus half of the diameter or half of the greatest dimension (for elliptical sewers, duct banks and other non-cylindrical utilities) of a utility and two feet from the outside of any subsurface structure.
- Install Pre-Clearance exploratory test holes (e.g., hand-dug test holes or vacuum excavation) must be performed for the first five feet below land surface (BLS) at each location prior to conducting mechanized intrusive activities. The size of the pre-clearance exploratory test hole should be at a minimum twice the diameter of any downhole tool or boring device. (Note: Pre-clearance exploratory test holes should be defined in the SOW/proposal provided to the client to prevent project delays and to allow adequate time for PM and PP to evaluate alternative approaches for the project. Alternate approaches will need to be pre-approved by the OM.
- For excavations, all utilities need to be marked and then exposed by hand following the protocols in this program. Pre-clearing for excavations may be performed by the "moat" technique (i.e., soft

digging around the perimeter). In these cases, dig in small lifts (<12” for first five feet) using a dedicated spotter.) For Tolerance Zone work, unless otherwise agreed upon with the Utility Operator, work within the tolerance zone requires verification by means of hand-dug test holes to expose the utility. Once structures have been verified a minimum clearance of two feet must be maintained between the utility and any powered equipment.

Appendix D - Utility Verification/Site Walkthrough Record

Employee Name:____

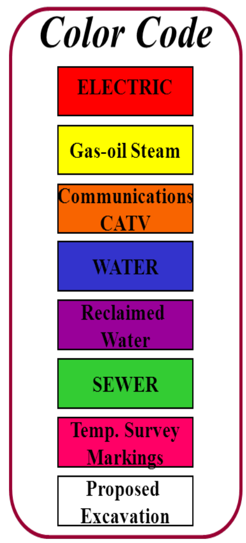
Date: ____

Instructions: For each utility suspected at the job site, indicate location on the job site, approximate burial depth, and means of detecting the utility. Leave blank if that utility is not believed to be present.

Utility	Description of Utility Location Identified Onsite	Approx. Depth (bls)	Method / Instrumentation used to determine Utility Location	Utility Owner Response (Date/Time)	Mark Out Indicates (Clear / Conflict)
Electrical Lines					
Gas Lines					
Pipelines					
Steam Lines					
Water Lines					
Sanitary and Stormwater Sewer lines					
Pressured Air-Lines					
Tank Vent Lines					
Fiber Optic Lines					
Underground Storage Tanks					
Phone Lines/ Other					

* bls - below land surface

Site Sketch Showing Utilities:



Other Comments / Findings:

Completed by: ______________________________

Signature: ______________________________ Date: ____________

APPENDIX E

Heavy Equipment Exclusion Zone Policy

HEAVY EQUIPMENT EXCLUSION ZONE MANAGEMENT PROGRAM

CORPORATE HEALTH AND SAFETY MANAGER	**:**	**Brian Hobbs, CIH, CSP**
EFFECTIVE DATE	**:**	**01/2019**
REVISION NUMBER	**:**	**1**

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1. PURPOSE

The purpose of the Exclusion Zone Management Program is to establish the minimum clearance distance that must be maintained between workers and heavy equipment while equipment is in operation (i.e., engaged or moving). The intent is to have no personnel or equipment entering the Exclusion Zone while the equipment is in operation or moving to ensure that Roux and Subcontractor employees are not unnecessarily exposed to the hazards of the equipment.

2. SCOPE AND APPLICABILITY

This Management Program applies to all Roux Associates, Inc. and its affiliated companies, Roux Environmental Engineering and Geology, D.P.C, and Remedial Engineering (collectively, “Roux”) employees and their subcontractors who are performing field work and are potentially exposed to heavy equipment. For the purpose of this program, heavy equipment includes, but is not necessarily limited to: excavation equipment, drill rigs, vacuum trucks, forklifts, lull telehandlers, man lifts, bobcats, delivery trucks, etc.

3. PROCEDURES

As specified in the following sections of this Program, an Exclusion Zones must be established and maintained during activities involving the movement/operation of heavy equipment. The Exclusion Zone requirements apply to all personnel on the site but are primarily focused on those personnel who are required to be working in the vicinity of the equipment. The exclusion zone is in effect when heavy equipment is moving or engaged (ex. movement of an arm or bucket of an excavator, rotation of an auger, lifting of a load with a forklift, raising/lowering of a man lift, etc.).

1. The Exclusion Zone must meet the following minimum requirements:
   - A minimum distance of 10 feet from all heavy equipment and loads being moved by the equipment;
   - Greater than the swing/reach radius of any moving part on the heavy equipment (i.e., for large equipment this may mean an exclusion zone distance larger than 20 feet);
   - Greater than the tip-over distance of the heavy equipment; and
   - Greater than the radius of blind spots.

   > The size of the Exclusion Zone will need to be determined on a task-specific basis considering the size of the heavy equipment in use and the task being performed. Prior to all heavy equipment operations, the Exclusion Zone(s) distance must be specifically identified in the Job Safety Analysis (JSA).

2. The spotter (or another individual) should be assigned responsibility for enforcing the Exclusion Zone. The spotter should be positioned immediately outside of the Exclusion Zone within a clear line of sight of the equipment operator. The spotter must signal the operator to stop work if anyone or anything has the potential to enter or compromise the Exclusion Zone. The operator should stop work if the spotter is not within his/her line of sight. If multiple pieces of equipment are being used, each piece of equipment must have its own Exclusion Zone and spotter. For large excavation and demolition projects the spotter should be in constant radio contact (not cell phone) with the machine driver.
3. If an individual must enter the Exclusion Zone, the designated Spotter must signal the Equipment Operator to stop the equipment. Once the equipment is no longer moving (ex. movement of an arm of an excavator is STOPPED, lifting of a load with a forklift STOPPED, raising/lowering of a man lift is

STOPPED, etc.), the operator must DISENGAGE THE CONTROLS and STOP and SIGNAL BY "SHOWING HIS HANDS". This signal will indicate that it is safe for the personnel to enter the limits of the Exclusion Zone to perform the required activity. The equipment must remain completely stopped/disengaged until all personnel have exited the limits of the Exclusion Zone and the designated Spotter has signaled by "SHOWING HIS HANDS" to the Equipment Operator that it is safe to resume operations.

4. When entering the limits of the Exclusion Zone, personnel must at a minimum:
   - Establish eye contact with the operator and approach the heavy equipment in a manner that is in direct line of sight to the Equipment Operator;
   - Never walk under any suspended loads or raised booms/arms of the heavy equipment; and
   - Identify a travel path that is free of Slip/Trip/Fall hazards.
5. The Exclusion Zone should be delineated using cones with orange snow fence or solid poles between the cones, barrels, tape or other measures. For work in rights-of-way rigid barriers, such as Jersey barriers or temporary chain link fence should be used. For certain types of wide-spread or moving/mobile equipment operations, such delineation may not be practicable around pieces of equipment or individual work areas. In such instances, it is expected that the entire operation will be within a larger secure work area or that additional means will be utilized to ensure security of the work zone.

All subcontractors who provide heavy equipment operations to field projects must implement a program that meets or exceeds the expectations described above as well as any additional requirements that may be required on a client or site-specific basis.

3.1 Exceptions

It is recognized that certain heavy equipment activities may require personnel to work within the limits of the Exclusion Zone as specified in this program. Such activities may include certain excavation clearance tasks, drill crew activities or construction tasks. However, any such activity must be pre-planned with emphasis on limiting the amount and potential exposure of any activity required within the zone. The critical safety steps to mitigate the hazards associated with working within the Exclusion Zone must be defined in the JSA and potentially other project-specific plans (i.e., critical lift plans, etc.), and approved by the Roux Project Principal and client representative, if required, prior to implementation.

4. TRAINING

Many Roux projects have different requirements that are client-specific or site-specific in nature. It is the responsibility of the Project Principal (or Project Manager if delegated this responsibility by the Project Principal) to ensure that the workers assigned to his/her projects are provided orientation and training with respect to these client and/or site-specific requirements.

APPENDIX F

COVID-19 Interim Health and Safety Guidance

COVID-19 INTERIM HEALTH AND SAFETY GUIDANCE

CORPORATE HEALTH AND SAFETY MANAGER	:	**Brian Hobbs, CIH, CSP**
EFFECTIVE DATE	:	**03/2020**
REVISION NUMBER	:	**1**

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1. PURPOSE

This guidance has been implemented to establish work practices, administrative procedures, and engineering controls to minimize potential exposure to SARS-CoV-2, the virus that causes COVID-19. The following guidance has been developed based on local, state and federal recommendations regarding COVID-19. The purpose of this document is to supplement existing site-specific Health and Safety Plans (HASPs) and provide interim health and safety guidance to minimize potential exposure to SARS-CoV-2. Should additional scientific information or regulatory information change, this document shall be updated accordingly.

2. SCOPE AND APPLICABILITY

This guidance covers all Roux employees and the subcontractors that Roux oversees. Site specific HASPs shall be developed to incorporate elements of mitigative measures against COVID-19 exposure. If work cannot be carried out in compliance with this guidance, the project shall be further evaluated by the Project Principal (PP), Office Manager (OM), and Corporate Health and Safety Manager (CHSM) prior to work authorization.

3. BACKGROUND

What is COVID-19?

COVID-19 is a respiratory illness that can spread from person to person. The virus that causes COVID-19 is a novel coronavirus that was first identified during an investigation into an outbreak in Wuhan, China. There is currently no vaccine to prevent COVID-19.

What are the symptoms of COVID-19?

Reported illnesses have ranged from mild symptoms to severe illness and death for confirmed COVID-19 cases. The following symptoms may appear 2 to14 days following exposure:

- Fever
- Dry Cough
- Shortness of breath

If someone develops emergency warning signs for COVID-19, they should be instructed to get medical attention immediately. Emergency warning signs can include those listed below; however, this list is not all inclusive. Please consult your medical provider for any other symptoms that are severe or concerning.

- Difficulty breathing or shortness of breath
- Persistent pain or pressure in the chest
- New confusion or inability to arouse
- Bluish lips or face

How does COVID-19 spread?

Person-to-person spread

The virus is thought to spread mainly from person-to-person contact.

- Between people who are in close contact with one another (within about 6 feet).
- Through respiratory droplets produced when an infected person coughs or sneezes.
    - These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.

Spread from contact with contaminated surfaces or objects

It also may be possible that a person can contract COVID-19 by touching a contaminated surface or object and then touching their mouth, nose, or possibly their eyes. Based on current data, this is not thought to be the main way the virus spreads.

According to the Centers for Disease Control and Prevention (CDC), people are thought to be most contagious when they are most symptomatic; however, there is a possibility for the virus to spread before an individual shows symptoms (asymptomatic).

How easily the virus spreads

How easily a virus spreads from person-to-person can vary. Several viruses, such as measles, are highly contagious while others do not spread as easily. Based on current data, COVID-19 spreads very easily and sustainably between people and suggests the virus is spreading more efficiently compared to influenza, but not as efficiently as measles.

4. TRAINING REQUIREMENTS

All employees with potential exposure to COVID-19 shall be provided training that incorporates COVID-19 exposure mitigation strategies, such as implementation of proper social distancing, personal hygiene (e.g., handwashing), as well as disinfection procedures, as outlined by CDC guidelines.

5. EXPOSURE RISK POTENTIAL

Worker risk of occupational exposure to COVID-19 can vary from very high, high, medium, or lower (caution) risk. This level of exposure is dependent on several factors, which can include industry type; need for contact within 6 feet of people known to be or suspected of being infected with COVID-19; density of work environment; and industrial setting (i.e., healthcare building, occupied interior work area, minimal ventilation).

Provided below is background risk level information taken from the U.S. Department of Labor Occupational Safety and Health Administration Guidance on preparing workplaces for COVID-19. Risk evaluations for each project shall be conducted by the PP and OM in consultation with the CHSM to ensure Roux employees and subcontractors remain within the lower exposure (caution) category. If it is identified there is a medium exposure risk or higher, further evaluation and mitigative measures shall be evaluated to reduce overall exposure risk prior to work authorization.

Occupational Risk Pyramid
for COVID-19

Very High Exposure Risk (Activities not conducted by Roux)

Very high exposure risk includes occupations/work activities with high potential for exposure to known or suspected sources of COVID-19 during specific medical, postmortem, or laboratory procedures. This can include but is not limited to:

- Healthcare workers (e.g., doctors, nurses, dentists, paramedics, emergency medical technicians) performing aerosol-generating procedures (e.g., intubation, cough induction procedures, bronchoscopies, some dental procedures and exams, or invasive specimen collection) on known or suspected COVID-19 patients.

- Healthcare or laboratory personnel collecting or handling specimens from known or suspected COVID-19 patients (e.g., manipulating cultures from known or suspected COVID-19 patients).
- Morgue workers performing autopsies, which generally involve aerosol-generating procedures on the bodies of people who are known to have, or suspected of having, COVID-19 at the time of their death.

High Exposure Risk (Activities not conducted by Roux)

High exposure risk occupations/work activities include exposure to known or suspected COVID-19 positive individuals. This can include but not limited to:

- Healthcare delivery and support staff (e.g., doctors, nurses, and other hospital staff who must enter patients' rooms) exposed to known or suspected COVID-19 patients. (Note: when such workers perform aerosol-generating procedures, their exposure risk level becomes very high.)
- Medical transport workers (e.g., ambulance vehicle operators) moving known or suspected COVID-19 patients in enclosed vehicles.
- Mortuary workers involved in preparing (e.g., for burial or cremation) the bodies of people who are known to have, or suspected of having, COVID-19 at the time of their death.

Medium Exposure Risk

Medium exposure risk occupations/work activities include those that require frequent and/or close contact with (i.e., within 6 feet of) people who may be infected with COVID-19, but who are not known or suspected to be COVID-19 positive. For most of our worksites, it is assumed there is on-going community transmission for COVID-19. Therefore, workers who work at sites and may have contact with the general public, other contractors, high-population-density work environments (i.e., greater than 10 people) fall within medium exposure risk group category. This can include, but is not limited to, sampling events that require two or more workers to collect and log samples in close contact or work occurring in an interior space with limited ventilation and several workers present.

Lower Exposure Risk (Caution)

Lower exposure risk (caution) occupations/work activities are those that do not require contact with people known to be or suspected of being COVID-19 positive. During these activities, there is limited contact (i.e., within 6 feet of) the general public or other workers. Workers in this category have minimal occupational contact with the public and other coworkers. This can include construction oversight that does not require close contact as well as sampling or gauging events performed by one worker.

6. EXPOSURE/SUSPECTED EXPOSURE

What do I do if I am sick or come into close contact with someone who is sick (e.g. living with/caring for)?

If you or others you are living with/caring for experience any of the following symptoms, such as acute respiratory illness (i.e., cough, shortness of breath), fatigue, sore throat, muscle aches or fever (100.4 °F [37.8 °C]), we ask you not report to your office/field site and stay home. Employees shall notify the OM immediately so proper notifications can be made.

Additionally, if you have come into close contact (i.e., within about 6 feet) with someone who is experiencing COVID-19-like symptoms, please notify the OM immediately. Information provided shall be used to determine appropriate internal response in consultation with the CHSM and Human Resources Director (HRD).

What if I am asked to self-isolate at home and when can I return from home isolation?

Depending on the situation, if you are COVID-19 positive or suspected to have COVID-19, employees may be required to self-isolate in their homes as per CDC or local health department guidance. As per CDC guidelines, home isolation for those who are sick can stop under the following conditions:

- **If you will not have a test** to determine if you are still potentially contagious, you can leave home after these three things have happened:
  - You have had no fever in the last 72 hours (that is three full days of no fever without the use of medicine that reduces fevers)

    AND
  - other symptoms have improved (for example, when your cough or shortness of breath have improved)

    AND
  - at least 7 days have passed since your symptoms first appeared
- **If you will be tested** to determine if you are still potentially contagious, you can leave home after these three things have happened:
  - You no longer have a fever (without the use of medicine that reduces fevers)

    AND
  - other symptoms have improved (for example, when your cough or shortness of breath have improved)

    AND
  - you received two negative tests in a row, 24 hours apart. Your doctor shall follow CDC guidelines.

Test-based strategy

Previous recommendations for a test-based strategy remain applicable; however, a test-based strategy is contingent on the availability of ample testing supplies and laboratory capacity as well as convenient access to testing. For jurisdictions that choose to use a test-based strategy, the recommended protocol has been simplified so only one swab is needed at every sampling.

In all cases, follow the guidance of your healthcare provider and local health department. The decision to stop home isolation should be made in consultation with your healthcare provider and state and local health departments. Local decisions depend on local circumstances.

7. WORKPLACE CONTROLS

During the project planning phase, worksite evaluations shall be carried out by the PP and OM in consultation with the CHSM to determine risk exposure levels for work activities. If it is determined there is a medium exposure risk level or higher, additional workplace controls shall be evaluated and implemented as required in addition to the basic infection prevention measures outlined below in Section 8. Additional workplace controls can include engineering controls (i.e., ventilation, physical barriers), administrative controls (i.e., minimizing contact between workers, rotating shifts, site specific training), and additional personal protective equipment (i.e., respiratory protection). If exposure risk cannot be mitigated, potential project postponement may be necessary at the discretion of the OM in consultation with the CHSM.

8. INFECTION PREVENTION MEASURES

The following is basic infection prevention and personal hygiene practices which shall be implemented for all Roux field activities as well as in the office setting.

- ***Personal Hygiene***
  - Wash your hands often with soap and water for at least 20 seconds.
    - If soap and water are not available, use an alcohol-based sanitizer that contains at least 60% ethanol or 70% isopropanol.
    - Key times to wash your hands include after blowing your nose, coughing or sneezing, after using the restroom, and before eating or preparing food.
  - Do not touch your eyes, face, nose and mouth with unwashed hands.
  - Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow.

- Throw potentially contaminated items (e.g., used tissues) in the trash.

- ***Avoid Close Contact/Secondary Contact with People and Potentially Contaminated Surfaces***
  - Apply appropriate social distance (6+ feet).
  - Stop handshaking—use and utilize other noncontact methods for greeting.
  - Do not work in areas with limited ventilation with other Site workers (e.g., small work trailer which lacks HVAC system). If working in a trailer, the following conditions must be met: limited to 4 workers, large enough to have the ability to apply social distance, and has open windows and/or operational HVAC to ensure proper ventilation of the workspace.
  - Morning tailgate/safety meetings shall occur outside and not within work trailers.
    - Do not require employees or subcontractors to sign in using the same tailgate form. The Site Supervisor/SHSO should record names of those in attendance on the form.
    - If the Site has more than 10 workers, separate tailgate meetings should be performed in smaller groups.
  - Do not share equipment or other items with co-workers and subcontractors unless wearing appropriate PPE (e.g. nitrile gloves). Assume equipment and other surfaces are potentially contaminated and remove gloves aseptically.
  - If receiving labware or other equipment disinfect to the extent feasible. If there are concerns for contaminating labware please wear appropriate PPE (e.g. gloves) to minimize contact.
  - Contact your lab/equipment vendor to confirm equipment is properly disinfected prior to being shipped.
  - Do not carpool with others (e.g. clients, coworkers).
  - For company owned vehicles limit sharing of vehicles with coworkers. If unable to limit sharing of company owned vehicles, properly disinfect vehicle before driving with a focus on commonly touched surfaces (e.g. steering wheels, shifters, buttons, etc.).
  - Use caution when using public restrooms, portable toilets. Use paper towel as a barrier when touching door handles and faucets.

- ***Cleaning and Disinfecting Surfaces***
  - Clean and disinfect frequently touched surfaces daily. Commonly touched items can include but are not limited to tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, sinks, and field equipment (i.e., photo-ionization detector, field equipment).
  - Surfaces
    - If surfaces are dirty, they should be cleaned with a detergent/soap and water prior to disinfection.
    - Refer to the manufacturer's instructions to ensure safe and effective use of the product and wear appropriate personal protective equipment (e.g., gloves, safety glasses, face shield).
    - Many products recommend:
      - Keeping surface wet for a period of time (see product label)
      - Precautions such as wearing gloves and making sure you have good ventilation during use of the product.
    - Disposable gloves should be removed aseptically and discarded after cleaning. Wash hands immediately following removal of gloves. Refer to Appendix A for how to remove gloves aseptically.
    - For disinfection, diluted household bleach solutions, alcohol solutions with at least 70% alcohol, and most common EPA-registered household disinfectants should be effective.
      - Diluted household bleach solutions can be used if appropriate for the surface. Follow manufacturer's instructions for application and proper ventilation. Check to ensure the product is not past its expiration date. Never mix household bleach with ammonia or any other cleanser.

Unexpired household bleach will be effective against coronaviruses when properly diluted. Leave the solution on the surface for at least 1 minute.

- Prepare a bleach solution by mixing:
  - 5 tablespoons (1/3 cup) bleach per gallon of water or
  - 4 teaspoons bleach per quart of water

- Products with EPA-approved emerging viral pathogen claims are expected to be effective against COVID-19. Follow the manufacturer's instructions for all cleaning and disinfecting products (e.g., concentration, application method and contact time, etc.).
- If applicable, for soft (porous) surfaces, remove visible contamination if present and clean with appropriate cleaners indicated for use on the surfaces. After cleaning:
  - Launder items as appropriate in accordance with the manufacturer's instructions. If possible, launder using the warmest appropriate water setting for the item and dry items completely; or
  - Use products with the EPA-approved emerging viral pathogens that claim they are suitable for porous surfaces.

- ***Linens, Clothing, and Other Items that Go in the Laundry***
  - Although it is unlikely field clothing would become potentially contaminated with COVID-19, it is recommended that field staff regularly launder field clothing following any field event upon returning home.
  - In order to minimize the possibility of dispersing the virus from potentially contaminated clothing, do not shake dirty laundry.
  - Wash items as appropriate in accordance with the manufacturer's instructions. If possible, launder items using the warmest appropriate water setting for the items and dry items completely.
  - Clean and disinfect hampers or other containers used for transporting laundry according to guidance listed above.

APPENDIX A

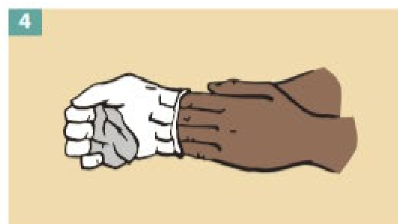
How to Remove Gloves

To protect yourself, use the following steps to take off gloves

Grasp the outside of one glove at the wrist.
Do not touch your bare skin.

Peel the glove away from your body,
pulling it inside out.

Hold the glove you just removed in
your gloved hand.



Peel off the second glove by putting your fingers
inside the glove at the top of your wrist.

Turn the second glove inside out while pulling
it away from your body, leaving the first glove
inside the second.

Dispose of the gloves safely. Do not reuse the gloves.

Clean your hands immediately after removing gloves.

APPENDIX F

Site Management Forms

Summary of Green Remediation Metrics for Site Management

Site Name: Park Lane Senior Code: C203138
Address: 1940 Turnbull Avenue City: Bronx
State: New York Zip Code: 10473 County: Bronx

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: ____________________

Current Reporting Period
Reporting Period From: ____________________ To: ____________________

Contact Information
Preparer's Name: ____________________ Phone No.: ____________________
Preparer's Affiliation: ____________________

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CONTRACTOR CERTIFICATION
I, ___________________________ (**Name**) do hereby certify that I am ______________________ (**Title**) of _________________ (**Contractor Name**), which is responsible for the work documented on this form. According to my knowledge and belief, all of the information provided in this form is accurate and the site management program complies with the DER-10, DER-31, and CP-49 policies. ____ **Date** **Contractor**

ROUX ENVIRONMENTAL ENGINEERING AND GEOLOGY, D.P.C
SITE-WIDE MONITORING, INSPECTION AND MAINTENANCE FORM

Client: PL SARA LLC
Location: 1940 Turnbull Avenue, Bronx, NY 10473
Inspector: ____________________
Date: ____________________

Site Observations: Performed by ( ) on ( )

Yes	No	
[ ]	[ ]	Have any Site improvements been made since last inspection?
[ ]	[ ]	Has there been any maintenance activity impacting the institutional and/or engineering controls?
		-Include sketches or photos of observations

Inspection of Asphalt Cap: Performed by ( ) on ( )

Yes	No	
[ ]	[ ]	Were significant cracks observed?
[ ]	[ ]	Was any other damage observed? If yes, refer to Page 2 for additional clarification.
		-Include sketches or photos of observations

Inspection of Groundwater Usage: Performed by ( ) on ( )

Yes	No	
[ ]	[ ]	Is there any evidence of groundwater underlying the property being used for any purposes including, but not limited to, drinking water or industrial purposes?

Inspection of Remaining Contaminated Material: Performed by ( ) on ( )

Yes	No	
[ ]	[ ]	Have there been any activities that caused a disturbance of remaining contaminated material since the last inspection?
[ ]	[ ]	If yes, were the activities conducted in accordance with the Site Management Plan (SMP)?
		-Include sketches or photos of observations

Inspection of Gardens and Farming: Performed by ( ) on ( )

Yes	No	
[ ]	[ ]	Is there any evidence of vegetable gardens and/or farming at the property (aside from raised planters)?
		-Include sketches or photos of observations

Site Records: Performed by ( ) on ( )

Yes	No	
[ ]	[ ]	Are site records up to date (e.g., Site Inspection Checklists)?

Inspection of Property Usage: Performed by ( ) on ( )

Yes	No	
[ ]	[ ]	Is the property being used for any purpose other than Restricted Residential Use?

ROUX ENVIRONMENTAL ENGINEERING AND GEOLOGY, D.P.C
SITE-WIDE MONITORING, INSPECTION AND MAINTENANCE FORM

Client: PL SARA LLC
Location: 1940 Turnbull Avenue, Bronx, NY 10473
Inspector: __________
Date: __________

Site Observations

Additional Comments or Clarification Where Corrective Actions May Be Required:

APPENDIX G

Request to Import/Reuse Fill Material Form

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e). Use of this form is not a substitute for reading the applicable Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is: Choose an item

Have Ecological Resources been identified? Choose an item

Is this soil originating from the site? Choose an item

How many cubic yards of soil will be imported/reused? Choose an item

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone? Choose an item

Does it contain less than 10%, by weight, material that would pass a size 10 sieve? Choose an item

Does it contain less than 10%, by weight, material that would pass a size 100 sieve? Choose an item

Is this virgin material from a permitted mine or quarry? Choose an item

Is this material recycled concrete or brick from a DEC registered processing facility? Choose an item

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

________________________________ ________________

Signature Date

____

Print Name

____

Firm

APPENDIX H

Field Sampling Plan

ROUX

Field Sampling Plan

1940 Turnbull Avenue
Tax Block 3672, Tax Lot 30
Bronx, New York

March 26, 2021

Prepared for:

PL Sara LLC
70 East 55th Street
Bronx, New York 10022

Prepared by:

Roux Environmental Engineering and Geology, D.P.C.
209 Shafter Street
Islandia, New York 11749

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Attachments

1. Introduction

Roux Environmental Engineering and Geology, D.P.C. (Roux), on behalf of PL SARA LLC (Volunteer) has developed this Field Sampling Plan (FSP) to describe in detail the field sampling methods to be used during performance of the Remedial Investigation (RI) at 1940 Turnbull Avenue (Section 2, Block 3672, Lot 30) in the Bronx, New York (Site). The Site is planned to be investigated, remediated, and redeveloped under the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP).

The Volunteer has prepared an application to enter into the Brownfield Cleanup Program (BCP) with New York State Department of Environmental Conservation (NYSDEC) which is currently under review. The FSP was prepared in accordance with directives provided in the DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) issued by the NYSDEC, as well as 6 NYCRR Part 375 and provides guidelines and procedures to be followed by field personnel during performance of the RI. Restricted Residential use as defined in 6 New York Codes, Rules, and Regulations (NYCRR) Part 375-6 Environmental Remediation Programs is proposed for the Site. Currently, the Site is occupied by residential parking lot and located in an area zoned Residential (R8) with a Commercial (C2-4) overlay. When the proposed development is completed, the anticipated Site usage will contain a 14-story senior affordable housing complex. The anticipated excavation depth for the development is 15 feet.

Information contained in this FSP relates to sampling objectives, sampling locations, sampling frequencies, sample designations, sampling equipment, sample handling, sample analysis, and decontamination. Additional details regarding the RI are provided in the associated Remedial Investigation Work Plan (RIWP).

2. Sampling Objectives

The objective of the proposed sampling is to determine the nature and extent of the known contamination on Site, to evaluate any additional areas of concern (AOCs) and to obtain a current representation of the environmental conditions at the Site.

Roux has performed a preliminary Site reconnaissance and has identified AOCs in the RI Work Plan (RIWP). These areas will be targeted during the RI to rule out any impacts. An inspection of the existing Site conditions will be conducted to determine final locations of samples based on actual field conditions.

The sampling procedures associated with characterization of soil, groundwater and soil vapor are discussed in detail in Section 4 of this FSP. A discussion of the data quality objectives (DQOs) is provided in the Quality Assurance Project Plan (QAPP) located in Appendix I of the RIWP.

3. Sample Media, Locations, Analytical Suites, and Frequency

The media to be sampled during the RI include soil, groundwater and soil vapor. Sampling locations, analytical suites, and frequency vary by sample medium. A discussion of the sampling schedule for each sample medium is provided below, while the assumed number of field samples to be collected for each sample medium, including quality control (QC) samples, is shown in Table F-1. The types of containers, volumes needed, and preservation techniques for the aforementioned testing parameters are presented in Table F-2. Specifics regarding the collection of samples at each location and for each task are provided in Section 4 of this FSP.

3.1 Soil Sampling

A minimum of 29 soil samples will be collected at 10 soil boring locations as shown in Figure 6 of the RIWP.

To characterize the soil conditions in order to fill data gaps for the Site, ten soil borings will be advanced across the Site. The excavation depth for the development is 15 feet, soils will be characterized within the excavation area and vertically delineated beneath the planned excavation pending the results of samples collected from 13-15 ft below land surface (bls). A sample from the 15-17 foot bls interval will also be collected and held at the laboratory pending results from the 13-15 foot bls sample interval. As depicted, four soil borings (RXSB-1, RXSB-8, RXSB-9 and RXSB-10) will be advanced in the northeastern portion of the Site to investigate elevated semi-volatile organic compounds (SVOCs) and lead concentrations previously identified at location SB-1 during Roux's Phase II ESA completed for the Site. More specifically, borings RXSB-1, RXSB-8, RXSB-9, and RXSB-10, will be installed to spatially delineate the impacts previously identified in SB-1. Two borings (RXSB-2 and RXSB-6) will be installed in the northwest area of the site to delineate SVOC and lead impacted soils identified at location SB-3. The remaining three borings (RXSB-3, RXSB-4, and RXSB-7) will be installed throughout the other areas on Site which have been previously uncharacterized. RXSB-5 is proposed to be installed off-Site within the sidewalk to the northeast. The purpose of this boring is to identify if SVOC and metal concentrations identified in this area previously extend off-Site and upgradient to the northeast.

All samples will be analyzed at a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory. The 29 soil samples will be analyzed for Full Target Compound List (TCL) volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) plus the 30 (10 VOCs and 20 SVOCs) highest concentration Tentatively Identified Compounds (TIC); Total Analyte List (TAL) metals; pesticides; herbicides; polychlorinated biphenyls; hexavalent chromium; trivalent chromium; total cyanide; and total mercury. Soil samples will also be analyzed for the emerging contaminants 1,4-Dioxane and Per- and Polyfluoroalkyl Substances (PFAS), which include the 21 compounds listed in the Sampling, Analysis, and Assessment of PFAS under NYSDEC's Part 375 Remedial Programs guidance document (NYSDEC January 2021 PFAS guidance document), If odor/visual evidence of contamination or elevated photoionization detector (PID) readings are noted, additional samples may be collected from the interval that exhibits the highest contamination. The samples collected from the 15-17 foot depth interval may also be analyzed pending the results from the 13-15 foot bls sample interval.

The sampling will be performed in accordance with the NYSDEC January 2021 guidance document to prevent any potential cross contamination (refer to Attachment 1) and the Roux SOPs provided in Attachment 2.

3.2 Groundwater Sampling

To characterize onsite groundwater flow and quality conditions, five new permanent groundwater monitoring wells (MW-1 through MW-5) will be installed using a Geoprobe with augers, developed, and sampled. New monitoring wells will be installed to characterize upgradient and downgradient groundwater quality as no historical groundwater samples have been collected. Monitoring wells will be constructed to straddle the water table to provide approximately three feet of screen above and seven feet of screen below the water table. The proposed groundwater monitoring well locations are shown on Figure 6 of the RIWP.

All monitoring wells will be gauged and sampled to provide additional water-level data for groundwater flow purposes and to monitor onsite upgradient and downgradient groundwater.

All samples will be analyzed at a NYSDOH ELAP-certified laboratory. The seven groundwater samples will be analyzed for Full TCL VOCs and SVOCs plus the 30 (10 VOCs and 20 SVOCs) highest concentration TICs; TAL metals; pesticides; herbicides; PCBs; hexavalent chromium; trivalent chromium; total cyanide; and total mercury. Groundwater samples will be filtered by the laboratory for metals and SVOCs. Groundwater samples will also be analyzed for the emerging contaminants 1,4-Dioxane and PFAS, which include the 21 compounds listed in the NYSDEC January 2021 PFAS guidance document. The sampling will be performed in accordance with the NYSDEC January 2021 PFAS guidance document to prevent any potential cross contamination (refer to Attachment 1).

Although not anticipated, groundwater will not be collected for analysis from a monitoring well if separate-phase petroleum product is observed within that monitoring well; however, the separate phase-petroleum product will be sampled and submitted to the analytical laboratory identification. Monitoring well installation and groundwater sampling procedures are outlined below in Sections 4.1.2 and 4.2.

3.3 Soil Vapor Sampling

Seven new soil vapor samples (SV-1 through SV-7) will be installed and sampled during the RI to evaluate soil vapor conditions at the Site at the locations shown on Figure 6 of the RIWP. The soil vapor samples are located throughout the Site in general locations as no historical soil vapor samples were collected.

All soil vapor samples will be collected in accordance with the October 2006 New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York. Samples will be analyzed at a NYSDOH ELAP-certified laboratory using USEPA Method TO-15 for VOCs. All soil vapor samples will be collected using pre-cleaned summa canisters with regulators calibrated to collect samples over a 2-hour period.

4. Field Sampling Procedures

This section provides a detailed discussion of the field procedures to be used during sampling of the various media being evaluated as part of the RI (i.e., soil, groundwater and soil vapor). The locations are shown on Figure 6 of the RIWP and additional information including intervals to be sampled and sample rationale is provided in Tables F-3, F-4, and F-5 of this FSP. Additional details regarding sampling procedures and protocols are described in the NYSDEC January 2021 PFAS guidance document, provided in FSP Attachment 1 and Roux's relevant Standard Operating Procedures (SOPs), which are provided in FSP Attachment 2.

4.1 Soil Sampling and Monitoring Well Installation

Details for the collection of soil samples and the installation of monitoring wells are provided in the section below. Boreholes will be pre-cleared to five feet below land surface using non-intrusive methods prior to advancement of soil borings and monitoring well pilot-boreholes to verify the absence of utilities. Should a utility or other feature be observed during pre-clearance activities, the sampling location will be relocated to no greater than 10 feet away from the original proposed location. Should the sampling location need to be located at a distance greater than 10 feet from the original proposed location due to access constraints, Roux will contact the NYSDEC case manager to confirm the revised location.

4.1.1 Soil Sampling

Soil borings will be advanced using a Geoprobe direct push rig. As described in the prior sections, a total of 10 soil borings will be advanced during the RI. A summary of the soil borings and samples proposed for collection is provided as Table F-3. The soil boring proposed for collection during the RI are described below:

- Soil borings RXSB-1 will be advanced from land surface to a depth of 20 ft-bls. The samples are planned to be collected from the 5-7 foot, and 13-15 foot intervals. A sample from the 15-17 foot interval will be collected and held at the lab pending results from the 13-15 foot interval. The purpose of this boring is to vertically and horizontally delineate lead contamination identified in previously installed SB-1.
- Soil borings RXSB-8, RXSB-9, and RXSB-10 will be advanced from land surface to a depth of 20 ft-bls. The samples are planned to be collected from the 5-7 foot, 11-13 foot and 13-15 foot intervals. A sample from the 15-17 foot interval will be collected and held at the lab pending results from the 13-15 foot interval. The purpose of these borings is to vertically and horizontally delineate SVOC and lead contamination identified in previously installed SB-1.
- Soil borings RXSB-2 and RXSB-6 will be advanced from land surface to a depth of 20 ft-bls. The samples are planned to be collected from the 0-2 foot, 5-7 foot and 13-15 foot intervals. A sample from the 15-17 foot interval will be collected and held at the lab pending results from the 13-15 foot interval. The purpose of these borings is to vertically and horizontally delineate SVOC and lead contamination identified in previously installed SB-3.
- Soil borings RXSB-3 and RXSB-4 and RXSB-7 will be advanced throughout the remaining portions of the Site which have not yet been characterized. The samples are planned to be collected from the 0-2 foot, 5-7 foot and 13-15 foot intervals. A sample from the 15-17 foot interval will be collected and held at the lab pending results from the 13-15 foot interval.
- Soil boring RXSB-5 will be advanced within the sidewalk northeast of the Site boundary. The purpose of this boring is to identify if the SVOCs and metals previously identified in this area extend off-Site and upgradient of the Site. The samples are planned to be collected from the 0-2 foot, 5-7 foot and 13-15 foot intervals. A sample from the 15-17 foot interval will be collected and held at the lab pending results from the 13-15 foot interval.

For soil borings advanced with the Geoprobe, soil from each continuous five-foot interval will be observed for lithology and evidence of contamination (e.g., staining, odors, and/or visible free product) and placed immediately thereafter into large Ziploc® bags for recording headspace using a PID. After a minimum of 15 minutes for equilibration with the headspace in the Ziploc® bag, each sample will be screened for organic vapors using a PID equipped with a 10.6 eV lamp. Samples for possible VOC analysis will be placed in an encore sampler prior to screening, due to the potential for loss of VOCs through volatilization. Soil samples will be collected according to Table F-3. These samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux's SOPs. Soil lithology will be recorded according to the Unified Soils Classification System (USCS). Geologic logs including lithology and PID measurements will be generated.

In accordance with the NYSDEC January 2021 PFAS guidance document, soil samples will be collected using either a stainless-steel hand auger or trowel and bowl, or acetate liners. Nitrile gloves will be worn while conducting field work and handling sample containers. Decontamination of stainless- steel equipment will be completed using Alconox and clean, PFAS-free water.

Following sample collection, boreholes will be backfilled with soil cuttings with an upper bentonite plug and capped to grade with asphalt or concrete. Soil cuttings from monitoring wells and potentially soils with visual contamination, if encountered, will be places in sealed and labeled DOT-approved 55-gallon drums pending characterization and off-site disposal at a permitted facility.4.1.2 Monitoring Well Installation

Groundwater is anticipated to be encountered between 11 and 13 ft bls. Following soil sampling activities, monitoring wells will be installed at five boring locations (RXSB-1/MW-1, RXSB-7/MW-2, RXSB-8/ MW-3, RXSB-9/ MW-4 and RXSB-10/ MW-5), bridging the water table to a maximum depth of approximately 20 ft-bls. Monitoring wells will be constructed of 2-inch-inside-diameter, schedule 40 polyvinyl chloride (PVC) casing and, 0.020-inch slot, machined screen. Well screens will be 10 feet long and will be installed with three feet above and seven feet below the water table. A sand pack will be placed around the well screen, extending two feet above the top of the screened zone. Once the driller confirms the depth of the sand pack, a minimum two-foot-thick bentonite pellet seal will be placed above the sand pack. Once the pellets have been allowed to hydrate, a cement-bentonite grout will be installed in the remaining annular space from the bottom up, to just above the bentonite seal. The wells will be completed using locking well plugs, and flush mounted, bolt down, watertight, manhole covers cemented into place. Additional details regarding monitoring well installation is provided in Table F-4.

Each newly installed monitoring well will be developed to remove any fine-grained material in the vicinity of the well screen and to promote hydraulic connection with the aquifer. The wells will be developed using a submersible pump, which will be surged periodically until well yield is consistent and has a turbidity below 50 Nephelometric turbidity units (NTUs). Following development, monitoring wells will be allowed one-week (five business days) to equilibrate with the surrounding formation prior to sampling.

As described in the RIWP, all monitoring wells will be surveyed by a licensed New York State surveyor to obtain horizontal and vertical survey coordinates.

4.2 Groundwater Sampling

Following development of the monitoring wells, groundwater samples will be collected from the five newly installed monitoring wells. Prior to sampling, depth to water will be measured at each well using an electronic oil/water level meter with an accuracy of +/-0.01 feet. Field parameters will be collected using a water quality meter during purging and prior to sampling. All wells will then be purged and sampled using a submersible pump, or an alternative method, depending on the observed depth to groundwater and logistical issues.

Field parameters (i.e., pH, dissolved oxygen, ORP, etc. as described in the USEPA low-flow sampling requirements) will be collected using a water quality meter with flow-through cell until parameters stabilized before samples are collected. Following purging, a groundwater sample will be collected from the four newly installed monitoring wells, in addition to groundwater samples from the three previously installed wells on the Site, for a total of seven groundwater samples. Groundwater samples will be collected using the methods described in “Low Stress Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells” (USEPA, 2010). Additional details regarding sampling procedures and protocols are described in the NYSDEC January 2021 PFAS guidance document provided in FSP Attachment 1 and in the Roux’s SOPs provided in FSP Attachment 2.

In accordance with the NYSDEC January 2021 PFAS guidance document, groundwater samples will be collected using one of the following materials: High-density polyethylene (HDPE), silicone, and/or polypropylene. Dedicated sampling equipment will be used during sample collection. Nitrile gloves will be worn while conducting field work and handling sample containers. Decontamination of the water quality meter will be completed using Alconox and clean, PFAS-free water.

All groundwater samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux’s SOPs. Additional details regarding groundwater sample analyses is provided in Table F-4.

4.3 Soil Vapor Sampling

Seven newly installed soil vapor points will be sampled during the RI to evaluate vapor conditions at the Site. Details for the installation soil vapor points and collection of vapor samples are provided below. Additional details regarding these samples is provided in Table F-5. The locations of the samples are shown on Figure 6 of the RIWP.

Seven soil-vapor point locations will be pre-cleared to five feet below land surface using non-intrusive methods to verify the absence of utilities. Should a utility or other feature be observed during pre-clearance activities, the sampling location will be relocated to no greater than 10 feet away from the original proposed location. Should the sampling location need to be located at a distance greater than 10 feet from the original proposed location due to access constraints, Roux will contact the NYSDEC case manager to confirm. A six-inch long, stainless steel, sample screen attached to Teflon-lined polyethylene sample tubing will be installed approximately 1 foot above the water table, #2 Morie sand will be added to 6-inches above the top of the screen. A one-foot-thick layer of bentonite will also be added to the top of the sand and the remainder of the boring annulus was filled with a cement/bentonite grout. A secure, five-inch diameter, flush-mounted curb box will then set in concrete and be finished to grade.

Prior to sample collection, the Teflon®-lined tubing will be purged of approximately two volumes of the tubing using a vacuum pump set at a rate of 0.2 liters per minute. A tracer gas (i.e., helium) will be used to enrich the atmosphere in the immediate vicinity of the sampling location in order to test the borehole seal and verify that ambient air is not being drawn into the sample in accordance with the procedures outlined in the NYSDOH Guidance. Following purging and verification with the tracer gas, the tubing will be connected to the laboratory supplied six-liter SUMMA canister. All soil vapor samples will be collected using pre-cleaned 6-liter summa canisters with regulators calibrated to collect samples over a 2-hour period and analyzed using USEPA Method TO-15 for VOCs. Additional details for the collection of soil vapor samples are included in the Roux’s SOPs.

5. Sample Handling and Analysis

To ensure quality data acquisition and collection of representative samples, there are selective procedures to minimize sample degradation or contamination. These include procedures for preservation of the samples as well as sample packaging and shipping procedures.

5.1 Field Sample Handling

A detailed discussion of the number and types of samples to be collected during each task, as well as the analyses to be performed can be found in Section 3 of this FSP. The types of containers, volumes needed, and preservation techniques for the aforementioned testing parameters are presented in Table F-2.

5.2 Sample Custody Documentation

The purpose of documenting sample custody is to confirm that the integrity and handling of the samples is not subject to question. Sample custody will be maintained from the point of sampling through the analysis. Specific procedures regarding sample tracking from the field to the laboratory are described in the NYSDEC January 2021 PFAS guidance document (Attachment 1) and Roux's SOP for Sample Handling (Attachment 2).

Each individual collecting samples is personally responsible for the care and custody of the samples. All sample labels will be pre-printed or filled out using waterproof ink. The technical staff will review all field activities with the Field Team Leader to determine whether proper custody procedures were followed during the fieldwork and to decide if additional samples are required.

All samples being shipped off-site for analysis must be accompanied by a properly completed chain of custody form (Attachment 3). The sample numbers will be listed on the chain of custody form. When transferring the possession of samples, individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to/from a secure storage area, and to the laboratory.

Samples will be packaged for laboratory pick up and/or shipment with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and/or secured with strapping tape in at least two locations for shipment to the laboratory.

5.3 Sample Shipment

Laboratory courier services may be used for sample transport on this project. However, in the event that samples are shipped to the laboratory the following procedures will apply. Sample packaging and shipping procedures are based upon USEPA specifications, as well as U.S. Department of Transportation (DOT) regulations. The procedures vary according to potential sample analytes, concentration, and matrix, and are designed to provide optimum protection for the samples and the public. Sample packaging and shipment must be performed using the general outline described below. Additional information regarding sample handling is provided in the NYSDEC January 2021 PFAS guidance document (Attachment 1) and Roux's SOP for Sample Handling (Attachment 2).

When possible, a laboratory courier will pick up samples each day for delivery directly to the laboratory. In the event that a laboratory courier is unable to pick up the samples, all samples will be shipped within 12 hours of collection (when possible) and will be preserved appropriately from the time of sample collection. A description of the sample packing and shipping procedures is presented below:

1. Prepare cooler(s) for shipment.
   - tape drain(s) of cooler shut;
   - affix “this side up” arrow labels and “fragile” labels on each cooler; and
   - place mailing label with laboratory address on top of cooler(s).
2. Arrange sample containers in groups by sample number or analyte.
3. Ensure that all bottle labels are completed correctly. Place clear tape over bottle labels to prevent moisture accumulation from causing the label to peel off.
4. Arrange containers in front of assigned coolers.
5. Place packaging material at the bottom of the cooler to act as a cushion for the sample containers.
6. Arrange containers in the cooler so that they are not in contact with the cooler or other samples.
7. Fill remaining spaces with packaging material.
8. Ensure all containers are firmly packed with packaging material.
9. If ice is required to preserve the samples, ice cubes should be repackaged in double Zip-Lock™ bags and placed on top of the packaging material.
10. Sign chain of custody form (or obtain signature) and indicate the time and date it was relinquished to Federal Express or other carrier, as appropriate.
11. Separate chain of custody forms. Seal proper copies within a large Zip-Lock™ bag and tape to cooler. Retain copies of all forms.
12. Close lid and latch.
13. Secure each cooler using custody seals.
14. Tape cooler shut on both ends.
15. Relinquish to Federal Express or other courier service as appropriate. Retain airbill receipt for project records. (Note: All samples will be shipped for “NEXT A.M.” delivery).
16. Telephone laboratory contact and provide him/her with the following shipment information:
    - sampler’s name;
    - project name;
    - number of samples sent according to matrix and concentration; and
    - airbill number.

6. Site Control Procedures

Site control procedures, including decontamination and waste handling and disposal, are discussed below.

6.1 Decontamination

In an attempt to avoid the spread of contamination, all drilling and sampling equipment must be decontaminated at a reasonable frequency in a properly designed and located decontamination area. Detailed procedures for the decontamination of field and sampling equipment are included in NYSDEC January 2021 PFAS guidance document (Attachment 1) and Roux's SOPs for the Decontamination of Field Equipment (Attachment 2). The location of the decontamination area will be determined prior to the start of field operations. The decontamination area will be established to ensure that all wash water generated during decontamination can be collected and containerized for proper disposal.

6.2 Waste Handling and Disposal

All waste materials (drill cuttings, decontamination water, etc.) generated during the RI will be consolidated, and stored in appropriate labeled bulk containers (drums, etc.), and temporarily staged at an investigation-derived-waste storage area onsite. Roux will then coordinate waste characterization and disposal by appropriate means.

TABLES

Table F-1. Remedial Investigation Field and Quality Control Sampling Summary

Sample Medium	Target Analytes	Field Samples	Replicates[1]	Trip Blanks[2]	Field Blanks[1]	Matrix Spikes[1]	Spike Duplicates[1]	Total No. of Samples
Soil	Full TCL VOCs +10	29	2	8	2	2	2	45
	Full TCL SVOCs +20	29	2	NA	2	2	2	37
	TCL Pesticides	29	2	NA	2	2	2	37
	TCL Herbicides	29	2	NA	2	2	2	37
	TCL PCBs	29	2	NA	2	2	2	37
	TAL Metals	29	2	NA	2	2	2	37
	Hexavalent Chromium	29	2	NA	2	2	2	37
	Trivalent Chromium	29	2	NA	2	2	2	37
	Total Cyanide	29	2	NA	2	2	2	37
	Total Mercury	29	2	NA	2	2	2	37
	1,4-Dioxane	29	2	NA	1	1	1	34
	PFAS	29	2	NA	1	1	1	34
Groundwater	Full TCL VOCs +10	5	1	1	1	1	1	10
	Full TCL SVOCs +20*	5	1	NA	1	1	1	9
	TCL Pesticides	5	1	NA	1	1	1	9
	TCL Herbicides	5	1	NA	1	1	1	9
	TCL PCBs	5	1	NA	1	1	1	9
	TAL Metals (Total)	5	1	NA	1	1	1	9
	TAL Metals (Dissolved)	5	1	NA	1	1	1	9
	Hexavalent Chromium	5	1	NA	1	1	1	9
	Trivalent Chromium	5	1	NA	1	1	1	9
	Total Cyanide	5	1	NA	1	1	1	9
	Total Mercury	5	1	NA	1	1	1	9
	1,4-Dioxane	5	1	NA	1	1	1	9
	PFAS	5	1	NA	1	1	1	9
Soil Vapor	TO-15 VOCs	7	1	NA	NA	NA	NA	8

Totals are estimated based on scope of work as written, actual sample quantities may vary based on field conditions. QA/QC sample quantities will be adjusted accordingly.
[1] Based on 1 per 20 samples or 1 per Sample Delivery Group
[2] Based on 1 cooler per day
TCL - USEPA Contract Laboratory Program Target Compound List
VOCs - Volatile Organic Compounds
SVOCs - Semivolatile Organic Compounds
PCBs - Polychlorinated Biphenyls
TAL - USEPA Contract Laboratory Program Target Analyte List
PFAS - Per- and Polyfluoroalkyl Substances
NA - Not Applicable
*All groundwater samples will be analyzed for both filtered and unfiltered metals and SVOCs.

Table F-2. Preservation, Holding Times and Sample Containers

Analysis	Matrix	Bottle Type	Preservation(a)	Holding Time(b)
TAL Metals (total & dissolved)	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	180 days, Hg 28 days
SW-846 6020B/7471B	Water	250 mL plastic, teflon lined cap	Nitric acid	
Hexavalent Chromium\Trivalent Chromium(calculated)	Soil	2 oz wide mouth glass, teflon lined cap	None	30 days to extract, 7 days to analysis
SW-846 7196A\6010C	Water	500 mL Plastic		24 hours from sample collection
Total Cyanide	Soil	4 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days from sample collection
SW-846 9012B	Water	250 mL Plastic	NaOH	14 days from sample collection
1,4-Dioxane	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days from sample collection
SW-846 8270D GS/MS SIM/Isotope Dilution	Water	2 x 500 mL amber wide mouth glass	Cool to 4°C	7 days from sample collection
Per- and Polyfluoroalkyl Substances (PFAS)	Soil	8 oz plastic container (non teflon lined)	Cool to 4°C	14 days to extract, 40 days to analysis
EPA 537(Modified)	Water	2 - 250 mL plastic	Trizma	14 days to extract, 28 days to anaysis
Volatile Organic Compounds (VOCs)	Air	6 liter Summa Canister for 8-hr sampling period	None	14 days from sample collection
TO-15		1 liter Summa Canister for 2-hr sampling period	None	14 days from sample collection
Target Compound List (TCL)				
TCL Volatile Organic Compounds (VOCs) + 10 TICS	Soil	Encore	Cool to 4°C	24 hours from sample collection
SW-846 8260C	Water	40mL voa vial, teflon lined cap	Hydrochloric Acid	14 days from sample collection
TCL Semivolatile Organic Compounds (SVOCs) +20 TICS	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
SW-846 8270D	Water	1 liter amber glass, teflon lined cap		7 days to extract, 40 days to analysis
TCL Pesticides	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
SW-846 8081B	Water	1 liter amber glass, teflon lined cap		7 days to extract, 40 days to analysis
TCL Herbicides	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
SW-846 8151A	Water	1 liter amber glass, teflon lined cap		7 days to extract, 40 days to analysis
TCL Polychlorinated biphenyls (PCBs)	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
SW-846 8082A	Water	1 liter amber glass, teflon lined cap		7 days to extract, 40 days to analysis

[a] All soil and groundwater samples to be preserved in ice during collection and transport

[b] Days from date of sample collection.

TAL - Target Analyte List

TCL - USEPA Contract Laboratory Program Target Compound List

Gas chromatography-mass spectrometry (GC/MS) in selected ion monitoring (SIM) mode

Table F3. Proposed Soil Sampling Locations and Rationale

Location	Matrix	Sample Intervals	Maximum Depth	Sample Parameters	Sampling Method	Rationale
RXSB-1	Soil	5-7 foot, 13-15 foot intervals (15-17 foot interval collected and held pending results of 13-15 foot sample)	20 feet below land surface	TCL + 30/TAL	EPA SW-846 8260C, EPA SW-846 8270D, EPA SW-846 8082A, EPA SW-846 8151A, EPA SW-846 8081B, EPA SW-846 6020B, Calculation- EPA SW-846 6010C/7196A, EPA SW-846 7196A, EPA SW-846 9012B, EPA SW-846 7471B and LCMSMS-ID (EPA 537), EPA SW-846 8270D SIM	Reinstall this boring in former location of SB-1 (Roux 2020). High lead concentrations as well as other metals were detected in addition to SVOCs.
RXSB-8 through RXSB-10	Soil	5-7 foot, 11-13 foot and 13-15 foot intervals (15-17 foot interval collected and held pending results of 13-15 foot sample)	20 feet below land surface	TCL + 30/TAL	EPA SW-846 8260C, EPA SW-846 8270D, EPA SW-846 8082A, EPA SW-846 8151A, EPA SW-846 8081B, EPA SW-846 6020B, Calculation- EPA SW-846 6010C/7196A, EPA SW-846 7196A, EPA SW-846 9012B, EPA SW-846 7471B and LCMSMS-ID (EPA 537), EPA SW-846 8270D SIM	Vertically and horizontally delineate SVOC and metals contamination previously identified in SB-1.
RXSB-2 and RXSB-6	Soil	0-2 foot, 5-7 foot and 13-15 foot intervals (15-17 foot interval collected and held pending results of 13-15 foot sample)	20 feet below land surface	TCL + 30/TAL	EPA SW-846 8260C, EPA SW-846 8270D, EPA SW-846 8082A, EPA SW-846 8151A, EPA SW-846 8081B, EPA SW-846 6020B, Calculation- EPA SW-846 6010C/7196A, EPA SW-846 7196A, EPA SW-846 9012B, EPA SW-846 7471B and LCMSMS-ID (EPA 537), EPA SW-846 8270D SIM	Vertically and horizontally delineate SVOC and lead contamination previously identified in SB-3.
RXSB-3, RXSB-4 and RXSB-7	Soil	0-2 foot, 5-7 foot and 13-15 foot intervals (15-17 foot interval collected and held pending results of 13-15 foot sample)	20 feet below land surface	TCL + 30/TAL	EPA SW-846 8260C, EPA SW-846 8270D, EPA SW-846 8082A, EPA SW-846 8151A, EPA SW-846 8081B, EPA SW-846 6020B, Calculation- EPA SW-846 6010C/7196A, EPA SW-846 7196A, EPA SW-846 9012B, EPA SW-846 7471B and LCMSMS-ID (EPA 537), EPA SW-846 8270D SIM	To evaluate current soil quality which included additional analytical paramaters in areas previously not investigated or sampled.
RXSB-5	Soil	0-2 foot, 5-7 foot and 13-15 foot intervals (15-17 foot interval collected and held pending results of 13-15 foot sample)	20 feet below land surface	TCL + 30/TAL	EPA SW-846 8260C, EPA SW-846 8270D, EPA SW-846 8082A, EPA SW-846 8151A, EPA SW-846 8081B, EPA SW-846 6020B, Calculation- EPA SW-846 6010C/7196A, EPA SW-846 7196A, EPA SW-846 9012B, EPA SW-846 7471B and LCMSMS-ID (EPA 537), EPA SW-846 8270D SIM	This off-site boring will be installed northeast of the Site boundary to investigate elevated SVOC concentrations identified at depth within the northeast corner of the Site.

Depths are in feet below land surface; Additional intervals may be added based on field observations.
Laboratory will report to their minimum possible standards for each method (QAPP Appendix D)
TCL + 30/TAL - includes TCL VOCs + 10 TICs, TCL SVOCs + 20 TICs, TCL Pest/Herb/PCBs, TAL Metals, Hex/Tri Chromium, Total Cyanide, Total Mercury, Per- and Polyfluoroalkyl Substances (PFAS), 1,4-Dioxane
TCL - USEPA Contract Laboratory Program Target Compound List
TAL - USEPA Contract Laboratory Program Target Analyte List
VOCs - Volatile Organic Compounds
SVOCs - Semivolatile Organic Compounds
PCBs - Polychlorinated Biphenyls
TICs - Tentatively Identified Compounds
TBD - To Be Determined
QA/QC samples will be collected as described in the QAPP Table 2

Table F4. Proposed Groundwater Sampling Locations and Rationale

Location	Matrix	New/Existing	Proposed/Existing Monitoring Well Depth*	Sample Interval	Sample Parameters	Sampling Method	Rationale
MW-1, MW-2, MW-3, MW-4	Groundwater	New	20 feet below land surface	Water Table	TCL + 30/TAL	EPA SW-846 8260C, EPA SW-846 8270D, EPA SW-846 8082A, EPA SW-846 8151A, EPA SW-846 8081B, EPA SW-846 6020B, Calculation- EPA SW-846 6020B/7196A, EPA SW-846 9012B, EPA SW-846 7470A, EPA 537(Modified), EPA SW-846 8270D GS/MS SIM/Isotope Dilution	To evaluate on Site groundwater quality.
MW-5	Groundwater	New	20 feet below land surface	Water Table	TCL + 30/TAL	EPA SW-846 8260C, EPA SW-846 8270D, EPA SW-846 8082A, EPA SW-846 8151A, EPA SW-846 8081B, EPA SW-846 6020B, Calculation- EPA SW-846 6020B/7196A, EPA SW-846 9012B, EPA SW-846 7470A, EPA 537(Modified), EPA SW-846 8270D GS/MS SIM/Isotope Dilution	Off-site, upgradient well to identify any potential upgradient groundwater impacts.

*Proposed monitoring well depth based on previously identified depth to water from prior investigations
Laboratory will report to their minimum possible standards for each method (QAPP Appendix D)
TCL + 30/TAL - includes TCL VOCs + 10 TICs, TCL BNA (SVOCs) + 20 TICs, TCL Pest/PCBs, TAL Metals, Hex/Tri Chromium, Total Cyanide, Total Mercury, Per- and Polyfluoroalkyl Substances (PFAS), 1,4-Dioxane
TCL - USEPA Contract Laboratory Program Target Compound List
TAL - USEPA Contract Laboratory Program Target Analyte List
VOCs - Volatile Organic Compounds
SVOCs - Semivolatile Organic Compounds
TICs - Tentatively Identified Compounds
PCBs - Polychlorinated Biphenyls
QA/QC samples will be collected as described in the QAPP Table 2
All groundwater samples will be analyzed for both filtered and unfiltered metals and SVOCs
ft-bls feet below land surface

Table F5. Proposed Vapor Sampling Locations and Rationale

Location	Matrix	New/Existing	Sample Interval	Sample Parameters	Sampling Method	Rationale
SV-1 through SV-4 and SV-6 and SV-7	Soil Vapor	New	At outdoor locations from approximately 1-foot above the water table.	TCL VOCs	TO-15	Generally characterize the soil vapor quality beneath the Site.
SV-5	Soil Vapor	New	At outdoor locations from approximately 1-foot above the water table.	TCL VOCs	TO-15	Characterize soil vapor upgradient of the Site to the northeast. SV-5 will be installed off-site in the same location as RXSB-5 and MW-5.

Laboratory will report to their minimum possible standards for each method (QAPP Appendix D)
TCL - USEPA Contract Laboratory Program Target Compound List
VOCs - Volatile Organic Compounds
TICs - Tentatively Identified Compounds
QA/QC samples will be collected as described in the QAPP Table 2
All groundwater samples will be analyzed for both filtered and unfiltered metals and SVOCs

ATTACHMENTS

1. NYSDEC Emerging Contaminant Sampling Guidance
2. Roux's Standard Operating Procedures
3. Chain of Custody Form

ATTACHMENT 1

NYSDEC Emerging Contaminant Sampling Guidance

Collection of Groundwater Samples for Per- and Polyfluoroalkyl Substances (PFAS) from Monitoring Wells Sample Protocol

Samples collected using this protocol are intended to be analyzed for perfluorooctanoic acid (PFOA) and other perfluorinated compounds by Modified (Low Level) Test Method 537.

The sampling procedure used must be consistent with the NYSDEC March 1991 Sampling Guidelines and Protocols http://www.dec.ny.gov/docs/remediation_hudson_pdf/sgpsect5.pdf with the following materials limitations.

At this time acceptable materials for sampling include: stainless steel, high density polyethylene (HDPE) and polypropylene. Additional materials may be acceptable if proven not to contain PFAS. **NOTE: Grunfos pumps and <u>some</u> bladder pumps are known to contain PFAS materials (e.g. Teflon™ washers for Grunfos pumps and LDPE bladders for bladder pumps).** <u>All sampling equipment components and sample containers should not come in contact with aluminum foil, low density polyethylene (LDPE), glass or polytetrafluoroethylene (PTFE, Teflon™) materials</u> including sample bottle cap liners with a PTFE layer. Standard two step decontamination using detergent and clean water rinse will be performed for equipment that does come in contact with PFAS materials. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFAS materials must be avoided. Many food and drink packaging materials and "plumbers thread seal tape" contain PFAS.

All clothing worn by sampling personnel must have been laundered multiple times. The sampler must wear nitrile gloves while filling and sealing the sample bottles.

Pre-cleaned sample bottles with closures, coolers, ice, sample labels and a chain of custody form will be provided by the laboratory.

1. Fill two pre-cleaned 250 mL HDPE or polypropylene bottle with the sample.
2. Cap the bottles with an acceptable cap and liner closure system.
3. Label the sample bottles.
4. Fill out the chain of custody.
5. Place in a cooler maintained at 4 ± 2º Celsius.

Collect one equipment blank for every sample batch, not to exceed 20 samples.

Collect one field duplicate for every sample batch, not to exceed 20 samples.

Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, not to exceed 20 samples.

Request appropriate data deliverable (Category A or B) and an electronic data deliverable.

Issue: NYSDEC has committed to analyzing representative groundwater samples at remediation sites for emerging contaminants (1,4-dioxane and PFAS) as described in the below guidance.

Implementation

NYSDEC project managers will be contacting site owners to schedule sampling for these chemicals. Only groundwater sampling is required. The number of samples required will be similar to the number of samples where "full TAL/TCL sampling" would typically be required in a remedial investigation. If sampling is not feasible (e.g., the site no longer has any monitoring wells in place), sampling may be waived on a site-specific basis after first considering potential sources of these chemicals and whether there are water supplies nearby.

Upon a new site being brought into any program (i.e., SSF, BCP), PFAS and 1,4-dioxane will be incorporated into the investigation of groundwater as part of the standard "full TAL/TCL" sampling. Until an SCO is established for PFAS, soil samples do not need to be analyzed for PFAS unless groundwater contamination is detected. Separate guidance will be developed to address sites where emerging contaminants are found in the groundwater. The analysis currently performed for SVOCs in soil is adequate for evaluation of 1,4-dioxane, which already has an established SCO.

Analysis and Reporting

Labs should provide a full category B deliverable, and a DUSR should be prepared by an independent 3rd party data validator. QA/QC samples should be collected as required in DER-10, Section 2.3(c). The electronic data submission should meet the requirements provided at: https://www.dec.ny.gov/chemical/62440.html ,

The work plan should explicitly describe analysis and reporting requirements.

PFAS sample analysis: Currently, ELAP does not offer certification for PFAS compounds in matrices other than finished drinking water. However, laboratories analyzing environmental samples (ex. soil, sediments, and groundwater) are required, by DER, to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537 or ISO 25101.

Modified EPA Method 537 is the preferred method to use for groundwater samples due to the ability to achieve 2 ng/L (ppt) reporting limits. If contract labs or work plans submitted by responsible parties indicate that they are not able to achieve similar reporting limits, the project manager should discuss this with a DER chemist. Note: Reporting limits for PFOA and PFOS should not exceed 2 ng/L.

PFAS sample reporting: DER has developed a PFAS target analyte list (below) with the intent of achieving reporting consistency between labs for commonly reportable analytes. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. This list may be updated in the future as new information is learned and as labs develop new capabilities. If lab and/or matrix specific issues are encountered for any particular compounds, the NYSDEC project manager will make case-by-case decisions as to whether particular analytes may be temporarily or permanently discontinued from analysis for each site. Any technical lab issues should be brought to the attention of a NYSDEC chemist.

Some sampling using this full PFAS target analyte list is needed to understand the nature of contamination. It may also be critical to differentiate PFAS compounds associated with a site from other sources of these chemicals. Like routine refinements to parameter lists based on investigative findings, the full PFAS target analyte list may not be needed for all sampling intended to define the extent of contamination. Project managers may approve a shorter analyte list (e.g., just the UCMR3 list) for some reporting on a case by case basis.

1,4-Dioxane Analysis and Reporting: The method detection limit (MDL) for 1,4-dioxane should be no higher than 0.35 µg/l (ppb). Although ELAP offers certification for both EPA Method 8260 SIM and EPA Method 8270 SIM, DER is advising the use of method 8270 SIM. EPA Method 8270 SIM provides a more robust extraction procedure, uses a larger sample volume, and is less vulnerable to interference from chlorinated solvents.

Full PFAS Target Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	**Perfluorobutanesulfonic acid**	**PFBS**	**375-73-5**
	Perfluorohexanesulfonic acid	**PFHxS**	**355-46-4**
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanessulfonic acid	**PFOS**	**1763-23-1**
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	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	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

Bold entries depict the 6 original UCMR3 chemicals

ATTACHMENT 2

Roux's Standard Operating Procedures

Date: May 5, 2000
Revision: April 7, 2015

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide procedures and standards for record keeping and maintenance, for all field activities conducted by Roux Associates, Inc. (Roux Associates).

Strict quality assurance/quality control (QA/QC) is necessary to properly and accurately document and preserve all project-related information. Quality assurance is implemented to corroborate that quality control procedures are followed. Quality control provides a means to monitor investigation activities (e.g., sampling and laboratory performance) as a check on the quality of the data.

Valid data and information are integral to all aspects of Roux Associates' field activities. These aspects include, but are not necessarily limited to, activities that involve: drilling; sediment, sludge, and soil sampling (lithologic, and soil-quality and analysis); well construction and development; aquifer testing and analysis; water-quality sampling and analysis (surface water and ground water); free-product sampling and analysis; air-quality sampling and analysis; geophysical testing; demolition activities; waste removal operations; engineering installations; etc. The data will be confirmed by QA/QC methods established and set forth in the work plan/scope of work. Without checks on the field and analytical procedures, the potential exists for contradictory results, and associated incomplete or incorrect results from the interpretation of potentially questionable data.

Documentation will be entered in a bound field notebook and must be transcribed with extreme care, in a clear and concise manner, as the information recorded will become part of the permanent legal record. Field notes are considered the legal record of site activities, and as such they must be taken in a standard and consistent manner. If abbreviations are used, then they must first be spelled out for clarity (i.e., to avoid ambiguity and misunderstanding). All entries must be dated and initialed, and the time (military time) of the entry included. Field notebooks and forms must be assigned to an individual project and properly identified (i.e., client name, project number, location and name of site, individual recording information, dates, times, etc.). Change of possession of field notebooks or forms must be documented with the date and time, and initialed by both individuals. Following each day's entries, the field notebook or form must be photocopied in the event that the original documentation is lost or stolen. All field notebooks must have the company name and address legibly printed in indelible ink along with the message "If found, then please forward to Roux Associates, Inc. at the above address - REWARD OFFERED."

Information must be recorded while onsite because it may be difficult to recall details at a later date. Furthermore, information must be documented immediately as it provides unbiased information which will be used for writing the report when the field activities are completed. Project-related documentation is an irreplaceable, important record for other individuals who may become involved in the project, and provides the project manager with a complete history of project-related activities. Written information must be accompanied by maps, sketches, and photographs where appropriate, especially if these supplemental sources of information assist in the documentation process. A new page must be used in the field notebook for each new day's entries (i.e., unused portions of a previous page must have an "X" placed through it). The end of the day's records must be initialed and dated.

As part of record keeping and QA/QC activities, state and federal regulatory agencies should be contacted to check if special or different protocols are required and/or if particular or unconventional methods are required for the given field activity. Thus, the record keeping and QA/QC activities implemented by Roux Associates are based on technically sound standard practices and incorporate Roux Associates own, extensive experience in conducting environmental field activities.

2.0 MATERIALS

In order to track investigation activities, specific materials are required. These materials include the following:

a. A bound, waterproof field notebook.

b. Appropriate Roux Associates' or project-specific forms (e.g., daily log, geologic log, monitoring well construction log, well sampling data form, location sketch, chain of custody, telephone conversation record, meeting notes, etc.).

c. Appropriate labels (e.g., sample, Roux Associates' Custody Seal, etc.)

d. Approved work plan/scope of work.

e. Health and safety plan (HASP).

f. Appropriate Roux Associates' SOPs.

g. Black pens, and indelible markers.

h. Digital camera.

3.0 DOCUMENTATION

3.1 Before the Roux Associates personnel leave the field, they must ensure that their field notes include comprehensive descriptions of the hydrogeologic conditions, and all investigation-related activities and results (onsite and offsite). This will safeguard against the inability to reconstruct and comprehend all aspects of the field investigation after its completion, and will serve to facilitate the writing of an accurate report. Properly documented information provides the QA/QC tracking (back-up) required for all Roux Associates' projects. General types of information that must be recorded (where pertinent to the investigation being conducted) include, but may not necessarily be limited to, the following:

a. List of Roux Associates personnel on site.

b. Name, date, and time of arrival on site by Roux Associates personnel, including temporary departures from, and returns to, the site during the work day.

c. Client and project number.

d. Name and location of study area.

e. Date and time of arrival on site by non-Roux Associates personnel (names and affiliation) and equipment (e.g., subcontractors and facility personnel, and drilling equipment, respectively, etc.), including temporary departures from, and returns to, the site during the work day, and departure at the end of the work day.

f. List of non-Roux Associates personnel (e.g. subcontractors, client representatives) on site.

g. Weather conditions at the beginning of the day as well as any changes in weather that occur during the working day.

h. Health and safety procedures including level of protection, monitoring of vital signs, frequency of air monitoring, and any change (i.e., downgrade or upgrade) in the level of protection for Roux Associates and other on-site personnel (e.g., subcontractors, facility personnel, etc.).

i. Health and safety procedures not in compliance with the HASP (for all on-site personnel).

j. Site reconnaissance information (e.g., topographic features, geologic features, surface-water bodies, seeps, areas of apparent contamination, facility/plant structures, etc.).

k. Air monitoring results (i.e., photoionization detector [PID], etc. measurements).

l. Task designation and work progress.

m. Work-related and site-related discussions with subcontractors, regulatory agency personnel, facility personnel, the general public, and Roux Associates personnel.

n. Delays, unusual situations, problems and accidents.

o. Field work not conducted in accordance with the work plan/scope of work, and rationale and justification for any change(s) in field procedures including discussions with personnel regarding the change(s) and who authorized the change(s).

p. QA/QC procedures not conducted in accordance with the QA/QC procedures established in the work plan/scope of work and rationale and justification for any change(s) in QA/QC procedures including discussions with personnel regarding the change(s) and who authorized the change(s).

q. Equipment and instrument calibration information, results and/or problems.

r. Decontamination and calibration procedures.

s. Activities in and around the site and work area by any and all on-site personnel which may impact field activities.

t. Sketches, maps, and/or photographs (with dates and times) of the site, structures, equipment, etc. that would facilitate explanations of site conditions.

u. Contamination evidenced as a result of work-related activities (e.g., visible contaminants [sheen] in drilling fluids or on drilling equipment; sheen on, or staining of, sediments; color of, or separate [nonaqueous] phase on, water from borehole or well; vapors or odors emanating from a borehole or well; etc.). Logbook entries should be objective, factual, and free of personal feelings or other terminology which might prove inappropriate. Avoid using nontechnical or subjective terms (e.g., , oily, strong-smelling).

v. Date and time of final departure from the site of all personnel at the end of the work day.

3.2 Pens with permanent ink will be used to record all data. Data or other information that has been entered incorrectly will be corrected by drawing a line through the incorrect entry and **initialing and dating** the linedthrough entry. Under no circumstances should the incorrect material be erased, made illegible or obscured so that it cannot be read.

3.3 In addition to the general types of information that must be recorded (as presented in Section 3.1), task-specific information must also be properly documented. Task-specific information which is required is provided in each respective task-oriented SOP, and the documentation procedures outlined in each SOP must be followed.

END OF PROCEDURE

Date: May 5, 2000
Revision: April 16, 2015

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for sample handling and management which will allow consistent and accurate results. Valid chemistry data are integral to investigations that characterize media-quality conditions. This SOP is designed to ensure that once samples are collected, they are preserved, packed and delivered in a manner which will maintain sample integrity. The procedures outlined are applicable to most sampling events and any required modifications must be clearly described in the work plan.

2.0 CONSIDERATIONS

Sample containers, sampling equipment decontamination, quality assurance/quality control (QA/QC), sample preservation, and sample handling are all components of this SOP.

2.1 Sample Containers

Prior to collection of a sample, considerations must be given to the type of container that will be used to store and transport the sample. The type and number of containers selected is usually based on factors such as sample matrix, potential contaminants to be encountered, analytical methods requested, and the laboratory's internal quality assurance requirements. In most cases, the overriding considerations will be the analytical methodology, or the state or federal regulatory requirements because these regulations generally encompass the other factors. The sample container selected is usually based on some combination of the following criteria:

a. Reactivity of Container Material with Sample

Choosing the proper composition of sample containers will help to ensure that the chemical and physical integrity of the sample is maintained. For sampling potentially hazardous material, glass is the recommended container type because it is chemically inert to most substances. Plastic containers are not recommended for most hazardous wastes because the potential exists for contaminants to adsorb to the surface of the plastic or for the plasticizer to leach into the sample.

In some instances, however, the sample characteristics or analytes of interest may dictate that plastic containers be used instead of glass. Because some metals species will adhere to the sides of the glass containers in an aqueous matrix, plastic bottles (e.g., nalgene) must be used for samples collected for metals analysis. A separate, plastic container should accompany glass containers if metals analysis is to be performed along with other analyses. Likewise, other sample characteristics may dictate that glass cannot be used. For example, in the case of a strong alkali waste or hydrofluoric solution, plastic containers may be more suitable because glass containers may be etched by these compounds and create adsorptive sites on the container's surface.

b. Volume of the Container

The volume of sample to be collected will be dictated by the analysis being performed and the sample matrix. The laboratory must supply bottles of sufficient volume to perform the required analysis. In most cases, the methodology dictates the volume of sample material required to complete the analysis. However, individual laboratories may provide larger volume containers for various analytes to ensure sufficient quantities for duplicates or other QC checks.

To facilitate transfer of the sample from the sampler into the container and to minimize spillage and sample disturbance, wide-mouth containers are recommended when not precluded by method requirements. Aqueous volatile organic samples must be placed into 40-milliliter (ml) glass vials with polytetrafluoroethylene (PTFE) (e.g., TeflonTM) septums. Non-aqueous volatile organic samples for “low-level” volatile analysis should be collected in the same type of vials or using EnCore samplers provided by the laboratory. Non-aqueous volatile organic samples for “mid or high-level” volatile analysis may be collected in 4-ounce (oz) wide-mouth jars provided by the laboratory. These jars should have PTFE-lined screw caps.

c. Color of Container

Whenever possible, amber glass containers should be used to prevent photodegradation of the sample, except when samples are being collected for metals analysis. If amber containers are not available, then containers holding samples should be protected from light (i.e., place in cooler with ice immediately after filling).

d. Container Closures

Container closures must screw on and off the containers and form a leak-proof seal. Container caps must not be removed until the container is ready to be filled with the sample, and the container cap must be replaced (securely) immediately after filling it. Closures should be constructed of a material which is inert with respect to the sampled material, such as PTFE (e.g., TeflonTM). Alternately, the closure may be separated from the sample by a closure liner that is inert to the sample material such as PTFE sheeting. If soil or sediment samples are being collected, the threads of the container must be wiped clean with a dedicated paper towel or cloth so the cap can be threaded properly.

e. Decontamination of Sample Containers

Sample containers must be laboratory cleaned by the laboratory performing the analysis. The cleaning procedure is dictated by the specific analysis to be performed on the sample. Sample containers must be carefully examined to ensure that all containers appear clean and in good condition. The vacuum pressure of Summa canisters should match the pressure provided from of laboratory that provided the canisters for each canister. Do not mistake the preservative as unwanted residue. The bottles should not be field cleaned. If there is any question regarding the integrity of the bottle, then the laboratory must be contacted immediately and the bottle(s) replaced.

f. Sample Bottle Storage and Transport

No matter where the sample bottles are, whether at the laboratory waiting to be packed for shipment or in the field waiting to be filled with sample, care must be taken to avoid contamination. Sample shuttles or coolers, and sample bottles must be stored and transported in clean environments. Sample bottles and clean sampling equipment must never be stored near solvents, gasoline, or other equipment that is a potential source of cross-contamination. When under chain of custody, sample bottles must be secured in locked vehicles, and custody sealed in shuttles or in the presence of authorized personnel. Information which documents that proper storage and transport procedures have been followed must be included in the field notebook and on appropriate field forms.

2.2 Decontamination of Sampling Equipment

Proper decontamination of all re-usable sampling equipment is critical for all sampling episodes. The SOP for Decontamination of Field Equipment and SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for decontamination of various types of equipment.

2.3 Quality Assurance/Quality Control Samples

QA/QC samples are intended to provide control over the proper collection and tracking of environmental measurements, and subsequent review, interpretation and validation of generated analytical data. The SOPs for Collection of Quality Control Samples, for Evaluation and Validation of Data, and for Field Record Keeping and Quality Assurance/Quality Control must be referred to for detailed guidance regarding these respective procedures. SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for QA/QC procedures.

2.4 Sample Preservation Requirements

Certain analytical methodologies for specific analytes require chemical additives in order to stabilize and maintain sample integrity. Generally, this is accomplished under the following two scenarios:

a. Sample bottles are preserved at the laboratory prior to shipment into the field.

b. Preservatives are added in the field immediately after the samples are collected.

Many laboratories provide pre-preserved bottles as a matter of convenience and to help ensure that samples will be preserved immediately upon collection. A problem associated with this method arises if not enough sample could be collected, resulting in too much preservative in the sample. More commonly encountered problems with this method include the possibility of insufficient preservative provided to achieve the desired pH level or the need for additional preservation due to chemical reactions caused by the addition of sample liquids to pre-preserved bottles. The use of pre-preserved bottles is acceptable; however, field sampling teams must always be prepared to add additional preservatives to samples if the aforementioned situations occur. Furthermore, care must be exercised not to overfill sample bottles containing preservatives to prevent the sample and preservative from spilling and therefore diluting the preservative (i.e., not having enough preservative for the volume of sample).

When samples are preserved after collection, special care must be taken. The transportation and handling of concentrated acids in the field requires additional preparation and adherence to appropriate preservation procedures. All preservation acids used in the field should be trace-metal or higher-grade.

2.5 Sample Handling/Shipping

After the proper sample bottles have been received under chain-of-custody, properly decontaminated equipment has been used to collect the sample, and appropriate preservatives have been added to maintain sample integrity, the final step for the field personnel is checking the sample bottles prior to proper packing and delivery of the samples to the laboratory.

All samples should be organized and the labels checked for accuracy. The caps should be checked for tightness and any 40-ml volatile organic compound (VOC) bottles must be checked for bubbles. This can be achieved by gently tapping the bottom of the voa to dislodge potential air bubbles. Each sample bottle must be placed in an individual "zip-lock" bag to protect the label, and placed on ice. Clear packing tape may also be used to protect the integrity of the sample label. The bottles must be carefully packed to prevent breakage during transport. Use of bubble wrap is recommended. When several bottles have been collected for an individual sample, they should not be placed adjacent to each other in the cooler to prevent possible breakage of all bottles for a given sample. If there are any samples which are known or suspected to be highly contaminated, these should be placed in an individual cooler under separate chain-of-custody to prevent possible cross contamination. Sufficient ice (wet or blue packs) should be placed in the cooler to maintain the temperature at 4 degrees Celsius (°C) until delivery at the laboratory.

Consult the work plan to determine if a particular ice is specified as the preservation for transportation (e.g., the United States Environmental Protection Agency does not like the use of blue packs because they claim that the samples will not hold at 4°C). If additional coolers are required, then they should be purchased.

The chain-of-custody form should be properly completed, placed in a "zip-lock" bag, and placed in the cooler. One copy must be maintained for the project files. The cooler should be sealed with packing tape and a custody seal. The custody seal number should be noted in the field book. Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time. If overnight mail is utilized, then the shipping bill must be maintained for the files and the laboratory must be called the following day to confirm receipt.

2.6 Chain-of-Custody Procedures

The Field Manager is responsible for the care and custody of the samples until they are transferred or properly dispatched. The Field Manager will complete the CoC form immediately after sample collection in an effort to establish sample custody in the field before sample shipment. The following information will be included on the CoC:

- Sample identification and sample container identification number, if applicable;
- Date and time the samples were collected;
- Matrix of the sample;
- The number of containers for each sample;
- Analysis requested and preservation codes;
- Name of sampler(s) and the person shipping the samples and documentation;

- Name, telephone number and email address of the Project Manager; and
- Signature of the sampler.

Any corrections to the CoC will be made by putting a single strike through the incorrect entry and initialing and dating it. When the shipping container (i.e., cooler) is packed for shipping, personnel relinquishing the container will sign the CoC. The CoC will accompany the samples to the laboratory and a copy of the CoC will be retained by the Field Manager and placed in the project file. The completed CoC will be supplied by the laboratory with the standard data package.

The QA Manager will be responsible for reviewing all sampling activities to verify whether proper custody procedures were followed during the field work. Any deviations in the custody procedures will be noted in the Final Report.

3.0 EQUIPMENT AND MATERIALS

3.1 General equipment and materials may include, but not necessarily be limited to, the following:

a. Sample bottles of proper size and type with labels.

b. Cooler with ice (wet or blue pack).

c. Field notebook, appropriate field form(s), chain-of-custody form(s), custody seals.

d. Black pen and indelible marker.

e. Packing tape, "bubble wrap", and "zip-lock" bags.

f. Overnight (express) mail forms, and laboratory addres or courier contact information

g. Health and safety plan (HASP).

h. Work plan/scope of work.

i. Pertinent SOPs for specified tasks and their respective equipment and materials.

3.2 Preservatives for specific samples/analytes as specified by the laboratory. Preservatives must be stored in secure, spillproof glass containers with their content, concentration, and date of preparation and expiration clearly labeled.

3.3 Miscellaneous equipment and materials including, but not necessarily limited to, the following:

a. Graduated pipettes.

b. Pipette bulbs.

c. Litmus paper.

d. Glass stirring rods.

e. Protective goggles.

f. Disposable gloves.

g. Lab apron.

h. First aid kit.

i. Portable eye wash station.

j. Water supply for immediate flushing of spillage, if appropriate.

k. Shovel and container for immediate containerization of spillage-impacted soils, if appropriate.

4.0 PROCEDURE

4.1 Examine all bottles and verify that they are clean and of the proper type, number, and volume for the sampling to be conducted.

4.2 Label bottles carefully and clearly with project name and number, site location, sample identification, date, time, and the sampler's initials using an indelible marker.

4.3 Collect samples in the proper manner (refer to specific sampling media SOPs).

4.4 Conduct preservation activities as required after each sample has been collected. Field preservation must be done immediately and must not be done later than 30 minutes after sample collection.

4.5 Conduct QC sampling, as required.

4.6 Seal each container carefully and place in an individual "zip lock" bag.

4.7 Organize and carefully pack all samples in the cooler immediately after collection (e.g., bubble wrap). Insulate samples so that breakage will not occur.

4.8 Complete and place the chain-of-custody form in the cooler after all samples have been collected. Maintain one copy for the project file. If the cooler is to be transferred several times prior to shipment or delivery to the laboratory, it may be easier to tape the chain-of-custody to the exterior of the sealed cooler. When exceptionally hazardous samples are known or suspected to be present, this should be identified on the chain-of-custody as a courtesy to the laboratory personnel.

4.9 Add additional ice as necessary to ensure that it will last until receipt by the laboratory.

4.10 Seal the cooler with packing tape and a custody seal. Record the number of the custody seal in the field notebook and on the field form. If there are any exceptionally hazardous samples, then shipping regulations should be examined to ensure that the sample containers and coolers are in compliance and properly labeled.

4.11 Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time.

4.12 Maintain the shipping bill for the project files if overnight mail is utilized and call the laboratory the following day to confirm receipt.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish the criteria to be followed for the evaluation of data quality and for data validation. Because valid media-quality data are integral to environmental investigations that characterize site conditions, the quality of the data generated by a laboratory is extremely important to the successful completion of a project. The level of data evaluation and validation required is determined by the project data quality objectives and must be outlined in the work plan/scope of work. Data collected to establish qualitative trends, for example, do not require the same level of validation as data generated to support litigation.

The data evaluation procedure described in Section 2.0 of this SOP is designed to provide a measure of comparability regarding quality control (QC) samples, i.e., between duplicate or replicate samples and to detect any contamination or bias in analyses of blanks. They may be used for both intra-laboratory and inter-laboratory comparisons.

The data validation procedure described in Section 3.0 of this SOP is designed to provide a stringent review of analytical chemical data with respect to sample receipt and handling, analytical methods used, and data reporting and deliverables.

Prior to performing any data evaluation or validation, it is crucial that all appropriate regulatory agencies be contacted and their data validation requirements be determined, as these requirements vary from agency to agency and may vary among different Regions of the United States Environmental Protection Agency (USEPA).

2.0 PROCEDURE FOR EVALUATION OF DATA

2.1 Not all analytical data packages will require a full data validation procedure as described in Section 3.0. The procedures described in this section provide an initial screening to help decide if full data validation is warranted. These data evaluation procedures are used as a quality assurance (QA) check for water-quality data, and are not generally applicable to soil-quality data. They are to be used when a full data validation procedure (described in Section 3.0) is not required.

2.2 Primary/Replicate, Primary Split and Primary/Laboratory Duplicate Comparisons

X = primary sample concentration

Y = replicate/split/laboratory duplicate sample concentration

Z = $\{(X-Y)/[(X+Y)/2]\} \times 100$

IDC = initial concentration requiring dilution, if samples have been diluted. If samples did not require dilution, then use the first range (i.e., QL-10[QL]).

QL = Quantitation Limit(1)

Organic Constituents

Range	Quantitative	Qualitative	Unusable
QL - 10(QL)	Z $\leq$ 60%	100% > Z > 60%	Z $\geq$ 100%
10(QL) - IDC	Z $\leq$ 40%	100% > Z > 40%	Z $\geq$ 100%
X or Y > IDC	Z $\leq$ 60%	100% > Z > 60%	Z $\geq$ 100%

Inorganic Constituents

Analytical Method	Quantitative	Qualitative	Unusable
Wet Chemistry testing	Z $\leq$ 60%	100% > Z > 60%	Z $\geq$ 100%
Atomic Absorption (AA)	Z $\leq$ 40%	100% > Z > 40%	Z $\geq$ 100%
Inductively Coupled Plasma (ICP)	Z $\leq$ 40%	100% > Z > 40%	Z $\geq$ 100%

2.3 Comparison of Blanks

X = primary sample concentration(2)

D = highest concentration in associated blank(s)

Y = X/dilution factor

	Quantitative	Qualitative	Unusable
Field Blank	D $\leq$ 0.1X	0.5X > D >0.1X	D $\geq$ 0.5X
Trip Blank	D $\leq$ 0.1X	0.5X > D > 0.1X	D $\geq$ 0.5X
Lab Blank	D $\leq$ 0.1Y	0.5Y > D > 0.1Y	D $\geq$ 0.5Y

(1)The quantitation limit will be dependent upon the specific methodology and the matrix, and will be either the minimum detection limit (MDL) or the practical quantitation limit (PQL).

(2)Results reported as BDL (below the detection limit) will be considered Quantitative because the primary samples have not been affected by the bias(es) which resulted in concentrations reported in the blank sample(s).

3.0 PROCEDURE FOR DATA VALIDATION

3.1 Determine study-specific data quality needs and pertinent regulatory agency data validation requirements.

3.2 Contact the appropriate regulatory agency(ies) to obtain their data validation procedure manual. This manual will indicate acceptable ranges for QC parameters to be investigated and procedures to follow for data which do not meet these requirements.

3.3 For inorganic compounds, the requirements that will be examined during the validation process are:

a. Holding times.

b. Instrument calibration, including initial and continuing calibration verification.

c. Blank(s).

d. Laboratory control sample(s).

e. Inductively Coupled Plasma (ICP) interference check samples.

f. Duplicate sample(s).

g. Matrix spike sample(s).

h. Furnace atomic absorption QC.

i. ICP serial dilution(s).

j. Sample result verifications.

k. Field duplicates.

l. General data assessment.

3.4 For organic compounds, the requirements that will be examined during the validation process are:

a. Holding times.

b. Gas Chromatograph/Mass Spectrometer (GC/MS) tuning.

c. GC calibration, initial and continuing.

d. Blanks.

e. Surrogate recoveries.

f. Matrix spike/matrix spike duplicates.

g. Internal standards performances.

h. Target Compounds List (TCL) compound identifications.

i. Reported detection limits.

j. Tentatively identified compounds (TICs).

k. Overall system performance.

l. General data assessment.

3.5 The parameters which do not conform to requirements are then listed and the data are qualified according to the guidelines provided in the appropriate regulatory agency's data validation procedure manual. The qualified data package is then reviewed and the project data reviewer, the project geochemist and/or the project manager makes a professional judgement concerning the validity of the data package, and its usability for the project.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish guidelines for conducting soil gas surveys utilizing a portable photoionization detector (PID).

2.0 CONSIDERATIONS

The specific procedure and equipment selection will be dependent upon the data objectives of the sampling program. For example, the sampling program may range from a preliminary screening utilizing several random locations to an extensive grid system with numerous horizontal and vertical sampling locations. The soil gas survey plan should be carefully designed and fully described in the work plan or proposal.

A soil gas survey is a method to approximate the distribution of volatile organic compounds (VOCs) in soil or ground water based on the concentration of VOCs in the pore space of the vadose zone. The advantage of a soil gas survey is that a broad site assessment can be conducted at a reduced cost with instantaneous qualitative analytical results. The survey can aid in the decision-making process for future soil sampling and well locations in order to optimize the data collected from these locations. Soil gas surveys can also be performed areas such as buildings and basements where access restrictions limit the use of conventional equipment.

Proper design of a soil gas survey requires an understanding of site features, equipment limitations, and hydrogeologic factors. Many site-specific factors, such as geology, depth to water, soil moisture, contaminant concentration and distribution, weather, natural and man-made migration pathways, organic content of soil, contaminant volatility and solubility, etc. will influence the results of a soil gas survey. Additionally, contaminant ionization potentials and response factors should be considered. It is beyond the scope of this SOP to discuss the specific potential impact of each of these factors. Collection and interpretation of soil gas data requires a thorough understanding of the relationships between these factors. As a result, only experienced personnel should design, conduct, and interpret soil gas surveys.

3.0 MATERIALS/EQUIPMENT

a. A work plan or proposal which outlines soil gas survey requirements.

b. Field book, field form(s) and maps.

c. Decontamination supplies (including non-phosphate, laboratory grade detergent, buckets, brushes, distilled water, potable water, regulatory-required reagents, aluminum foil, plastic sheeting, etc.).

d. Survey stakes or flags.

e. Device to remove surface material (shovel, jack hammer, concrete core drill, electric drill, etc.).

f. Magnetometer.

g. Cable locator.

h. Hand auger.

i. Slam bar.

j. Soil gas probes.

k. Hand sledge hammer.

l. Tool box.

m. Inert tubing of appropriate diameter with screw clamps.

n. Low volume, calibrated vacuum pump.

o. Extension cords.

p. Inorganic clay (modeling).

q. Photoionization meter and charging unit (two units, if possible).

r. Calibration gases and regulators.

s. 100-foot cloth tape measure.

t. 10-foot steel tape measure.

u. Disposable sampling gloves.

v. Backfill and repair materials (clean sand, asphalt patch, concrete patch material, etc.).

w. Broom.

4.0 CALIBRATION

The photoionization meter must be calibrated according to the manufacturer's specifications at a minimum frequency of once per day prior to collecting photoionization readings. In addition, periodic checks with the standard gas (e.g., every 2 hours or every ten samples) will be conducted to confirm that the calibration has not drifted. The time, date and calibration procedure must be clearly documented in the field book. If at any time the photoionization results appear erratic or inconsistent with field observations, then the unit must be recalibrated. If calibration is difficult to achieve, then the unit's lamp should be checked for dirt or moisture and cleaned, as necessary. During humid or wet conditions, the unit should be calibrated on a more frequent basis as determined by field personnel.

5.0 DECONTAMINATION

All reusable downhole equipment must be thoroughly cleaned according to regulatory-approved procedures. The soil gas probes should be pre-cleaned, wrapped in aluminum foil, and dedicated to an individual sampling location. Equipment such as drill bits, hand augers, slam bars, etc. must be thoroughly decontaminated between sampling locations to prevent cross-contamination. Procedures for cleaning field equipment can be found in the decontamination SOP. Equipment rinsate blanks should be collected to document proper decontamination.

6.0 PROCEDURE

6.1. Utilizing the work plan or proposal, locate soil gas sampling points and mark with a survey flag or nail. Do not use spray paint or solvent-based markers. Verify that the selected locations will achieve the desired data requirements based on the original survey design in the work plan.

6.2. Ensure the absence of subsurface utilities using, as necessary, a utility mark-out service, magnetometer, cable locator, and site reconnaissance.

6.3. Once all soil gas locations have been established, use a calibrated photoionization meter to determine ambient air concentrations (background). If facility operations will impact background readings, then arrangements should be made to conduct the soil gas survey during non-operational times.

6.4. Secure access to the subsurface using shovel, jack hammer, concrete core drill, gas drill, electric drill, etc. Clean surface debris from around the sampling location and utilize plastic sheeting to prevent cross-contamination of equipment.

6.5. Depending upon subsurface materials utilize a hand auger, slam bar, electric drill, etc. to advance the small diameter boring to a depth of 0.5 to 1.0 foot less than the desired sampling depth. Do not use a gasoline-powered drill for advancing the boring.

6.6. Log all geologic materials (if possible) paying special attention to any horizontal stratification or materials which may have preferential permeability.

6.7. Insert a pre-cleaned, stainless steel vapor probe (with perforated end first) into the borehole and drive it 0.5 to 1.0 feet into undisturbed sediments to the desired sampling interval. Refer to the field equipment decontamination SOP for minimum decontamination procedures for all downhole equipment. Pull back on the protective sheath (if present) exposing the perforated portion of the vapor probe.

6.8. Seal the annular space at the surface with inorganic clay (modeling clay) to prevent migration of vapors or surface material from entering the borehole.

6.9. Connect a section of dedicated and disposable teflon tubing to the soil gas probe and clamp off the tubing to establish an air-tight seal. Commercially available manifolds are permitted if properly decontaminated and constructed of stainless steel and/or teflon.

6.10. Connect a vacuum pump to the teflon tubing, release the clamp, and purge the probe to create inflow of potential vapors. Do not allow water to pass through the probe and enter the PID. Reclamp the tubing. The purge volume and rate should be clearly defined in the work plan. The selected rate and volume must remain consistent for all locations for a given survey.

6.11. Connect the calibrated photoionization meter to the teflon tubing creating an air-tight seal, release the clamp, and take a reading. The peak and average readings must be recorded.

6.12. If necessary, reclamp the tubing and secure the location for collection of a duplicate reading at a later time.

6.13. When activities are completed at the location, remove the soil gas probe and thoroughly decontaminate according to regulatory-approved protocols. Backfill the hole using native material or clean fill and restore the surface with appropriate patching material (asphalt, concrete, soil, etc.). Clean the area with a broom and dispose of all non-reusable materials in an appropriate manner.

6.14. Completely document all appropriate information in the field notebook including, but not limited to the following: sample location; sample identification; method of advancing boring; geologic material encountered; documentation of calibration; evacuation procedures including time and volume; photoionization readings including peak, average and time collected; duplicate readings, if any; and any difficulties encountered. A site map should be prepared with exact measurements to sampling points in case future investigation is necessary.

END OF PROCEDURE

Date: January 9, 2011

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for the sampling and screening of soil vapor monitoring points.

As part of the SOP for the sampling of soil vapor monitoring points, sample collection equipment and devices must be considered, and pre and post-sampling procedures (e.g., purging sample tubing prior to sample collection and screening monitoring point after collection) must be implemented.

All soil vapor sampling will be performed in general accordance with the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor in the State of New York dated October 2006.

2.0 EQUIPMENT AND MATERIALS

2.1 In order to sample the soil vapor monitoring points, specific equipment and materials are required. The equipment and materials list may include, but not necessarily be limited to, the following:

a. Safety first. Obtain the appropriate work permit, Job Safety Analysis (JSA) and personal protection equipment (PPE), as specified in the site Health and Safety Plan (HASP).

b. Three-way valve.

c. Teflon-lined polyethylene tubing.

d. Master-flex tubing.

e. Tracer gas (i.e., lab grade Helium).

g. Five gallon plastic bucket.

h. Vacuum pump with a constant low flow module calibrated to a maximum rate of 0.2 Liters per minute.

i. Flow meter capable of achieving a flow rate of 0.2 Liters per minute or less.

j. Watch/Timer.

k. Appropriate monitoring instruments (e.g., MultiRae, CO_2 and O_2 meters, or equivalent) to measure natural attenuation parameters including volatile organic compounds (VOCs), lower explosive limit (LEL), oxygen, hydrogen sulfide, carbon monoxide and carbon dioxide. LEL will be measured as a percentage of the lower explosion limit for methane (where 100% LEL equals 50,000 ppm of methane), and the remaining parameters will be measured as percent volume using multi-gas meters calibrated daily with appropriate multi-gas standards.

l. Calibration gases (isobutylene) and zeroing devices (i.e., air scrubbers)

m. Roux Associates' soil vapor sampling data form and field notebook.

n. Plastic sheeting.

o. Teflon™ tape.

p. Black pen and water-proof marker.

q. Tools (e.g., security bolt key, wrenches, screwdrivers, hammer, tubing cutter, etc.) or alternatives recommended in the JSA.

r. Nitrile and cut-proof gloves.

s. Laboratory-supplied Summa® canister(s) and flow regulator(s).

t. Chain-of-custody form(s) and custody seal(s).

u. Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) or equivalent summary.

v. Site health and safety plan (HASP).

w. Overnight (express) mail forms, if courier isn’t used.

3.0 DECONTAMINATION

3.1 Make sure all equipment is decontaminated and cleaned before use (refer to the SOP for Decontamination of Field Equipment for detailed decontamination methods; a summary for pumps is provided below). Use new, clean materials when decontamination is not appropriate (e.g., disposable gloves, sample tubing). Document, initial and date the decontamination procedures on the appropriate field form and in the field notebook.

a. Decontaminate a vacuum pump by: disassembling the vacuum pump and cleaning the internal parts with methanol. *Vacuum pumps should not be cleaned in the field*. Vacuum pumps should be decontaminated/cleaned by the facility that supplied/sold the equipment prior to the sampling event.

4.0 CALIBRATION OF FIELD ANALYSIS EQUIPMENT

Calibrate field analysis equipment according to manufacturer's manual before use (e.g., Photoionization Detector). Document, initial and date the calibration procedures on the appropriate field form, and in the field notebook.

5.0 PROCEDURE FOR SAMPLING/SCREENING/ SOIL VAPOR MONITORING POINTS

5.1 Soil Vapor Sample Collection Procedures - Soil vapor sampling should be performed in a manner consistent with prior investigations utilizing the following procedural steps:

5.1.1 Document, initial and date monitoring point identification, pre-sampling information, and problems encountered on the appropriate field form and in the field notebook, as needed.

5.1.2 Inspect the protective curb box and the monitoring point sample tubing, and note any items of concern such as missing tubing cap, or bent or damaged tubing and protective curb box.

5.1.3 Place a seal (i.e., model clay) surrounding the sample tubing to further minimize the potential for infiltration of the atmospheric air present at land surface directly above the soil vapor monitoring point (ambient air).

5.1.4 Connect the sample tubing to a "T" connector three-way assembly, with one end of the "T" connector leading to a vacuum pump and the other end leading to a pre-evacuated Summa canister with a calibrated regulator.

5.1.5 Purge the soil vapor sample tubing and the surrounding sand pack of approximately three volumes of air using a vacuum pump set at a rate of approximately but not greater than 0.2 liters per minute.

5.1.6 To verify that ambient air is not diluting the soil vapor sample during collection, test monitoring points using a tracer gas (helium), prior to sample collection. Place a plastic container (i.e., bucket) with a seal over the monitoring point, including the "T" connector and inject helium into the bucket to enrich the interior of the bucket with the tracer gas (this should be done while purging the monitoring point). Measure the rate of helium from the sample tubing as well as the helium-enriched area within the bucket using the MGD-2002 Helium Detector (by Dielectric) or equivalent meter. If the screening results show that the rate of helium detected in the sample tubing is greater than 10% of that found in the bucket, reset the seals around the sampling equipment and the sample tubing and purge again. This process of resetting and purging should be continued until the tracer gas is no longer detected at levels greater than 10% of the enriched area.

5.1.7 Following the purging and tracer gas verification steps, close the valve leading to the pump, and turn off the pump. Redirect the soil vapor to a 6-liter Summa canister for sample collection. Use a laboratory supplied calibrated flow controller (2 hour flow controllers for sub-slab soil vapor samples and 8 hour controllers for indoor air and ambient air samples) to restrict the sample collection rate to 0.2 liters per minute or less. The flow controller valve should be closed and sample collection completed when the vacuum reading of the Summa canister reaches -4 inches of mercury (shown on the flow controller gauge). If the Summa canister vacuum reaches less than 1 inch of mercury, contact the project manager to determine if sample should be analyzed.

5.1.8 Once the sample is collected, the soil vapor monitoring point should be screened, if warranted, with redundant gas meters for the lower explosive limit (LEL), hydrogen sulfide, VOCs, oxygen, carbon monoxide and carbon dioxide. The screening process includes double-checking the screening data through the utilization of separate, redundant gas meters. If there is a discrepancy between the redundant gas meters and the screening parameter mentioned above, the meter should be recalibrated according to manufacturer's manual and the soil vapor point should be rescreened. All screening data should be recorded on the appropriate field screening data form and in the field notebook.

5.1.9 Collect quality control (QC) samples as required in the work plan to monitor sampling and laboratory performance. One duplicate sample should be collected for every 20 samples. The duplicate sample should be collected immediately after collecting original sample, before screening with redundant gas meters.

5.1.10 Upon completion of sample collection and screening steps, cap the sample tubing below grade within the flush-mount curb box enclosure to allow for subsequent sampling events.

5.1.11 Complete all necessary field forms, field notebook entries, and the chain-of-custody form(s). Chain-of-custody form(s) must be signed and dated prior to shipping samples. Retain one copy of each chain-of-custody form. Secure the cooler with sufficient packing tape and a custody seal.

5.1.12 Samples collected from Monday through Friday will be delivered within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Consult the work plan to determine if any of the analytes require a shorter delivery time.

6.0 REFERENCES

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

END OF PROCUDURE

Date: October 23, 2015

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide procedures and standards for photographic documentation of project activities conducted by Roux Associates, Inc. (Roux Associates). Field staff are encouraged to use photographic documentation to display site features or ongoing field work. The exact number of still or video images is left to the professional discretion of field staff in consultation with the Project Manager. This instruction addresses how the photographic images will be incorporated into the project file documentation.

All photography collected for project use should be in a digital format and only document the field activities and / or site features associated with the specific project. Digital cameras have become the primary means of gathering evidence and this medium has many advantages. These advantages include enhanced image resolution, the capability to immediately view the image after it is collected, and the ability to collect still images using a single piece of equipment. The digital camera reduces printing time and cost because the digital images do not need to be taken to a photo lab for developing; rather, the digital images can be viewed on the computer and printed as needed.

2.1 MATERIALS

In order to provide photo documentation of field activities and site features, specific materials are required. These materials include the following:

a. A bound, waterproof field notebook.

b. Digital camera or camera phone.

c. A standard reference marker (a ruler or other object with a known length).

d. Approved work plan/scope of work.

e. Health and safety plan (HASP).

f. Appropriate Roux Associates' SOPs.

g. Black pens, and indelible markers.

3.1 OPERATION

3.2 General Photographic Activities in the Field: The following sections provide general guidelines that should be followed to visually document field activities and site features using digital cameras or cell phone cameras. Listed below are general suggestions that the photographer should consider when performing activities under this SOP:

a. The photographer should be prepared to take a variety of shots, from close-up to wide-angle. Many shots will be repetitive in nature or format, especially close-up site feature photographs.

b. The lighting for sample and feature photography should be oriented toward a flat condition with little or no shadow. A flash may be used to adjust low lighting settings or to prevent shadows.

c. Digital cameras have multiple photographic quality settings. A camera that obtains a higher resolution (quality) has a higher number of pixels and will store less photographs per digital storage medium. When possible, the camera should be set to the highest resolution.

d. The photograph should include a standard reference marker if scale is difficult to determine in the photograph.

e. If photographs are being collected in unfamiliar locations or of unknown objects, Roux Associates personnel are encouraged to record the photographic activities in their assigned field notebook. The following information would provide the user reference for post-processing of the photo:

- Photographer name
- Date and time the photograph was taken (military time)
- Description of the location where the photo was taken
- A brief description of the activity/ item photographed, and other pertinent information about the photograph.

Pens with permanent ink will be used to record all data. Data or other information that has been entered incorrectly will be corrected by drawing a line through the incorrect entry and initialing and dating the lined through entry. Under no circumstances should the incorrect material be erased, made illegible or obscured so that it cannot be read.

4.1 POST-OPERATION (ARCHIVING PHOTO)

4.2 At the end of each day's photographic session, the field personnel should ensure that the field logbook is complete. At the conclusion of the field day, the field personnel should follow these procedures to ensure the proper achival of the digital photographs:

a. Upload the photos to the network drive in a folder that includes the corresponding date of the photographs, located in the proper project folder.

b. If a large amount a photographs are planned to be collected for the project, a log may be usedful in for storing pertinent information about the photos and may facilitate searching the photo database. Information that may be included in the photo log includes photograph date and time, location, photographer, and any other corresponding notes.

c. Once the above steps are completed, double check to save your edits before deleting the photos off the the camera to ensure storage space for future photo documentation.

END OF PROCEDURE

Date: January 9, 2011
Revision: May 5, 2015

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for decontamination of all field equipment potentially exposed to contamination during field investigation activities (i.e. drilling, soil and water sampling).

The objective of decontamination is to ensure that all field samplingequipment is decontaminated (free of potential contaminants): 1) prior to being brought onsite to avoid the introduction of potential contaminants to the site; 2) between drilling and sampling events/activities onsite to eliminate the potential for cross-contamination between boreholes and/or wells; and 3) prior to the removal of equipment from the site to prevent the transportation of potentially contaminated equipment offsite.

The decontamination line is setup so that the first station is used to clean the most contaminated item. It progresses to the last station where the least contaminated item is cleaned. A site is typically divided up into the following boundaries: Hot Zone or Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), and the Support or Safe Zone (SZ). The decontamination line should be setup in the Contamination Reduction Corridor (CRC).

In considering decontamination procedures, state and federal regulatory agency requirements must be considered because of potential variability between state and federal requirements. Decontamination procedures must be in compliance with state and/or federal protocols in order that regulatory agency(ies) scrutiny of the procedures and data collected do not result in non acceptance (invalidation) of the work undertaken and data collected.

The equipment and materials list for decontamination activities may include, but not necessarily be limited to, the following:

a. A work plan and health and safety plan which outlines decontamination procedures and requirements.

b. Field notebook and field form(s).

c. Decontamination solutions, including as necessary: non-phosphate, laboratory-grade detergent; distilled/deionized water; potable water; cleaning solvents if needed [e.g., hexane, acetone, nitric acid).

d. Long and short handled brushes,

e. Bottle brushes

f. Drop cloth/plastic sheeting

g. Paper towels

h. Plastic or galvanized tubs or buckets

i. Pressure washers or steam cleaners

j. Solvent sprayers

k. Trash / bilge pumps

l. Aluminum foil

m. 55-gallon drums.

2.0 PROCEDURE FOR DRILLING EQUIPMENT

The following is a minimum decontamination procedure for drilling equipment. Drilling equipment decontamination procedures will be documented on an appropriate field form or in the field notebook, especially any variation from the method itemized below:

2.1 Safety first. Obtain the appropriate Job Safety Analysis (JSA) and personal protection equipment (PPE), as specified in the site Health and Safety Plan (HASP). Prior to mobilization to a site, the expected types of contamination should be evaluated to determine if the field cleaning and decontamination activities will generate rinsates and other waste waters that might be considered RCRA hazardous waste or may require special handling.

2.2 The drill rig and all associated equipment should be properly decontaminated by the contractor before arriving at the site.

2.3 The augers, drilling casings, rods, samplers, tools, and any piece of equipment that can come in contact (directly or indirectly) with the soil, requires proper decontamination on-site prior to commencing drilling. The project work plan or HASP, and appropriate regulatory requirements, should be consulted to determine site-specific decontamination requirements.

2.4 The same decontamination procedures used prior to drilling will be followed between boreholes (at a fixed on-site location[s], if appropriate) and before leaving the site at the end of the investigation.

2.5 All on-site steam cleaning or (decontamination) activities will be monitored and documented by a member(s) of the staff of Roux Associates, Inc. and should be performed on a decontamination pad that meets the following specifications:

1. The pad should be constructed in an area known or believed to be free of surface contamination.

2. A temporary pad should be lined with a water impermeable material with no seams within the pad. This material should be either easily replaced disposable) or repairable.The pad should be regularly inspected to ensure there are no leaks.

3. Water should be removed from the decontamination pad frequently.

2.6 If drilling activities are conducted in the presence of thick, sticky oils (e.g., PCB oil) which coat drilling equipment, then special decontamination procedures may have to be utilized before steam cleaning (e.g., hexane scrub and wash).

2.7 Containment of decontamination fluids may be necessary (e.g., rinseate from steam cleaning) or will be required (e.g., hexane), and disposal must be in accordance with state and/or federalregulatory requirements.

3.0 PROCEDURE FOR SOIL-SAMPLING EQUIPMENT

The following is a minimum decontamination procedure for soil-sampling equipment (e.g., split spoons, stainless-steel spatulas). Soil-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

3.1 Safety first. Obtain JSA and PPE, as specified in the site HASP.

3.2 Wear disposable gloves while cleaning equipment to avoid cross-contamination and change gloves as needed.

3.3 Steam clean the sampler or rinse with potable water. If soil-sampling activities are conducted in the presence of thick, sticky oils (e.g., PCB oil) which coat sampling equipment, then special decontamination procedures may have to be utilized before steam cleaning and washing in detergent solution (e.g., hexane scrub and wash).

3.4 Prepare a non-phosphate, laboratory-grade detergent solution and distilled or potable water in a clean bucket.

3.5 Disassemble the sampler, as necessary and immerse all parts and other sampling equipment in the solution.

3.6 Scrub all equipment in the bucket with a brush to remove any adhering particles.

3.7 Rinse all equipment with copious amounts of potable water followed by distilled or deionized water.

3.8 Place clean equipment on a clean plastic sheet (e.g., polyethylene)

3.9 Reassemble the cleaned sampler, as necessary.

3.10 After equipment has been cleaned, all individuals involved in equipment handling should don clean gloves, or wrap the equipment with a suitable material (e.g., plastic bag, aluminum foil).

As part of the decontamination procedure for soil-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

4.0 PROCEDURE FOR WATER-SAMPLING EQUIPMENT

The following is a decontamination procedure for water-sampling equipment (e.g., bailers, pumps). Water-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

4.1 Safety first. Obtain the JSAs and PPE, as specified in the site HASP.

4.2 Decontamination procedures for bailers follow:

a. Wear disposable gloves while cleaning bailer to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a bucket.

c. Disassemble sampling equipment. Discard all used sampling tubes and cords in an appropriate manner. Disconnect all power sources from electrical equipment (i.e. pumps). Scrub each piece of equipment with a brush and solution.

d. Rinse all sampling equipment with copious amounts of potable, distilled or deionized water, Reassemble equipment as per the manufacturer's instructions.

f. Air dry.

g. Wrap equipment with a suitable material (e.g., clean plastic bag, aluminum foil).

4.3 Decontamination procedures for pumps follow:

a. Wear disposable gloves while cleaning pump to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a clean bucket, clean garbage can, or clean 55-gallon drum.

c. Flush the pump and discharge hose (if not disposable) with the detergent solution, and discard disposable tubing and/or cord in an appropriate manner.

d. Flush the pump and discharge hose (if not disposable) with potable water.

e. Place the pump on clear plastic sheeting.

f. Wipe any pump-related equipment (e.g., electrical lines, cables, discharge hose) that entered the well with a clean cloth and detergent solution, and rinse or wipe with a clean cloth and potable water.

g. Air dry.

h. Wrap equipment with a suitable material (e.g., clean plastic bag).

As part of the decontamination procedure for water-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

END OF PROCEDURE

ATTACHMENT 3

Chain of Custody Form

SOIL COC

NEW YORK CHAIN OF CUSTODY

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of

Date Rec'd in Lab

ALPHA Job #

Project Information

Project Name:
Project Location:
Project #
(Use Project name as Project #) ☑
Project Manager:
ALPHAQuote #:

Turn-Around Time

Standard ☑ Due Date:
Rush (only if pre approved) ☐ # of Days:

Client Information

Client: Roux Assocaites
Address: 209 Shafter Street
Islandia New York 11749
Phone: 631-232-2600
Fax:
Email:

Deliverables

☐ ASP-A ☑ ASP-B
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other

Regulatory Requirement

☐ NY TOGS ☐ NY Part 375
☐ AWQ Standards ☐ NY CP-51
☐ NY Restricted Use ☐ Other
☐ NY Unrestricted Use
☐ NYC Sewer Discharge

Billing Information

☑ Same as Client Info
PO #

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:
☐ NJ ☐ NY
☐ Other:

Other project specific requirements/comments:

All samples kept on ice

Please specify Metals or TAL.

ANALYSIS

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Full TCL VOCs + 10 TICs	Full TCL SVOCs + 20 TICs	TAL Pest / Herbicides	TAL PCBs	TAL Total Metals + Hg	Hex Chrom / Tri Chrom	Total Cyanide	Total Solids	Sample Specific Comments	Total Bottles
					Container Type	E	G	G	G	G	G	G	P		
					Preservative	A	A	A	A	A	A	A	A		

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS.

Form No: 01-25 (rev. 30-Sept-2013)

GROUNDWATER COC

ALPHA ANALYTICAL World Class Chemistry

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

NEW YORK CHAIN OF CUSTODY

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Date Rec'd in Lab

ALPHA Job #

Client Information

Client: Roux Assocaites
Address: 209 Shafter Street
Islandia New York 11749
Phone: 631-232-2600
Fax:
Email:

Project Information

Project Name:
Project Location:
Project #
(Use Project name as Project #) ☑
Project Manager:
ALPHAQuote #:

Turn-Around Time

Standard ☑ Due Date:
Rush (only if pre approved) ☐ # of Days:

Deliverables

☐ ASP-A ☑ ASP-B
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other

Billing Information

☑ Same as Client Info
PO #

Regulatory Requirement

☐ NY TOGS ☐ NY Part 375
☐ AWQ Standards ☐ NY CP-51
☐ NY Restricted Use ☐ Other
☐ NY Unrestricted Use
☐ NYC Sewer Discharge

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:
☐ NJ ☐ NY
☐ Other:

☐

Other project specific requirements/comments:
All samples kept on ice

Please specify Metals or TAL.

ANALYSIS

Sample Filtration
☐ **Done**
☑ **Lab to do**
Preservation
☐ **Lab to do**
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Full TCL VOCs + 10 TICs	Full TCL SVOCs + 20 TICs	TAL Pest	TAL PCBs / Herbicides	TAL Total Metals + Hg	TAL Dissolved Metals + Hg	Hex Chrom / Tri Chrom	Total Cyanide	Sample Specific Comments	Total Bottles
				Container Type		V	A	A	A	P	P	P	P		
				Preservative		B	A	A	A	C	A	A	E		

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Relinquished By:	Date/Time	Received By:	Date/Time

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS.

AIR ANALYSIS

PAGE OF

CHAIN OF CUSTODY

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab:

ALPHA Job #:

Project Information

ALPHA Quote #:

Client Information

Client: Roux Associates

Address: 209 Shafter Street

Islandia, New York 11749

Phone: 631-631-232-2600

Turn-Around-Time

☒ Standard ☐ Rush (only confirmed if pre-approved)

Date Due: Time:

Report/Data Deliverables Information

☐ FAX ☒ EMAIL

☒ ADEx ☒ Add'l Deliverables

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed	Program	Residential/Commercial

☐ These samples have been Previously analyzed by Alpha

Other Project Specific Requirements/Comments:

☐ Project-Specific Target Compound List

Analysis

All Columns Below Must Be Filled Out

Alpha Lab Use Only	Sample ID	Collection: End Date	Collection: Start Time	Collection: End Time	Collection: Initial Vac	Collection: Final Vac	Sample Matrix*	Sampler Initials	Can Size	ID Can	ID Flow Controller	TO-15							Sample Specific Comments (i.e. PID)
												☐	☐	☐	☐	☐	☐	☐	
												☐	☐	☐	☐	☐	☐	☐	
												☐	☐	☐	☐	☐	☐	☐	
												☐	☐	☐	☐	☐	☐	☐	
												☐	☐	☐	☐	☐	☐	☐	
												☐	☐	☐	☐	☐	☐	☐	
										Container Type		-	-	-	-	-	-	-	

****SAMPLE MATRIX CODES:***

AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Relinquished By	Date/Time	Received By:	Date/Time

Please print clearly & legibly and completely. Samples cannot be logged in and turn around time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.

Form 101-02 (I) Rev: 25-Sept-15

WASTE CHAR COC

NEW YORK CHAIN OF CUSTODY

ALPHA ANALYTICAL — World Class Chemistry

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

Service Centers
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Date Rec'd in Lab

ALPHA Job #

Client Information

Client: Roux Assocaites
Address: 209 Shafter Street
Islandia New York 11749
Phone: 631-232-2600
Fax:
Email:

Project Information

Project Name:
Project Location:
Project #
(Use Project name as Project #) ☑
Project Manager:
ALPHAQuote #:

Turn-Around Time

Standard ☑ Due Date:
Rush (only if pre approved) ☐ # of Days:

Deliverables

☑ ASP-A ☐ ASP-B
☐ EQuIS (1 File) ☐ EQuIS (4 File)
☐ Other

Billing Information

☑ Same as Client Info
PO #

Regulatory Requirement

☐ NY TOGS ☐ NY Part 375
☐ AWQ Standards ☐ NY CP-51
☐ NY Restricted Use ☐ Other
☐ NY Unrestricted Use
☐ NYC Sewer Discharge

Disposal Site Information

Please identify below location of applicable disposal facilities.

Disposal Facility:
☐ NJ ☐ NY
☐ Other:

☐

Other project specific requirements/comments:

Please specify Metals or TAL.

ANALYSIS

Sample Filtration
☐ Done
☐ Lab to do
Preservation
☐ Lab to do
(Please Specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Part 375 VOCs	Part 375 SVOCs/ PCBs	Part 375 Pest / Herbicides	Total EPH / Paint Filter	Part 375 Total Metals + Hg	Hex Chrom / Tri Chrom	Total Cyanide/Total Solids	**RCRA Char / Full TCLP	Sample Specific Comments	Total Bottles

Preservative Code:
A = None
B = HCl
C = HNO_3
D = H_2SO_4
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

Container Type								
Preservative								

Relinquished By:	Date/Time	Received By:	Date/Time

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Form No: 01-25 (rev. 30-Sept-2013)

APPENDIX I

Quality Assurance Project Plan

ROUX

Quality Assurance Project Plan

Site Name: Park Lane Senior
NYSDEC BCP Site No. C203138

Site Address: 1940 Turnbull Avenue
Bronx, New York
Tax Block 3672, Tax Lot 30

December 18, 2023

Prepared for:

PL Sara LLC
70 East 55th Street
Bronx, New York

Prepared by:

Roux Environmental Engineering and Geology, D.P.C.
209 Shafter Street
Islandia, New York 11749

3475.0001Y108/CV

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1. Introduction

This Quality Assurance Project Plan (QAPP) has been prepared on behalf of PL SARA LLC (Volunteer) to describe the measures that will be taken to ensure that the data generated during performance of the PL Senior project Remedial Investigation Work Plan (RIWP) at 1940 Turnbull Avenue (Section 2, Block 3672, Lot 30), in the borough of the Bronx, New York (Site) are of quality sufficient to meet project-specific data quality objectives (DQOs).

Due to the presence of contaminated media at the Site, the Volunteer has submitted a Brownfields Cleanup Program Application (BCP) and plans to enter into a Brownfield Cleanup Agreement (BCA) with NYSDEC, to investigate and remediate the 0.30-acre Site. Restricted Residential use as defined in 6 New York Codes, Rules, and Regulations (NYCRR) Part 375-6 Environmental Remediation Programs is proposed for the Site. Currently, the Site is occupied by a parking lot and is located in an area zoned as a residential with a commercial overlay (R8/ C2-4). When the proposed development is completed, the Site usage will contain affordable senior housing. The current development plan includes pile construction with a basement.

The QAPP was prepared in accordance with the guidance provided in NYSDEC Technical Guidance DER-10 (Technical Guidance for Site Investigation and Remediation), the Brownfield Cleanup Program Guide, the Sampling, Analysis, and Assessment of PFAS under NYSDEC's Part 375 Remedial Programs guidance document (NYSDEC January 2021 PFAS guidance document) and the United States Environmental Protection Agency's (USEPA's) Guidance for the Data Quality Objectives Process (EPA QA/G-4).

2. Background, Objectives and Scope

In order to achieve project objectives, Roux has developed a scope of work that includes sampling of soil, groundwater and soil vapor. A brief overview of each element of the RI Scope of Work is provided below. RI sampling locations are shown in Figure 1.

2.1 Soil

An estimated total of 29 soil samples will be collected and analyzed at a minimum of 10 locations for Full Target Compound List (TCL) volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) plus the 30 (10 VOCs and 20 SVOCs) highest concentration Tentatively Identified Compounds (TIC); Total Analyte List (TAL) metals; pesticides; herbicides; Polychlorinated biphenyls (PCBs); hexavalent chromium; trivalent chromium; total cyanide; total mercury, Per- and Polyfluoroalkyl Substances (PFAS) compounds and 1,4-Dioxane. PFAS will be analyzed by EPA Method 1633. If odor/ visual evidence of contamination or elevated photoionization detector (PID) readings are noted, additional samples will be collected from the interval that exhibits the highest contamination.

2.2 Groundwater

An estimated total of five groundwater samples will be collected from new monitoring wells installed by Roux during the RI. After gauging with an electronic interface probe, each well will be sampled for Full Target TCL VOCs and SVOCs plus the 30 (10 VOCs and 20 SVOCs) highest concentration TIC; TAL metals (total and dissolved); pesticides; herbicides; PCBs; hexavalent chromium; trivalent chromium; total cyanide; total mercury; 1,4-Dioxane; and PFAS compounds. PFAS will be analyzed by EPA Method 1633. Groundwater samples will be filtered by the laboratory for metals and SVOCs. Field parameters, including temperature, pH, conductivity, redox potential, dissolved oxygen, and turbidity will also be measured.

2.3 Soil Vapor Samples

An estimated total of seven soil vapor samples will be collected from new soil vapor points during the RI to evaluate soil vapor conditions at the Site. All soil vapor samples will be collected in accordance with the October 2006 New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH Guidance) and analyzed using USEPA Method TO-15 for VOCs.

3. Project Organization

A general and generic summary of the overall management structure and responsibilities of project team members are presented below. Professional profiles are presented in Appendix A.

Project Principal

Frank Cherena, P.G., of Roux will serve as Project Principal. The Project Principal is responsible for defining project objectives and bears ultimate responsibility for the successful completion of the investigation.

Project Manager

Kathryn Sommo of Roux will serve as Project Manager. The Project Manager is responsible for defining project objectives and ensures the successful completion of the work. This individual will provide overall management for the implementation of the scope of work, will coordinate all field activities. The Project Manager is also responsible for data review/interpretation and report preparation.

Field Team Leader

The Field Team Leader will be determined prior to the start of the Work. The Field Team Leader bears the responsibility for the successful execution of the field program and following the standard operating procedures for sample collection and field data reporting. The Field Team Leader will direct the activities of the technical staff in the field, as well as all subcontractors. The Field Team Leader will also assist in the interpretation of data and in report preparation. The Field Team Leader reports to the Project Manager.

Laboratory Project Manager

The Laboratory Project Manager will be Lidya Gulizia of York Analytical Laboratories, Inc. The Laboratory Project Manager is responsible for sample container preparation, sample custody in the laboratory, and completion of the required analysis through oversight of the laboratory staff. The Laboratory Project Manager will ensure that quality assurance procedures are followed and that an acceptable laboratory report is prepared and submitted. The Laboratory Project Manager reports to the Field Team Leader.

Quality Assurance Officer

Brandon Vella of Roux will serve as the Quality Assurance Officer (QAO) for this project. The QAO is responsible for conducting reviews, inspections, and audits to ensure that the data collection is conducted in accordance with the FSP and QAPP. The QAO's responsibilities range from ensuring effective field equipment decontamination procedures and proper sample collection to the review of all laboratory analytical data for completeness and usefulness. The QAO reports to the Project Manager and makes independent recommendations to the Field Team Leader.

Data Usability Report Preparer

The data usability report preparer will be Joshua Cope, a Roux-employed experienced environmental scientist, that is independent from the PL Senior project team. The data usability report preparer is from a separate office and will provide the data validation as a "blind" assessment. The Data Usability Report Preparer will review all RI data to determine if the data packages received meet the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10. The qualifications of the data usability report preparer, Joshua Cope, are provided in Appendix B.

4. Sampling Procedures

This section provides a detailed discussion of the field procedures to be used during sampling of the various media being evaluated as part of the RI (i.e., soil, groundwater and soil vapor). The locations are shown on Figure 1. Additional details regarding sampling procedures and protocols are described in the NYSDEC January 2021 PFAS guidance document, provided in Appendix C and Roux's relevant Standard Operating Procedures (SOPs), which are provided in Appendix F.

4.1 Soil Sampling and Monitoring Well Installation

Details for the collection of soil samples and the installation of monitoring wells are provided in the section below. Boreholes will be pre-cleared to five feet below land surface using non-intrusive methods prior to advancement of soil borings and monitoring well pilot-boreholes to verify the absence of utilities. Should a utility or other feature be observed during pre-clearance activities, the sampling location will be relocated to no greater than 10 feet away from the original proposed location. Should the sampling location need to be located at a distance greater than 10 feet from the original proposed location due to access constraints, Roux will contact the NYSDEC case manager to confirm the revised location.

4.1.1 Soil Sampling

Soil borings will be advanced using a Geoprobe direct push rig. As described in the prior sections, a total of 10 soil borings will be advanced during the RI. The soil boring proposed for collection during the RI are described below:

- Soil borings RXSB-1 will be advanced from land surface to a depth of 20 ft-bls. The samples are planned to be collected from the 5-7 foot, and 13-15 foot intervals. A sample from the 15-17 foot interval will be collected and held at the lab pending results from the 13-15 foot interval. The purpose of this boring is to vertically and horizontally delineate lead contamination identified in previously installed SB-1.
- Soil borings RXSB-8, RXSB-9, and RXSB-10 will be advanced from land surface to a depth of 20 ft-bls. The samples are planned to be collected from the 5-7 foot, 11-13 foot and 13-15 foot intervals. A sample from the 15-17 foot interval will be collected and held at the lab pending results from the 13-15 foot interval. The purpose of these borings is to vertically and horizontally delineate SVOC and lead contamination identified in previously installed SB-1.
- Soil borings RXSB-2 and RXSB-6 will be advanced from land surface to a depth of 20 ft-bls. The samples are planned to be collected from the 0-2 foot, 5-7 foot and 13-15 foot intervals. A sample from the 15-17 foot interval will be collected and held at the lab pending results from the 13-15 foot interval. The purpose of these borings is to vertically and horizontally delineate SVOC and lead contamination identified in previously installed SB-3.
- Soil borings RXSB-3 and RXSB-4 and RXSB-7 will be advanced throughout the remaining portions of the Site which have not yet been characterized. The samples are planned to be collected from the 0-2 foot, 5-7 foot and 13-15 foot intervals. A sample from the 15-17 foot interval will be collected and held at the lab pending results from the 13-15 foot interval.
- Soil boring RXSB-5 will be advanced within the sidewalk northeast of the Site boundary. The purpose of this boring is to identify if the SVOCs and metals previously identified in this area extend off-Site and upgradient of the Site. The samples are planned to be collected from the 0-2 foot, 5-7 foot and 13-15 foot intervals. A sample from the 15-17 foot interval will be collected and held at the lab pending results from the 13-15 foot interval.

For soil borings advanced with the Geoprobe, soil from each continuous five-foot interval will be observed for lithology and evidence of contamination (e.g., staining, odors, and/or visible free product) and placed immediately thereafter into large Ziploc® bags for recording headspace using a PID. After a minimum of 15 minutes for equilibration with the headspace in the Ziploc® bag, each sample will be screened for organic vapors using a PID equipped with a 10.6 eV lamp. Samples for possible VOC analysis will be placed in an encore sampler prior to screening, due to the potential for loss of VOCs through volatilization. These samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux's SOPs. Soil lithology will be recorded according to the Unified Soils Classification System (USCS). Geologic logs including lithology and PID measurements will be generated.

In accordance with the NYSDEC January 2021 PFAS guidance document, soil samples will be collected using either a stainless-steel hand auger or trowel and bowl, or acetate liners. Nitrile gloves will be worn while conducting field work and handling sample containers. Decontamination of stainless- steel equipment will be completed using Alconox and clean, PFAS-free water.

Following sample collection, boreholes will be backfilled with soil cuttings with an upper bentonite plug and capped to grade with asphalt or concrete. Soil cuttings from monitoring wells and potentially soils with visual contamination, if encountered, will be places in sealed and labeled DOT-approved 55-gallon drums pending characterization and off-site disposal at a permitted facility.

4.1.2 Monitoring Well Installation

Groundwater is anticipated to be encountered between 11 and 13 ft bls. Following soil sampling activities, monitoring wells will be installed at five boring locations (RXSB-1/MW-1, RXSB-7/MW-2, RXSB-8/ MW-3, RXSB-9/ MW-4 and RXSB-10/ MW-5), bridging the water table to a maximum depth of approximately 20 ft-bls. Monitoring wells will be constructed of 2-inch-inside-diameter, schedule 40 polyvinyl chloride (PVC) casing and, 0.020-inch slot, machined screen. Well screens will be 10 feet long and will be installed with three feet above and seven feet below the water table. A sand pack will be placed around the well screen, extending two feet above the top of the screened zone. Once the driller confirms the depth of the sand pack, a minimum two-foot-thick bentonite pellet seal will be placed above the sand pack. Once the pellets have been allowed to hydrate, a cement-bentonite grout will be installed in the remaining annular space from the bottom up, to just above the bentonite seal. The wells will be completed using locking well plugs, and flush mounted, bolt down, watertight, manhole covers cemented into place.

Each newly installed monitoring well will be developed to remove any fine-grained material in the vicinity of the well screen and to promote hydraulic connection with the aquifer. The wells will be developed using a submersible pump, which will be surged periodically until well yield is consistent and has a turbidity below 50 Nephelometric turbidity units (NTUs). Following development, monitoring wells will be allowed one-week (five business days) to equilibrate with the surrounding formation prior to sampling.

As described in the RIWP, all monitoring wells will be surveyed by a licensed New York State surveyor to obtain horizontal and vertical survey coordinates.

4.2 Groundwater Sampling

Following development of the monitoring wells, groundwater samples will be collected from the five newly installed monitoring wells. Prior to sampling, depth to water will be measured at each well using an electronic oil/water level meter with an accuracy of +/-0.01 feet. Field parameters will be collected using a water quality meter during purging and prior to sampling. All wells will then be purged and sampled using a submersible pump, or an alternative method, depending on the observed depth to groundwater and logistical issues.

Field parameters (i.e., pH, dissolved oxygen, ORP, etc. as described in the USEPA low-flow sampling requirements) will be collected using a water quality meter with flow-through cell until parameters stabilized before samples are collected. Following purging, a groundwater sample will be collected from the four newly installed monitoring wells, in addition to groundwater samples from the three previously installed wells on the Site, for a total of seven groundwater samples. Groundwater samples will be collected using the methods described in "Low Stress Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells" (USEPA, 2010). Additional details regarding sampling procedures and protocols are described in the NYSDEC January 2021 PFAS guidance document provided in Appendix C and in the Roux's SOPs provided in Appendix F.

In accordance with the NYSDEC January 2021 PFAS guidance document, groundwater samples will be collected using one of the following materials: High-density polyethylene (HDPE), silicone, and/or polypropylene. Dedicated sampling equipment will be used during sample collection. Nitrile gloves will be worn while conducting field work and handling sample containers. Decontamination of the water quality meter will be completed using Alconox and clean, PFAS-free water.

All groundwater samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux's SOPs.

4.3 Soil Vapor Sampling

Seven newly installed soil vapor points will be sampled during the RI to evaluate vapor conditions at the Site. Details for the installation soil vapor points and collection of vapor samples are provided below. The locations of the samples are shown on Figure 1.

Seven soil-vapor point locations will be pre-cleared to five feet below land surface using non-intrusive methods to verify the absence of utilities. Should a utility or other feature be observed during pre-clearance activities, the sampling location will be relocated to no greater than 10 feet away from the original proposed location. Should the sampling location need to be located at a distance greater than 10 feet from the original proposed location due to access constraints, Roux will contact the NYSDEC case manager to confirm. A six-inch long, stainless steel, sample screen attached to Teflon-lined polyethylene sample tubing will be installed approximately 1 foot above the water table, #2 Morie sand will be added to 6-inches above the top of the screen. A one-foot-thick layer of bentonite will also be added to the top of the sand and the remainder of the boring annulus was filled with a cement/bentonite grout. A secure, five-inch diameter, flush-mounted curb box will then set in concrete and be finished to grade.

Prior to sample collection, the Teflon®-lined tubing will be purged of approximately two volumes of the tubing using a vacuum pump set at a rate of 0.2 liters per minute. A tracer gas (i.e., helium) will be used to enrich the atmosphere in the immediate vicinity of the sampling location in order to test the borehole seal and verify that ambient air is not being drawn into the sample in accordance with the procedures outlined in the NYSDOH Guidance. Following purging and verification with the tracer gas, the tubing will be connected to the laboratory supplied six-liter SUMMA canister. All soil vapor samples will be collected using pre-cleaned 6-liter summa canisters with regulators calibrated to collect samples over a 2-hour period and analyzed using USEPA Method TO-15 for VOCs. Additional details for the collection of soil vapor samples are included in the Roux's SOPs.

5. Quality Assurance/Quality Control

The primary intended use for the RI data is to characterize Site conditions and determine if remediation needs to be undertaken at the Site. The primary DQO of the soil, groundwater and soil vapor sampling programs, therefore, is that data be accurate and precise, and hence representative of the actual Site conditions. Accuracy refers to the ability of the laboratory to obtain a true value (i.e., compared to a standard) and is assessed through the use of laboratory quality control (QC) samples, including laboratory control samples and matrix spike samples, as well as through the use of surrogates, which are compounds not typically found in the environment that are injected into the samples prior to analysis. Precision refers to the ability to replicate a value and is assessed through both field and laboratory duplicate samples.

Sensitivity is also a critical issue in generating representative data. Laboratory equipment must be of sufficient sensitivity to detect target compounds and analytes at levels below NYSDEC standards and guidelines whenever possible. Equipment sensitivity can be decreased by field or laboratory contamination of samples, and by sample matrix effects. Assessment of instrument sensitivity is performed through the analysis of reagent blanks, near-detection-limit standards, and response factors. Potential field and/or laboratory contamination is assessed through use of trip blanks, method blanks, and equipment rinse blanks (also called “field blanks”).

Table 1 lists the field and laboratory QC samples that will be analyzed to assess data accuracy and precision, as well as to determine if equipment sensitivity has been compromised. Table 2 lists the RI field and quality control sampling summary. Table 3 lists the preservation, holding times and sample container information. Appendix D provides the reporting limits and minimum detection limits achievable by the laboratory. QA/QC protocols will also be followed as described in the NYSDEC January 2021 PFAS guidance document provided in Appendix C.

All RI “assessment” analyses (i.e., TCL VOCs, SVOCs, pesticides/herbicides/PCBs, TAL metals [including hexavalent and trivalent chromium, and cyanide], 1,4-Dioxane, PFAS) and TO-15 will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP), using USEPA SW-846 methods. York Analytical Laboratories, Inc shall maintain a NYSDOH Environmental Laboratory Approval Program (ELAP) Contract Laboratory Protocol (CLP) certification for each of the “assessment” analyses listed in Section 2.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC’s website (http://www.dec.ny.gov/chemical/62440.html). A Data Usability Report (DUSR) will be prepared meeting the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10 for all data packages generated for the RI.

A Quality Assurance Glossary is presented in Appendix E.

6. Decontamination Procedures

In an attempt to avoid the spread of contamination, all drilling and sampling equipment must be decontaminated at a reasonable frequency in a properly designed and located decontamination area. Detailed procedures for the decontamination of field and sampling equipment are included in NYSDEC January 2021 PFAS guidance document (Appendix C) and Roux's SOPs for the Decontamination of Field Equipment (Appendix F). The location of the decontamination area will be determined prior to the start of field operations. The decontamination area will be constructed to ensure that all wash water generated during decontamination can be collected and containerized for proper disposal.

TABLES

1. Field and Laboratory QC Summary
2. Field and Quality Control Sampling Summary
3. Preservation, Holding Times and Sample Containers

Table 1. Field and Laboratory QC Summary

QC Check Type	Minimum Frequency	Use
Field QC		
Duplicate	per matrix per 20 samples or SDG	Precision
Trip Blank	1 per VOC cooler	Sensitivity
Field Blank	1 per matrix per 20 samples	Sensitivity
Laboratory QC		
Laboratory Control Sample	1 per matrix per SDG	Accuracy
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicat	1 per matrix per SDG	Accuracy/Precision
Surrogate Spike	All organics samples	Accuracy
Laboratory Duplicate	1 per matrix per SDG	Precision
Method Blank	1 per matrix per SDG	Sensitivity

Notes:

* SDG - Sample Delivery Group - Assumes a single extraction or preparation

** Provided to lab by field sampling personnel

Table 2. Remedial Investigation Field and Quality Control Sampling Summary

Sample Medium	Target Analytes	Field Samples	Replicates[1]	Trip Blanks[2]	Field Blanks[1]	Matrix Spikes[1]	Spike Duplicates[1]	Total No. of Samples
Soil	Full TCL VOCs +10	29	2	3	2	2	2	40
	Full TCL SVOCs +20	29	2	NA	2	2	2	37
	TCL Pesticides	29	2	NA	2	2	2	37
	TCL Herbicides	29	2	NA	2	2	2	37
	TCL PCBs	29	2	NA	2	2	2	37
	TAL Metals	29	2	NA	2	2	2	37
	Hexavalent Chromium	29	2	NA	2	2	2	37
	Trivalent Chromium	29	2	NA	2	2	2	37
	Total Cyanide	29	2	NA	2	2	2	37
	Total Mercury	29	2	NA	2	2	2	37
	1,4-Dioxane	29	2	NA	2	2	2	37
	PFAS	29	2	NA	2	2	2	37
Groundwater	Full TCL VOCs +10	5	1	1	1	1	1	10
	Full TCL SVOCs +20	5	1	NA	1	1	1	9
	TCL Pesticides	5	1	NA	1	1	1	9
	TCL Herbicides	5	1	NA	1	1	1	9
	TCL PCBs	5	1	NA	1	1	1	9
	TAL Metals (Total)	5	1	NA	1	1	1	9
	TAL Metals (Dissolved)	5	1	NA	1	1	1	9
	Hexavalent Chromium	5	1	NA	1	1	1	9
	Trivalent Chromium	5	1	NA	1	1	1	9
	Total Cyanide	5	1	NA	1	1	1	9
	Total Mercury	5	1	NA	1	1	1	9
	1,4-Dioxane	5	1	NA	1	1	1	9
	PFAS	5	1	NA	1	1	1	9
Soil Vapor	TO-15 VOCs	7	1	NA	NA	NA	NA	8

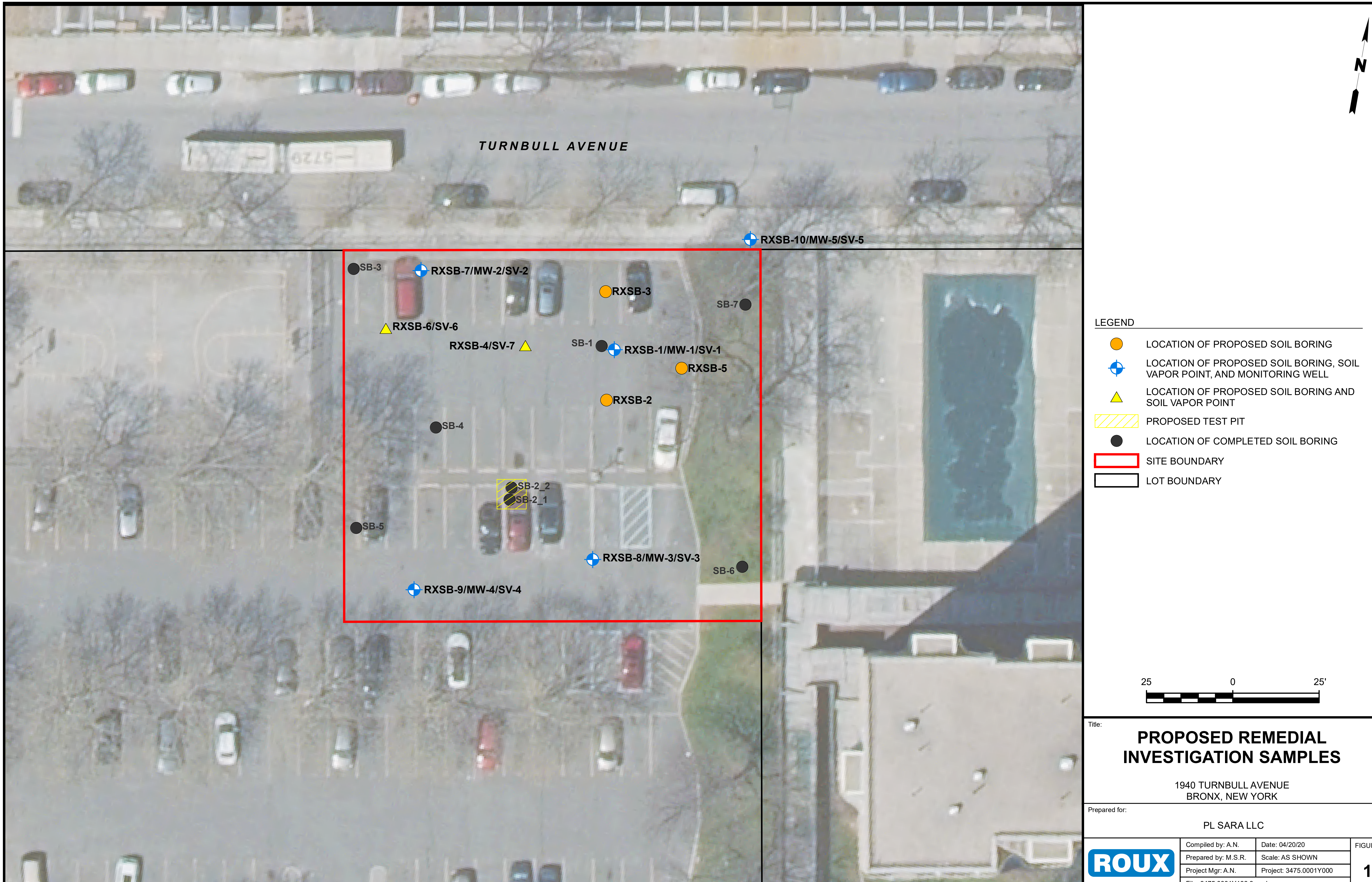
Totals are estimated based on scope of work as written, actual sample quantities may vary based on field conditions. QA/QC sample quantities will be adjusted accordingly.
[1] Based on 1 per 20 samples or 1 per Sample Delivery Group
[2] Based on 1 cooler per day
TCL - USEPA Contract Laboratory Program Target Compound List
VOCs - Volatile Organic Compounds
SVOCs - Semivolatile Organic Compounds
PCBs - Polychlorinated Biphenyls
TAL - USEPA Contract Laboratory Program Target Analyte List
PFAS - Per- and Polyfluoroalkyl Substances
NA - Not Applicable
*All groundwater samples will be analyzed for both filtered and unfiltered metals.

Table 3. Preservation, Holding Times and Sample Containers

Analysis	Matrix	Bottle Type	Preservation(a)	Holding Time(b)
TAL Metals (total & dissolved)	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	180 days, Hg 28 days
SW-846 6020B/7471B	Water	250 mL plastic, teflon lined cap	Nitric acid	
Hexavalent Chromium\Trivalent Chromium(calculated)	Soil	2 oz wide mouth glass, teflon lined cap	None	28 days
SW-846 7196A\6010C	Water	500 mL Plastic		24 hours from sample collection
Total Cyanide	Soil	4 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days from sample collection
SW-846 9012B	Water	250 mL Plastic	NaOH	14 days from sample collection
1,4-Dioxane	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days from sample collection
SW-846 8270D GS/MS SIM/Isotope Dilution	Water	2 x 500 mL amber wide mouth glass	Cool to 4°C	7 days from sample collection
Per- and Polyfluoroalkyl Substances (PFAS)	Soil	8 oz plastic container (non teflon lined)	Cool to 4°C	14 days from sample collection
EPA 1633	Water	2 - 250 mL HDPE plastic	Trizma	14 days to extraction and 28 days to anaysis
Volatile Organic Compounds (VOCs)	Air	6 liter Summa Canister for 8-hr sampling period	None	14 days from sample collection
TO-15		1 liter Summa Canister for 2-hr sampling period	None	14 days from sample collection
<u>Target Compound List (TCL)</u>				
TCL Volatile Organic Compounds (VOCs) + 10 TICS	Soil	Encore	Cool to 4°C	24 hours from sample collection
SW-846 8260C	Water	40mL voa vial, teflon lined cap	Hydrochloric Acid	14 days from sample collection
TCL Semivolatile Organic Compounds (SVOCs) +20 TICS	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
SW-846 8270D	Water	1 liter amber glass, teflon lined cap		7 days to extract, 40 days to analysis
TCL Pesticides	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
SW-846 8081B	Water	1 liter amber glass, teflon lined cap		7 days to extract, 40 days to analysis
TCL Herbicides	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
SW-846 8151A	Water	1 liter amber glass, teflon lined cap		7 days to extract, 40 days to analysis
TCL Polychlorinated biphenyls (PCBs)	Soil	8 oz wide mouth glass, teflon lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
SW-846 8082A	Water	1 liter amber glass, teflon lined cap		7 days to extract, 40 days to analysis

(a) All soil and groundwater samples to be preserved in ice during collection and transport
(b) Days from date of sample collection.
TAL - Target Analyte List
TCL - USEPA Contract Laboratory Program Target Compound List
Gas chromatography-mass spectrometry (GC/MS) in selected ion monitoring (SIM) mode

FIGURES



Title:

PROPOSED REMEDIAL INVESTIGATION SAMPLES

1940 TURNBULL AVENUE
BRONX, NEW YORK

Prepared for:

PL SARA LLC

ROUX

Compiled by: A.N.	Date: 04/20/20	FIGURE
Prepared by: M.S.R.	Scale: AS SHOWN	1
Project Mgr: A.N.	Project: 3475.0001Y000	
File: 3475.0001Y106.6.mxd		

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APPENDICES

A. Professional Profiles

B. Data Usability Report Preparer Profile

C. Sampling, Analysis, and Assessment of Per-And Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (January 2021)

D. Laboratory Reporting Limits for Soil, Water and Air Samples

E. Quality Assurance Glossary

F. Roux's Standard Operating Procedures

APPENDIX A

Professional Profiles

ROUX

PROFESSIONAL PROFILE

Frank Cherena, P.G., LEP

Principal Geologist

TECHNICAL SPECIALTIES

Project Management and Field Management of Phase I and Phase II Environmental site assessments. GIS data analysis and mapping. Project Management and oversight of remediation and construction activities. Additional experience includes the performance of investigation design and agency correspondence for petroleum and chlorinated solvent remediation projects.

EXPERIENCE SUMMARY

Fifteen years of experience: Principal Geologist with Roux Associates, Inc., Islandia, New York; Staff Geologist with RTP Environmental Associates, Inc., Green Brook, New Jersey.

CREDENTIALS

B.A., Geology, Colgate University, 2003

OSHA 40-Hour Hazardous Materials Training, 2003

OSHA 8-Hour Supervisor Training, 2004

Accredited AHERA Inspector, 2004

State of New York Asbestos Inspector Certificate, 2004

NJ UST Subsurface Evaluator Certification# 491925, 2009

New York State Licensed Professional Geologist, 2018

KEY PROJECTS

- Principal in charge of large university tech development project in New York City. The project consists of the demolition and decommissioning of a former hospital building, and excavation for redevelopment of four separate buildings for the first phase of campus construction. Environmental considerations on the project included site assessment, remediation design and oversight, SDPES permitting (construction dewatering and geothermal well discharge), soil characterization for reuse and capping of soils. Coordinated with NYCDEP, and other project stakeholders concerning community protection and monitoring concerns.

- Principal in charge of redevelopment of shopping mall in Staten Island, New York. The Site will consist of the construction of two commercial out parcel buildings, a new parking deck, and an expansion of the existing mall building. Areas of concern include historical fill, site-wide soil contamination (arsenic and pesticides). In addition, also responsible for agency coordination with FDNY, NYSDEC, and NYCOER for mitigation of methane and chlorinated volatile organic compounds vapor issues.

- Principal in charge for new development of a large regional mall in Norwalk, Connecticut with underground parking. The proposed redevelopment will result in the construction of a retail shops, restaurants, hotel, and entertainment. Previous usage of the property included over 30 different parcels including three establishments, gasoline filling stations, fuel oil terminal storage, hazardous waste disposal areas. The project includes investigation and subsequent remediation of petroleum and hazardous waste releases, filing of the Environmental Conditions Assessment Form (ECAF) associated with the three transfer act parcels

- Project Manager for the largest redevelopment project in New York City (over $4.5 billion). Project includes Phase I and Phase II ESAs (investigation of soil, groundwater, and soil vapor) at over 75 properties; Construction support for excavation of one million cubic yards of soil including implementing an in situ waste characterization program; Environmental support for demolition, asbestos and lead abatement, site remediation using In Situ Chemical Oxidation, and relocating of an active 9-acre 100-year old railyard; Property acquisition support throughout the project (7 city blocks); and Agency support for NYSDEC, NYCDEP, MTA (LIRR/NYCT), and ESDC. The environmental data was used as an integral component of the New York State Environmental Quality Review Act (SEQRA) final Environmental Impact Statement (EIS). The project will encompass 336,000 sq ft of office space, 6.4 million sq ft of residential space, an 18,000 seat sports and entertainment venue - the Barclays Center (home of the Nets professional basketball team) - 247,000 sq ft of retail space, a 165,000 square-foot hotel, and over 8 acres of intricately designed publicly accessible open space.

- Principal in Charge of numerous due diligence projects for owners, developers, managers, municipalities, and lenders at commercial and industrial properties throughout the Northeast. Activities included performance of UST evaluations and closures, hot spot remediations, Phase I and Phase II Site Assessments, vapor intrusion studies and mitigation, lead based paint, asbestos and hazardous materials surveys, interaction with regulatory agencies on behalf of clients and development of remedial cost estimates for planning and negotiation.

- Principal in Charge for investigation and review of a former electroplating facility in Bay Shore, New York with chlorinated solvent DNAPL. Activities included historical document review, subsurface investigation, and coordination with outside legal counsel and NYSDEC.

- Implemented GIS analysis and mapping for a remedial study and alternative analysis report (AAR) for an active petroleum storage terminal in Buffalo, New York under jurisdiction of the NYSDEC. The AAR required spatial analyses in order to categorize and analyze contaminant data from multiple investigations, investigate remedial alternatives, and to help focus ongoing additional investigations.

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- Project manager for a property transfer support project at a heavily contaminated state-of-the-art distribution facility in the Bronx, New York. The site was a former MGP being handled under the VCP in central office, the site had an open spill under the regional spills group and the site was attempting to apply to the BCP through the regional office. Roux performed a Phase I for the buyer, a Phase II and remedial cost estimate for the owner and negotiated with the buyer's consultant and NYSDEC to limit the scope of the investigation and cleanup.
- Served as Environmental Professional on hundreds of Phase I Environmental Site Assessments according to ASTM E1527-00, ASTM E1527-05, and ASTM E1527-13 for due diligence of large retail shopping centers, industrial facilities, and office buildings. Associated activities included agency contact, database management and interpretation, report preparation, and recommendations for additional work.

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ROUX

PROFESSIONAL PROFILE

Kathryn Sommo, CPESC, ISA Arborist

Senior Ecologist/Environmental Scientist

TECHNICAL SPECIALTIES

Wetland Delineation, Wetland and SPDES Permitting, Constructed Treatment Wetland (CTW) System Design Management, Wetland Assessments, Habitat Evaluations, Rare, Threatened & Endangered (RTE) Species Surveys, Soil and Sediment Characterization, Wetland Mitigation/Restoration, Hydrologic Monitoring, Litigation Support and Phytoremediation.

EXPERIENCE SUMMARY

Seventeen years of experience with Roux Associates.

Five years' experience as Biologist with U.S. Forest Service, Colorado Division of Wildlife, and Colorado Natural Heritage Program.

CREDENTIALS

B.S. Fishery Biology, Colorado State University, 1998

Wetland Delineation Certification, Richard Chinn Environmental Training, 2000

Winter Plant Identification Certification, Rutgers University, 2011.

Rare, Threatened, Endangered Species of NJ, Rutgers University, 2012

International Society of Arboriculture (ISA) Certified Arborist

Certified Professional in Erosion and Sediment Control (CPESC)

OSHA 40-Hour Health and Safety Course

PROFESSIONAL AFFILIATIONS

Society of Wetland Scientists, Society for Ecological Restoration, Xerces Society for Invertebrate Conservation, ISA New York Chapter.

KEY PROJECTS

Environmental Services

- Project Manager for benthic community evaluation for waterfront redevelopment site located within an inlet of the East River and greater NYC harbor area. Completed benthic, sediment and surface water sampling to evaluate the effects of the contaminated sediment on the benthic community. Work performed in support of the creation of tidal marshes, provision of benthic habitat structures, and the partial removal of a bulkhead to provide public access to the created water feature.
- Project Management for groundwater monitoring for several major railroad transportation companies and bus transportation terminals located throughout New Jersey. Completed quarterly and annual reporting for groundwater compliance monitoring programs.
- Project Manager for remedial investigatin at a former aerospace manufacturing facility located in Wallingford, CT. Site contamination included chlorinated hydrocarbons petroleum related VOCS and metals in soils and groundwater An air/sparge soil vapor extraction (AS/SVE) system was installed to address soil and groundwater contamination from the flow meter testing area.. Work activities have included: quarterly groundwater monitoring, writing and implementation of subsurface investigation Work Plans, review and analysis of laboratory analytical data, and reporting of investigation results, completion of a Sensitive Receptor Survey, Water Supply Well Survey, Ecological Scoping Checklist, RCRA Corrective Action Forms (Current Human Exposures Under Control -CA-725 & Migration of Contaminated Groundwater Under Control - CA750) and the Conceptual Site Model.
- Project Manager for wetland delineation, sediment sampling and characterization, and assessment of wetland vegetative communities present within a two mile stretch of the Peconic River in Brookhaven, New York. The project included sediment removal and wetland restoration for the remediation of metal contaminated sediments in the emergent marsh and forested riparian wetland system. Project manager for the restoration monitoring, supplemental planting, and invasive species control activities.
- Field Manager for landfill leachate investigation in Holtsville, New York. Downgradient pond and surface water tributary impacted from landfill leachate. Investigation activities included oversight of well installation, well development, the collection of groundwater, surface water and sediment samples, staff gauge installation piezometer installation and stream flow readings. Completed inventory of soils and vegetation within the landfill. Designed planting plan for pond restoration and completed permit application for restoration of the pond and surrounding uplands.
- Field Manager for sediment investigation and wetland vegetation encroachment control at a former petroleum bulk storage facility in Staten Island, New York. Wetland investigation, remediation and restoration project for a 440-acre former Major Oil Storage Facility containing approximately 95 acres of tidal and freshwater wetlands. As part of a Consent Order between the client and the NYSDEC, Roux developed and implemented a remedial design that minimized impacts to the wetlands while ensuring the protection of human health, wildlife and the surrounding environment. The remedial design included excavation and offsite disposal of 21,000 CY of sediment over 10 acres of wetlands. Achieved regulatory closure of the wetland restoration within two years of monitoring.
- Field Manager for landfill leachate investigation in Holtsville, New York. Downgradient pond and surface water tributary impacted from landfill leachate.

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Investigation activities included oversight of well installation, well development, the collection of groundwater, surface water and sediment samples, staff gauge installation piezometer installation and stream flow readings. Completed inventory of soils and vegetation within the landfill. Designed planting plan for pond restoration and completed permit application for restoration of the pond and surrounding uplands.

- Project Manager for post-remediation documentation for a former colorants facility in Rensselaer, New York. Ongoing work activities include, updates to the Site Management Plan for OU-1 and OU-2, Periodic Review Reporting for the groundwater monitoring, groundwater treatment system, soil vapor barrier and landfill cap.
- Field Manager for sediment investigation and wetland vegetation encroachment control at a former petroleum bulk storage facility in Staten Island, New York. Wetland investigation, remediation and restoration project for a 440-acre former Major Oil Storage Facility containing approximately 95 acres of tidal and freshwater wetlands. As part of a Consent Order between the client and the NYSDEC, Roux developed and implemented a remedial design that minimized impacts to the wetlands while ensuring the protection of human health, wildlife and the surrounding environment. The remedial design included excavation and offsite disposal of 21,000 CY of sediment over 10 acres of wetlands.Achieved regulatory closure of the wetland restoration within two years of monitoring.
- Field manager for a former petroleum bulk storage facility in Greenport, New York. Work activities included soil and groundwater sampling, creation of groundwater flow maps, soil and monitoring well profiles.

Green Technologies: Living Shoreline Stabilization/ Constructed Treatment Wetlands/Phyototechnology

- Field Manager for coastal shoreline stabilization and grassland mitigation of an 80 acre island located off the coast of Brooklyn, NY. The island formally served as a municipal landfill and due to erosion forces the landfill waste became exposed. The design provided slope stabilization improvements and the creation of warm season maritime grasslands to provide foraging, cover and nesting habitat for birds. An inventory of the island vegetation was completed as well as soil, sediment and surface water samples to fully characterize the nature and depth to the landfill waste. Wetland permitting was completed to mitigate for the impacts to the wetland and adjacent areas.
- Project Manager for feasibility study and engineering design to reroute additional stormwater to constructed treatment wetland (CTW) system in Portsmouth, Virginia. Zinc and copper were the primary constituents targeted for treatment in the CTW system. Components of the work included, stormwater runoff modeling analysis, mass loading calculations, constructed treatment wetland performance and life expectancy calculations and alternatives analysis. NPDES reporting and permitting renewal.
- Project Manager for City of Glen Cove, Mill Pond rehabilitation project. Design objectives were to restore improve the functionality of Mill Pond to treat stormwater runoff and baseflow from Cedar Swamp Creek and the surrounding watershed, improve solids removal, surface water flow and access for maintenance activities. Elements of the design included: reestablishment of forebay for sediment removal, excavation of sediment deposition areas, concrete revetment berm/ access road and removable weir plate for forebay maintenance, wooden headwall replacement, improve surface water flow deflection, and floatables collection system to prevent debris from entering Hempstead Harbor. Completed all wetland permitting for USACE, NYSDEC and NYSDOS. Negotiated sediment disposal facilities options with NYSDEC.
- Wetland Specialist for Subsurface Stormwater Treatment Wetlands (SSTW) systems being installed to capture and treat stormwater runoff from the MassDOT Longfellow bridge rehabilitation project. The SSTWs will be installed in both Cambridge and Boston Massachusetts. The project components include SSTW design review, planting recommendations, construction oversight and documentation and vegetation monitoring.
- Project Manager for wetland delineation, RTE survey and wetlands permitting at an active metals smeltering facility in Sayerville, NJ. The project design elements included the design and construction of an engineered Constructed Treatment Wetland system that will provide treatment of stormwater run-off from the facility prior to discharge from the site. RTE surveys of the wetlands and wetland buffer areas were required for the potential presence of threatened and endangered species.
- Wetland Specialist for Subsurface Stormwater Treatment Wetlands (SSTW) systems being installed to capture and treat stormwater runoff from the MassDOT Longfellow bridge rehabilitation project. The SSTWs will be installed in both Cambridge and Boston Massachusetts. The project components include SSTW design review, planting recommendations, construction oversight and documentation and vegetation monitoring.
- Completed a phytoremediation feasibility study for a Site in Ogdensburg, New York. The project encompassed creating an aesthetically pleasing landscape planting plan, which would be comprised of native flora with deep

rooting potential capable of hydraulically containing the containment plume

Ecological Services

- Project Manager for former fibers facility in Williamsburg, VA; project components include land management for wildlife enhancement projects, Phytotechnology monitoring, and permitting. Baseline vegetation survey completed including mapping of all habitat types present. Wildlife monitoring surveys for bats, birds, amphibians, reptiles, mammals and insects. Wildlife projects implemented include creation of pollinator meadow areas, warm season grasslands, sustainable forestry management, purple martin colony, blue bird trail, bat housing, native bee housing, and vernal pool monitoring. Wildlife Habitat Council Wildlife at Work certification earned for wildlife projects. Other project work consisted of phytoremediation tree plot monitoring, evaluation and recommendation for fertilization and maintenance;. Virginia Pollutant Discharge Elimination System (VPDES) permit renewal.
- Project Manager for benthic community evaluation for waterfront redevelopment site located within an inlet of the East River and greater NYC harbor area. Completed benthic, sediment and surface water sampling to evaluate the effects of the contaminated sediment on the benthic community. Work performed in support of the creation of tidal marshes, provision of benthic habitat structures, and the partial removal of a bulkhead to provide public access to the created water feature.
- Project Manager and Field Manager for the delineation and assessment of a shrub forested freshwater riparian wetland located along the Branch Brook Nature Preserve in Smithtown, NY. A hydrologic monitoring well network and vegetation monitoring plots established within the recovery system potential downgradient area. Water level monitoring conducted to pre and post recovery system startup to determine any effects to wetland resources. Prevalence Index (PI) scores used to evaluate shifts in vegetation composition within monitoring plots overtime. Designed planting plan for restoration of the disturbed upland adjacent well installation areas.
- Expert biologist project support provided for evaluation of natural resource damage (NRD) claims and determination of monetary compensation for damages. Sites for NRD claims located throughout the northeast, southeast and Midwest. Mitigation banks consulted throughout these areas for potential available credits and the unique requirements per area for mitigation banking reviewed. Wetland status and potential damages assumed for Site and value of the land determined based upon various mitigation evaluation methods. Habitat Equivalency Analysis (HEA) software utilized to evaluate timeline of impacted Sites and time required for complete Site restoration as applicable.
- Project Manager for litigation support provided to Southampton community members. Services included review of Town of Southampton wetland delineation of proposed project Site, expert review and commentary provided on Towns redevelopment plans and provision of verbal support at several town hearings regarding potential impacts to the Site and permitting requirements.
- Wetland specialist for restoration monitoring within restored emergent marsh and forested wetlands at former Chemical manufacturing facility located in Middleborough, Massachusetts. The 59-acre site was formerly used to manufacture chlorinated solvents remediation was required under an Administrative Consent Order issued by Massachusetts Department of Environmental Protection (MADEP). The swale and former lagoon area were filled and re-graded to remove ecological exposure pathways. Approximately one acre of wet meadow, shrub swamp and forested wetlands were restored.
- Wetland Permitting Specialist for redevelopment project located within wetland adjacent area in New York City. Development plans included multi-building, mixed-use development for affordable housing and commercial space. The project components included jurisdictional negotiation with NYSDEC, completion of restoration design plans, and sediment and erosion control plans and submittal of wetland permitting package.
- Field Manager of remediation activities for impacted wetland and transition areas. Prepared the wetland permit application, and provided regulatory support to obtain the required state approvals to perform regulated activities within and adjacent to the delineated wetlands located on an active bulk storage, receiving and transfer facility for petroleum and chemical products in Carteret, New Jersey.
- Field manager for a 3.2 acre pond remediation and restoration located in Massapequa Preserve on Long Island, New York. Wetland delineation verification. Inventory of open water and wetland vegetation completed and a delineation of the sediment depth. Assisted in development of design and restoration planting plan for permitting to remove impacted sediments and restore the pond and associated wetlands with native emergent wetland plants surrounded by shrub forest.
- Project Manager for the habitat inventory, rare, threatened and endangered (RTE) species survey, and wetland delineation of 110 acres of NYC parkland in Staten Island, NY. Completion of an EAS, Consistency Assessment, and wetland permitting for the redevelopment of the Site into multi-use parkland and constructed stormwater wetlands.

- Designed planting plan for shoreline restoration of wetland mitigation areas at a former telephone manufacturing facility in Staten Island, New York. Restoration elements included tidal marsh, brackish marsh, forest riparian and forested upland plantings. Project manager for wetlands restoration monitoring. Successful reestablishment of oyster population within tidal mudflats.
- Field manager for a 3.2 acre pond remediation and restoration located in Massapequa Preserve on Long Island, New York. Wetland delineation verification. Inventory of open water and wetland vegetation completed and a delineation of the sediment depth. Assisted in development of design and restoration planting plan for permitting to remove impacted sediments and restore the pond and associated wetlands with native emergent wetland plants surrounded by shrub forest.
- Project Manager for wetland delineation, sediment sampling and characterization, and assessment of wetland vegetative communities present within a two mile stretch of the Peconic River in Brookhaven, New York. The project included sediment removal and wetland restoration for the remediation of metal contaminated sediments in the emergent marsh and forested riparian wetland system. Project manager for the restoration monitoring, supplemental planting, and invasive species control activities.

Publications

- Peconic River Wetland Remediation. 2006. Huhn-Sommo, Kathryn, A. Ludlow, W. Medeiros, and T. Green. New York State Wetlands Forum, Inc. 2006 Annual Conference and Meeting, Syracuse, New York.
- Maritime Grassland Creation and Sustainable Bioengineered Shoreline Stabilization (poster). 2014. Sommo, Kathryn, A. Ludlow, D. Flynn. Society for Ecological Restoration, Mid-Atlantic 2014 Annual Conference, Ambler, Pennsylvania, March 25, 2014
- Maritime Grassland Creation and Sustainable Bioengineered Shoreline Stabilization (poster). 2014. Sommo, Kathryn, A. Ludlow, D. Flynn. The Waters We Share, Restoring the NY-NJ Harbor & Estuary: Ensuring Ecosystem Resilience and Sustainability in a Changing Future, Conference June 3, 2014.
- Maritime Grassland Creation and Shoreline Stabilization. 2014. Sommo, Kathryn, A. Ludlow, D. Flynn. Conference on Ecological and Ecosystem Restoration, New Orleans, Louisiana, July 30, 2014.
- Incorporating Wildlife Habitat into Water Treatment Areas. 2014. Sommo, Kathryn. Webinar for Wildlife Habitat Council Conservation Academy, August 20, 2014.
- Integrating Ecological Elements into Remedial Designs, 2014. Sommo, Kathryn, V. Burrows. 26th Annual Wildlife Habitat Council Symposium, November 11, 2014.
- Habitat Enhancement Project Connections along the Atlantic Coastal Flyway 2016. Sommo, Kathryn, Nathan Epler1, J. Douglas Reid-Green. Society of Ecological Restoration, Mid-Atlantic 2016 Annual Conference, March 13, 2016.

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Brandon D. Vella
Project Scientist

TECHNICAL EXPERIENCE

Phase I and Phase II Environmental Site Assessments (ESAs) conducted in accordance with American Society for Testing and Materials International (ASTM) E1527-13, E2600-15, and E1903-11; management and closure of New York State Department of Environmental Conservation (NYSDEC) spill sites; underground storage tank (UST) investigations and closure; Exposure Assessments (EAs) and Spill Closure Requests; conceptual site model (CSM) development; Environmental Quality Information Systems (EQuIS) database management; Mann-Kendall statistical trend analysis; constituent of concern (COC) migration modeling using Groundwater Spatiotemporal Data Analysis Tool (GWSDAT); investigation and remediation of underground injection control (UIC) structures including stormwater systems, sanitary systems, and grease traps; New York State Pollutant Discharge Elimination System (SPDES) monitoring and Stormwater Pollution Prevention Plan (SWPPP) compliance; installation of soil borings and groundwater monitoring wells; soil vapor intrusion (SVI) investigations; remedial construction oversight; regulatory coordination; development of site-specific health and safety plans (HASPs); Request for Proposal (RFP) development; subcontractor bid evaluation; management of subcontractors and third-party personnel.

EXPERIENCE SUMMARY

Over one year of experience: Project Scientist at Roux Environmental Engineering and Geology, D.P.C., Islandia, New York

Two and a half years of experience: Associate Environmental Scientist and Case Manager at Groundwater & Environmental Services, Inc., Hauppauge, New York

One and a half years of experience: Environmental Scientist at Enviroscience Consultants, Inc., Ronkonkoma, New York

CREDENTIALS

B.S. Biochemistry & Minor Environmental Studies, SUNY Binghamton 2014
OSHA 40-Hour HAZWOPER and 8-Hour Annual Refreshers
OSHA 30-Hour Construction Safety
OSHA Site Supervisor
RCRA and DOT Hazardous Materials Transport
Loss Prevention System (LPS) Manager and Supervisor
ExxonMobil Permit Issuer and Recipient
American Red Cross First Aid and CPR
Smith Safe Driver Trained

PUBLICATIONS

Vella, B.D. & Schertzer, J.W. "Understanding and Exploting Bacterial Outer Membrane Vesicles." *Pseudomonas: Volume 7: New Aspects of Pseudomonas Biology.* Edited by J.-L. Ramos, J.B. Goldberg, & A. Filloux, Dordrecht: Springer Netherlands, 2015, pp. 217-250.

KEY PROJECTS

- Case Manager for a legacy portfolio of active retail gasoline and automotive service stations throughout Nassau, Suffolk, Westchester, and Rockland Counties in New York. The portfolio sites were associated with multiple open NYSDEC spills, numerous historic releases of petroleum product including comingled petroleum hydrocarbon volatile organic compound (VOC) plumes, and multiple historic remediation attempts. Assisted Senior Project Managers by drafting work plans, RFPs, and summary investigation reports. Coordinated and conducted field activities including management and oversight of subcontractor personnel in accordance with site-specific HASPs. Interpreted laboratory analytical data and conducted statistical trend analyses. Drafted technical figures and models such as contour maps, soil data maps, hydrographs, hydrogeologic cross-sections, and soil boring/well logs. Reviewed over three decades worth of historic soil, groundwater, and remediation data in order to refine CSMs. Authored EAs and Spill Closure Requests that were submitted to NYSDEC regulators in support of spill closure.
- Prepared between 50 and 100 Phase I ESAs for properties in the greater New York City and Long Island areas, New Jersey, Connecticut, Rhode Island, Massachusetts, and New Hampshire. These assessments ranged from small residential properties to large scale industrial, commercial, and manufacturing businesses. Responsible for maintaining report integrity and compliance with ASTM E1527-13 and E2600-15 standards. Maintained client expectations and delivered accurate results in a timely manner to satisfy tight due diligence deadlines. Provided recommendations to clients if Phase II ESA investigations were warranted. All Phase I inspections and reports were completed safely, on-time, and within the allotted budgets.
- Case Manager and Field Lead for over one year during the large-scale collection of over 2,000 soil samples from wetland creek areas and adjoining residential properties in order to delineate historic releases of cadmium and hexavalent chromium at a NYSDEC Superfund Site in West Islip, New York. Sample locations were located and logged using global positioning system (GPS) navigation. Provided project quality assurance and quality control (QA/QC) for field activities including management of multiple sampling teams each comprised of three to four samplers. Ensured that all field work adhered to the sampling specifications as directed by the NYSDEC-approved Remedial Investigation Work Plan (RIWP) and Quality Assurance Project Plan (QAPP). Routinely coordinated with both NYSDEC regulators, third-party engineering firm personnel, and residential homeowners in order to achieve sampling objectives.
- Case Manager and Field Lead for light non-aqueous phase liquid (LNAPL) delineation activities at an active retail gasoline and automotive service station in Glen Head, New York, associated with one open NYSDEC spill and multiple historic releases of petroleum product. Coordinated and provided oversight of subcontractor personnel during the advancement of numerous soil borings using sonic drilling technology. Soils were field screened via visual inspection, photoionization detector

(PID) headspace measurements, qualitative fluorescent dye assays, and subsequent subsequently submitted for laboratory analysis of VOCs. Prepared a summary report of the investigative activities that was submitted to NYSDEC and the client. Results of the delineation investigation were used to further refine the CSM in preparation for a remedial engineering alternatives analysis.

- Case Manager and Field Lead for the investigation and remediation of numerous stormwater drywells, sanitary systems, and grease traps for a variety of clients throughout Nassau and Suffolk Counties in Long Island, New York. The impacted underground injection control (UIC) structures, septic tanks, and grease traps were located on properties ranging from small single-family residences to large commercial properties, some of which were historically associated with the use and unauthorized release of hazardous materials and petroleum products. Structures were gauged, measured, and inventoried prior to sampling. Bottom sediment, and standing liquids in some cases, were sampled in accordance with Suffolk County Department of Health Services (SCDHS) Sanitary Code Article XII. Laboratory analytical results were compared to SCDHS Action Levels in order to determine if remediation was warranted. Coordinated remediation strategies under SCDHS oversight which included the removal of liquids and sediment using vacuum trucks, solid and liquid waste disposal, endpoint sampling, and backfilling of the structures with virgin sand. Results of investigative and remediatial activities were reported to clients and SCHDS in order to document proper remediation and/or closure of the structures.
- Case Manager and Field Staff for the installation of remedial system wells at an active retail gasoline and automotive service station in Roslyn, New York. Provided field oversight of subcontractors during well installation activities utilizing sonic drilling technologies in order to upgrade an existing air sparge (AS)/soil vapor extraction (SVE) treatment system targeting residual dissolved-phase and adsorbed-phase hydrocarbons associated with an open NYSDEC petroleum hydrocarbon and methyl-*tertiary*-butyl ether (MTBE) spill.
- Field Staff during Phase I and II ESA divestment activities for a portfolio of various gasoline stations and convenience stores throughout Jefferson County in New York. Conducted site reconnaissance inspections and relayed field findings to office support staff using a mobile reporting platform in order to facilitate expedited reporting requirements. Subsequently oversaw subcontractor personnel during subsurface clearance activities in preparation for the advancement of soil borings and the installation of groundwater monitoring wells. All Phase I and Phase II divestment field activities were completed safely, on-time, and within the allotted budgets.
- Field Lead for one month during stream tributary sediment sampling activities conducted in order to delineate impacts resulting from historic releases of polychlorinated biphenyls (PCBs), VOCs, semi-volatile organic compounds (SVOCs), and heavy metals at a NYSDEC Superfund Site in Dunkirk, New York. Stringent sampling equipment decontamination protocols were adhered to throughout the entire duration of the project. Sample locations with relative measured distances between stream transects, field sketches of wetland terrain, and a comprehensive photographic log were submitted to NYSDEC engineers for review in preparation for land clearing and remedial dredging activities.
- Field Staff during emergency response operations related to a per- and polyfluoroalkyl substances (PFAS) release in New Windsor, New York. Interfaced with Senior Project Managers, airport personnel, NYSDEC regulators, third-party subcontractors, media reporters, and local residents during emergency response operations. Compiled comprehensive photographic and written daily logs over the course of one month documenting the presence and abatement of aqueous film-forming foam (AFFF) found in the on-site network of stormwater drains and off-site stream tributaries throughout the surrounding town. Directed subcontractor personnel to initiate recovery of AFFF using vacuum trucks equipped with skimmers. Monitored stream tributaries for the presence of accumulated AFFF on floating absorbent booms and directed subcontractor personnel to conduct periodic boom change-outs prior to precipitation events. Maintained an inventory of on-site subcontractor resources including the number of vacuum trucks, the number of frac tanks, and accumulated water volume/available capacity of the frac tanks.
- Field Staff for routine wastewater discharge sampling at various industrial sites operated by public transportation agencies and freight carrier corporations throughout the Greater New York City metropolitan area. Collected monthly wastewater samples and recorded influent/effluent flow rates. Conducted monthly site inspections and reported potentially hazardous conditions such as failing safety devices or security controls. Prepared and submitted routine SPDES reports to regulators in accordance with SWPPPs.
- Field Staff for site characterization and remedial excavation activities at an urban housing development in Brooklyn, New York. Delineated zone of hazardous and non-hazardous impacted soils within an area approximately equivalent to one city block. Collected and submitted subsurface soils samples for analysis of VOCs, SVOCs, metals, pesticides, herbicides, and PCBs. Developed the site-specific HASP and oversaw subcontractor personnel including those responsible for operating direct-push drilling equipment, excavators, and ground-penetrating radar.

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APPENDIX B

Data Usability Report Preparer Profile

Josh Cope
Senior Scientist

TECHNICAL SPECIALTIES
Fuel oil forensics and age dating, USEPA Superfund, OPA, and NJDEP environmental regulations, Site Assessment and Contractor Oversight, GC/MS Operator, Data Validation, Technical Report preparation and review, Field Chemistry: field screening, HAZCATTING, groundwater and soil sampling, Hazardous Waste Transportation and Disposal

EXPERIENCE SUMMARY
Over 27 years of experience; Senior Scientist with Roux Associates, Inc.; Senior Chemist, Project Manager with Tetra Tech, Inc.; Owner of Geodyne Engineering Consultants, Inc.; Quality Assurance Officer, GC/MS Operator, Twenty First Century Environmental, Inc.; Project Manager, Field Technician, Resource Applications, Inc.

CREDENTIALS
B.A., 1991, Chemistry, Haverford College
OSHA 40-Hour Health and Safety Training
New Jersey Transit (NJT) – Roadway Worker / On Track Protection

FEDERAL PROGRAMS – CLIENT: USEPA
KEY PROJECTS
- Provide technical and project management support to USEPA Removal and Remedial Branches in Regions 2, 3, 4 on Superfund and OPA projects.
- Manage and perform phase I and II site assessments, remedial investigations, removal action oversight, prepare health and safety plans, monitor site health and safety, support USEPA enforcement actions, implementation of Facility Response Plan (FRP) program, emergency response, biowatch exercises, criminal investigation support, contractor oversight, cost tracking, documentation, daily reporting, prepare after action reports, data validation, waste management, and attend public meetings
- Sites include: UST, AST, and pipeline leaks, lead smelter sites, wood treatment facilities, coal to gas plants, dry cleaners, junk yards, federal facilities, unpermitted landfills, drum burial, flood and hurricane clean up, oil refinery inspections, farmland, and historic industrial sites.
- Contaminants include: TCE, PCE, MTBE, BTEX, oil, gasoline, PCP, PAHs, mercury, lead, arsenic, ammonia, acids, bases, pesticides, PCBs, asbestos, and unknowns.
- Participated in the largest USEPA sponsored interagency response emergency response exercise, Liberty Radex, in Philadelphia. Acted as planner prior to the exercise and master controller during the exercise.
- Interface with state and local regulators on sites in Pennsylvania, Delaware, New Jersey, Maryland, Virginia, West Virginia, and Mississippi.

STATE PROGRAMS – CLIENTS: BUSINESSES AND INDIVIDUALS IN NEW JERSEY
- Provide a wide array of environmental services to homeowners, land developers, insurance companies, gas stations, and small industrial companies in New Jersey.
- Manage and/or perform ISRA reporting, phase I and II site assessments, third party investigations, subsurface evaluation, UST removal, air emissions permitting preparation, soil, groundwater, and vapor intrusion investigations, NPDES compliance.
- Manage remedial investigation, design, and execution for LUSTs, and farmland development.
- Manage reporting, deed restriction preparation, CEAs, remedial action permits, and response action outcome preparation (RAO).
- Evaluate environmental costs for insurance claims and litigation cases.
- Prepare and present justification for fine reduction to state regulators for private client.
- Meet with clients, prepare proposals, and negotiate contracts.

DATA VALIDATION/LABORATORY EXPERIENCE
- Perform level 3 and 4 data validation of analytical data packages in accordance with USEPA National Functional Guidelines.
- Data validation in accordance with NJDEP DKQP and NYS DUSR guidance.
- Quality assurance officer and GC/MS operator for New Jersey certified laboratory.
- Performed analysis of volatile and semi-volatile organics.
- Preformed maintenance and repair of analytical instruments.
- Performed method development and troubleshooting of analytical issues.
- Set up and operated mobile laboratory for organic and inorganic analyses on Superfund site assessments.
- Performed field screening of contaminants using test kits, XRF, radiation meters, and various types of air monitoring equipment.

WASTE MANAGEMENT
- Waste Management Specialist for oil pipeline client in Michigan for largest inland oil spill in United States during August 2010 through October 2011.
- Responsible for compliance, cost tracking, cost estimation, waste tracking and reporting, oil recovery calculation and reporting, contractor oversight.

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- Prepared Waste Transportation and Disposal Plans and responses to regulator comments.
- Prepared waste profiles, negotiated waste removal protocols with USEPA and MDEQ to streamline process of waste handling to realize savings through greater efficiency and lowering sampling requirements.
- Located disposal facilities, negotiated disposal rates.
- Performed cost benefit analysis of various soil dewatering agents and procedures and proposed methods and protocols to client, USEPA, and MDEQ.
- Performed some oversight of removal actions along river.
- Supported submerged oil assessment of river.

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APPENDIX C

Sampling, Analysis, and Assessment of Per-And Polyfluoroalkyl Substances (PFAS) under NYSDEC's Part 375 Remedial Programs (January 2021)

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

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

Under NYSDEC's Part 375 Remedial Programs

January 2021

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January 2021

ERRATA SHEET for

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

Citation and Page Number	Current Text	Corrected Text	Date
Title of Appendix I, page 32	Appendix H	Appendix I	2/25/2020
Document Cover, page 1	Guidelines for Sampling and Analysis of PFAS	Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs	9/15/2020
Routine Analysis, page 9	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1 or ISO 25101."	"However, laboratories analyzing environmental samples…PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533."	9/15/2020
Additional Analysis, page 9, new paragraph regarding soil parameters	None	"In cases where site-specific cleanup objectives for PFOA and PFOS are to be assessed, soil parameters, such as Total Organic Carbon (EPA Method 9060), soil pH (EPA Method 9045), clay content (percent), and cation exchange capacity (EPA Method 9081), should be included in the analysis to help evaluate factors affecting the leachability of PFAS in site soils."	9/15/2020
Data Assessment and Application to Site Cleanup Page 10	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFAS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Target levels for cleanup of PFAS in other media, including biota and sediment, have not yet been established by the DEC.	Until such time as Ambient Water Quality Standards (AWQS) and Soil Cleanup Objectives (SCOs) for PFOA and PFOS are published, the extent of contaminated media potentially subject to remediation should be determined on a case-by-case basis using the procedures discussed below and the criteria in DER-10. Preliminary target levels for cleanup of PFOA and PFOS in other media, including biota and sediment, have not yet been established by the DEC.	9/15/2020

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

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

Citation and Page Number	Current Text	Corrected Text	Date
Footnotes	None	[1] TOP Assay analysis of highly contaminated samples, such as those from an AFFF (aqueous film-forming foam) site, can result in incomplete oxidation of the samples and an underestimation of the total perfluoroalkyl substances. [2] The movement of PFAS in the environment is being aggressively researched at this time; that research will eventually result in more accurate models for the behaviors of these chemicals. In the meantime, DEC has calculated the soil cleanup objective for the protection of groundwater using the same procedure used for all other chemicals, as described in Section 7.7 of the Technical Support Document (http://www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf).	9/15/2020
Additional Analysis, page 9	In cases… soil parameters, such as Total Organic Carbon (EPA Method 9060), soil…	In cases… soil parameters, such as Total Organic Carbon (Lloyd Kahn), soil…	1/8/2021
Appendix A, General Guidelines, fourth bullet	List the ELAP-approved lab(s) to be used for analysis of samples	List the ELAP- certified lab(s) to be used for analysis of samples	1/8/2021
Appendix E, Laboratory Analysis and Containers	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by ISO Method 25101.	Drinking water samples collected using this protocol are intended to be analyzed for PFAS by EPA Method 537, 537.1, 533, or ISO Method 25101	1/8/2021

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

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.

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 F) 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

Currently, New York State Department of Health's Environmental Laboratory Approval Program (ELAP) does not offer certification for PFAS in matrices other than finished drinking water. However, laboratories analyzing environmental samples for PFAS (e.g., soil, sediments, and groundwater) under DER's Part 375 remedial programs need to hold ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, ISO 25101, or Method 533. Laboratories should adhere to the guidelines and 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). 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).

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. 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.

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]

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

Data Assessment and Application to Site Cleanup

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

Water Sample Results

PFOA and PFOS should be further assessed and considered as potential contaminants of concern in groundwater or surface water if PFOA or PFOS is detected in any water sample at or above 10 ng/L (ppt) and is determined to be attributable to the site, either by a comparison of upgradient and downgradient levels, or the presence of soil source areas, as defined below. 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

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

Soil Sample Results

Soil cleanup objectives for PFOA and PFOS 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.

Guidance Values for Anticipated Site Use	**PFOA (ppb)**	**PFOS (ppb)**
Unrestricted	0.66	0.88
Residential	6.6	8.8
Restricted Residential	33	44
Commercial	500	440
Industrial	600	440
Protection of Groundwater[2]	1.1	3.7

[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 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).

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.

Testing for Imported Soil

Testing for PFAS should be included any time a full TAL/TCL analyte list is required. Results for PFOA and PFOS should be compared to the applicable guidance values. If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on SPLP testing, for example. If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.

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

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

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

General Guidelines in Accordance with DER-10

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

Specific Guidelines for PFAS

- Include in the text that sampling for PFAS will take place
- Include in the text that PFAS will be analyzed by LC-MS/MS for PFAS using methodologies based on EPA Method 537.1
- 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
- Laboratory should have ELAP certification for PFOA and PFOS in drinking water by EPA Method 537, 537.1, EPA Method 533, or ISO 25101
- 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 methodologies based on EPA Method 537.1.

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

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

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix D - Sampling Protocols for PFAS in Surface Water

General

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

Laboratory Analysis and Container

Samples collected using this protocol are intended to be analyzed for PFAS using methodologies based on EPA Method 537.1.

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

Equipment

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

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

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

- stainless steel cup

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

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

General

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

Laboratory Analysis and Container

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

Equipment

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

Appendix F - Sampling Protocols for PFAS in Fish

This appendix contains a copy of the latest guidelines developed by the Division of Fish and Wildlife (DFW) entitled “General Fish Handling Procedures for Contaminant Analysis” (Ver. 8).

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

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

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

Version: 8

Previous Version Date: 21 March 2018

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

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

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

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

A. Original copies of all continuity of evidence (i.e., Chain of Custody) and collection record forms must accompany delivery of fish to the lab. A copy shall be directed to the Project Leader or as appropriate, Wayne Richter. 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. **<u>The Bureau of Ecosystem Health will supply the bags.</u>** If necessary, food grade bags may be procured from a suitable vendor (e.g., grocery store). It is preferable to redundantly label each bag with a manila tag tied between the knot and the body of the bag. This tag should be labeled with the project name, collection location, tag number, collection date, and fish species. If scales are collected, the scale envelope should be labeled with the same information.

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

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

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

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

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

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

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

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

Project and Site Name ____ DEC Region ____________

Collections made by (include all crew) ____

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

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

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

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

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CHAIN OF CUSTODY

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

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

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

Town of ____, in _________________________________ County.

Item(s) ____

____

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

____ ____________________________
Signature Date

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

_______________________________________ ___________________
Signature Date

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

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

NOTICE OF WARRANTY

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

HANDLING INSTRUCTIONS

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

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

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

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

EQUIPMENT LIST

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

Fish measuring board.

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

Individually numbered metal tags for fish.

Manila tags to label bags.

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

Knife for removing scales.

Chain of custody and fish collection forms.

Clipboard.

Pens or markers.

Paper towels.

Dish soap and brush.

Bucket.

Cooler.

Ice.

Duct tape.

Appendix G – PFAS Analyte List

Group	Chemical Name	Abbreviation	CAS Number
Perfluoroalkyl sulfonates	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanesulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	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	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

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

General

New York State Department of Environmental Conservation's Division of Environmental Remediation (DER) developed the following guidelines for laboratories analyzing environmental samples for PFAS under DER programs. If laboratories cannot adhere to the following guidelines, they should contact DER's Quality Assurance Officer, Dana Barbarossa, at dana.barbarossa@dec.ny.gov prior to analysis of samples.

Isotope Dilution

Isotope dilution techniques should be utilized for the analysis of PFAS in all media.

Extraction

For water samples, the entire sample bottle should be extracted, and the sample bottle rinsed with appropriate solvent to remove any residual PFAS.

For samples with high particulates, the samples should be handled in one of the following ways:

1. Spike the entire sample bottle with isotope dilution analytes (IDAs) prior to any sample manipulation. The sample can be passed through the SPE and if it clogs, record the volume that passed through.
2. If the sample contains too much sediment to attempt passing it through the SPE cartridge, the sample should be spiked with isotope dilution analytes, centrifuged and decanted.
3. If higher reporting limits are acceptable for the project, the sample can be diluted by taking a representative aliquot of the sample. If isotope dilution analytes will be diluted out of the sample, they can be added after the dilution. The sample should be homogenized prior to taking an aliquot.

If alternate sample extraction procedures are used, please contact the DER remedial program chemist prior to employing. Any deviations in sample preparation procedures should be clearly noted in the case narrative.

Signal to Noise Ratio

For all target analyte ions used for quantification, signal to noise ratio should be 3:1 or greater.

Blanks

There should be no detections in the method blanks above the reporting limits.

Ion Transitions

The ion transitions listed below should be used for the following PFAS:

PFOA	413 > 369
PFOS	499 > 80
PFHxS	399 > 80
PFBS	299 > 80
6:2 FTS	427 > 407
8:2 FTS	527 > 507
N-EtFOSAA	584 > 419
N-MeFOSAA	570 > 419

Branched and Linear Isomers

Standards containing both branched and linear isomers should be used when standards are commercially available. Currently, quantitative standards are available for PFHxS, PFOS, NMeFOSAA, and NEtFOSAA. As more standards become available, they should be incorporated in to the method. All isomer peaks present in the standard should be integrated and the areas summed. Samples should be integrated in the same manner as the standards.

Since a quantitative standard does not exist for branched isomers of PFOA, the instrument should be calibrated using just the linear isomer and a technical (qualitative) PFOA standard should be used to identify the retention time of the branched PFOA isomers in the sample. The total response of PFOA branched and linear isomers should be integrated in the samples and quantitated using the calibration curve of the linear standard.

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated for each target analyte and the ratio compared to standards. Lab derived criteria should be used to determine if the ratios are acceptable.

Reporting

Detections below the reporting limit should be reported and qualified with a J qualifier.

The acid form of PFAS analytes should be reported. If the salt form of the PFAS was used as a stock standard, the measured mass should be corrected to report the acid form of the analyte.

Appendix I - 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 analytical results for projects within the Division of Environmental Remediation (DER) as well as aid in the preparation of a data usability summary report. 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 14 days to extraction for aqueous and solid samples. The time from extraction to analysis for aqueous samples is 28 days and 40 days for solids.

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

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

Initial Calibration

The initial calibration should contain a minimum of five 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%. Linear fit calibration curves should have an R^2 value greater than 0.990.

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
R^2 >0.990	J flag detects and UJ non detects
Low-level calibration check <50% or >150%	J flag detects and UJ non detects
Mid-level calibration check <70% or >130%	J flag detects and UJ non detects

Initial Calibration Verification

An initial calibration verification (ICV) standard should be from a second source (if available). The ICV should be at the same concentration as the mid-level standard of the calibration curve.

ICV recovery <70% or >130%	J flag detects and non-detects

Continuing Calibration Verification

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

CCV recovery <70 or >130%	J flag results

Blanks

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

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

Field Duplicates

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

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

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

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

Matrix Spike/Matrix Spike Duplicate

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

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

Extracted Internal Standards (Isotope Dilution Analytes)

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

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

Secondary Ion Transition Monitoring

Quantifier and qualifier ions should be monitored for all target analytes (PFBA and PFPeA are exceptions). The ratio of quantifier ion response to qualifier ion response should be calculated from the standards for each target analyte. Lab derived criteria should be used to determine if the ratios are acceptable. If the ratios fall outside of the laboratory criteria, qualify results as an estimated maximum concentration.

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.

Branched and Linear Isomers

Observed branched isomers in the sample that do not have a qualitative or quantitative standard should be noted and the analyte should be qualified as biased low in the final data review summary report. Note: The branched isomer peak should also be present in the secondary ion transition.

Reporting Limits

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

Peak Integrations

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

APPENDIX D

Laboratory Reporting Limits for Soil, Water and Air Samples

MDL/RL LIST - AIR

Analytical Method Information

Printed: 02/03/2021 3:01 pm

Volatile Organics, EPA TO15 Full List in Air (EPA TO-15)

Preservation: None Required

Container: 12_Summa Canister, 6 Liter **Amount Required:** 6 L **Hold Time:** 30 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
1,1,1,2-Tetrachloroethane	0.059	0.10 ppbv		25			70-130	
1,1,1-Trichloroethane	0.084	0.10 ppbv		25			70-130	
1,1,2,2-Tetrachloroethane	0.048	0.10 ppbv		25			70-130	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.096	0.10 ppbv		25			70-130	
1,1,2-Trichloroethane	0.043	0.10 ppbv		25			70-130	
1,1-Dichloroethane	0.083	0.10 ppbv		25			70-130	
1,1-Dichloroethylene	0.025	0.025 ppbv		25			70-130	
1,2,4-Trichlorobenzene	0.079	0.10 ppbv		25			70-130	
1,2,4-Trimethylbenzene	0.060	0.10 ppbv		25			70-130	
1,2-Dibromoethane	0.040	0.10 ppbv		25			70-130	
1,2-Dichlorobenzene	0.065	0.10 ppbv		25			70-130	
1,2-Dichloroethane	0.062	0.10 ppbv		25			70-130	
1,2-Dichloropropane	0.051	0.10 ppbv		25			70-130	
1,2-Dichlorotetrafluoroethane	0.098	0.10 ppbv		25			70-130	
1,3,5-Trimethylbenzene	0.054	0.10 ppbv		25			70-130	
1,3-Butadiene	0.038	0.30 ppbv		25			70-130	
1,3-Dichlorobenzene	0.067	0.10 ppbv		25			70-130	
1,3-Dichloropropane	0.031	0.10 ppbv		25			70-130	
1,4-Dichlorobenzene	0.060	0.10 ppbv		25			70-130	
1,4-Dioxane	0.083	0.20 ppbv		25			70-130	
2-Butanone	0.059	0.10 ppbv		25			70-130	
2-Hexanone	0.041	0.20 ppbv		25			70-130	
3-Chloropropene	0.076	0.50 ppbv		25			70-130	
4-Methyl-2-pentanone	0.085	0.10 ppbv		25			70-130	
Acetone	0.098	0.20 ppbv		25			70-130	
Acrolein	0.097	0.10 ppbv		25			70-130	
Acrylonitrile	0.079	0.10 ppbv		25			70-130	
Benzene	0.099	0.10 ppbv		25			70-130	
Benzyl chloride	0.054	0.10 ppbv		25			70-130	
Bromodichloromethane	0.034	0.10 ppbv		25			70-130	
Bromoform	0.049	0.10 ppbv		25			70-130	
Bromomethane	0.098	0.10 ppbv		25			70-130	
Carbon disulfide	0.094	0.10 ppbv		25			70-130	
Carbon tetrachloride	0.025	0.025 ppbv		25			70-130	
Chlorobenzene	0.056	0.10 ppbv		25			70-130	
Chloroethane	0.064	0.10 ppbv		25			70-130	
Chloroform	0.092	0.10 ppbv		25			70-130	
Chloromethane	0.049	0.10 ppbv		25			70-130	
cis-1,2-Dichloroethylene	0.025	0.025 ppbv		25			70-130	
cis-1,3-Dichloropropylene	0.041	0.10 ppbv		25			70-130	
Cyclohexane	0.086	0.10 ppbv		25			70-130	
Dibromochloromethane	0.049	0.10 ppbv		25			70-130	
Dichlorodifluoromethane	0.090	0.10 ppbv		25			70-130	
Ethanol	0.10	0.10 ppbv		25			70-130	
Ethyl acetate	0.068	0.20 ppbv		25			70-130	
Ethyl Benzene	0.069	0.10 ppbv		25			70-130	
Hexachlorobutadiene	0.085	0.10 ppbv		25			70-130	
Isopropanol	0.096	0.20 ppbv		25			70-130	
Isopropylbenzene	0.059	0.10 ppbv		25			70-130	
Methyl Methacrylate	0.031	0.10 ppbv		25			70-130	
Methyl tert-butyl ether (MTBE)	0.097	0.10 ppbv		25			70-130	
Methylene chloride	0.070	0.20 ppbv		25			70-130	
Naphthalene	0.097	0.20 ppbv		25			70-130	

Volatile Organics, EPA TO15 Full List in Air (EPA TO-15) (Continued)

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
n-Butylbenzene	0.054	0.10 ppbv		25			70-130	
n-Heptane	0.043	0.10 ppbv		25			70-130	
n-Hexane	0.080	0.10 ppbv		25			70-130	
n-Propylbenzene	0.093	0.10 ppbv		25			70-130	
o-Xylene	0.024	0.10 ppbv		25			70-130	
p- & m- Xylenes	0.14	0.20 ppbv		25			70-130	
p-Ethyltoluene	0.076	0.10 ppbv		25			70-130	
p-Isopropyltoluene	0.030	0.10 ppbv		25			70-130	
Propylene	0.042	0.10 ppbv		25			70-130	
sec-Butylbenzene	0.056	0.10 ppbv		25			70-130	
Styrene	0.059	0.10 ppbv		25			70-130	
tert-Butylbenzene	0.051	0.10 ppbv		25			70-130	
Tetrachloroethylene	0.049	0.10 ppbv		25			70-130	
Tetrahydrofuran	0.053	0.20 ppbv		25			70-130	
Toluene	0.059	0.10 ppbv		25			70-130	
trans-1,2-Dichloroethylene	0.079	0.10 ppbv		25			70-130	
trans-1,3-Dichloropropylene	0.092	0.10 ppbv		25			70-130	
Trichloroethylene	0.025	0.025 ppbv		25			70-130	
Trichlorofluoromethane (Freon 11)	0.076	0.10 ppbv		25			70-130	
Vinyl acetate	0.062	0.10 ppbv		25			70-130	
Vinyl bromide	0.096	0.10 ppbv		25			70-130	
Vinyl Chloride	0.044	0.050 ppbv		25			70-130	
Xylenes, Total	0.17	0.30 ppbv						
Tentatively Identified Compounds								
SURR: p-Bromofluorobenzene								
Bromochloromethane								
ISTD: 1,4-Difluorobenzene								
ISTD: d5-Chlorobenzene								

MDL/RL LIST - SW

Analytical Method Information

Printed: 02/03/2021 1:37 pm

Chromium, Hexavalent in Soil (EPA 7196A)

Preservation: Cool 4°C

Container: 06_4 oz. WM Clear Glass Cool to 4° C **Amount Required:** 25 g, **Hold Time:** 30 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Chromium, Hexavalent	0.350	0.500 mg/kg		35	75-125		18.8-206	

Analytical Method Information

Printed: 02/03/2021 1:40 pm

Cyanide, Total in Soil (EPA 9014/9010C)

Preservation: Cool 4°C

Container: 06_4 oz. WM Clear Glass Cool to 4° C   **Amount Required:** 10 g.   **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Cyanide, total	0.500	0.500 mg/kg		15	79.6-107		72.9-112	

Analytical Method Information

Herbicides, Target List in Soil (EPA 8151A)

Preservation: Cool 4°C

Container: 06_4 oz. WM Clear Glass Cool to 4° C **Amount Required:** 100 g. **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
2,4,5-T	20.0	20.0 ug/kg			10-120	35	10-120	30
2,4,5-T [2C]	20.0	20.0 ug/kg			10-120	35	10-120	30
2,4,5-TP (Silvex)	20.0	20.0 ug/kg			10-120	35	10-120	30
2,4,5-TP (Silvex) [2C]	20.0	20.0 ug/kg			10-120	35	10-120	30
2,4-D	20.0	20.0 ug/kg			10-118	35	10-118	30
2,4-D [2C]	20.0	20.0 ug/kg			10-118	35	10-118	30
2,4-DB	20.0	20.0 ug/kg			10-128	35	10-128	30
2,4-DB [2C]	20.0	20.0 ug/kg			10-128	35	10-128	30
Dalapon	20.0	20.0 ug/kg			30-150	35	40-140	30
Dalapon [2C]	20.0	20.0 ug/kg			30-150	35	40-140	30
Dicamba	20.0	20.0 ug/kg			12-117	35	12-117	30
Dicamba [2C]	20.0	20.0 ug/kg			12-117	35	12-117	30
Surr: 2,4-Dichlorophenylacetic acid (DCAA)			21-150					
Surr: 2,4-Dichlorophenylacetic acid (DCAA) [2C]			21-150					

Analytical Method Information

Printed: 02/03/2021 2:26 pm

Mercury by 7473 in Soil (EPA 7473)

Preservation: Cool 4°C

Container: 06_8 oz. WM Clear Glass Cool to 4° C **Amount Required:** 10 g. **Hold Time:** 28 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Mercury	0.0300	0.0300 mg/kg		35	75-125		67.6-131	

Metals, Target Analyte in Soil (EPA 6010D)

Preservation: Cool 4°C

Container: 06_4 oz. WM Clear Glass Cool to 4° C **Amount Required:** 50 **Hold Time:** 180 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Aluminum	5.00	5.00 mg/kg		35	75-125	35	80-120	
Antimony	2.50	2.50 mg/kg		35	75-125	35	80-120	
Arsenic	1.50	1.50 mg/kg		35	75-125	35	80-120	
Barium	2.50	2.50 mg/kg		35	75-125	35	80-120	
Beryllium	0.0500	0.0500 mg/kg		35	75-125	35	80-120	
Cadmium	0.300	0.300 mg/kg		35	75-125	35	80-120	
Calcium	0.500	5.00 mg/kg		35	75-125	35	80-120	
Chromium	0.500	0.500 mg/kg		35	75-125	35	80-120	
Cobalt	0.400	0.400 mg/kg		35	75-125	35	80-120	
Copper	2.00	2.00 mg/kg		35	75-125	35	80-120	
Iron	25.0	25.0 mg/kg		35	75-125	35	80-120	
Lead	0.500	0.500 mg/kg		35	75-125	35	80-120	
Magnesium	5.00	5.00 mg/kg		35	75-125	35	80-120	
Manganese	0.500	0.500 mg/kg		35	75-125	35	80-120	
Nickel	1.00	1.00 mg/kg		35	75-125	35	80-120	
Potassium	5.00	5.00 mg/kg		35	75-125	35	80-120	
Selenium	2.50	2.50 mg/kg		35	75-125	35	80-120	
Silver	0.500	0.500 mg/kg		35	75-125	35	80-120	
Sodium	50.0	50.0 mg/kg		35	75-125	35	80-120	
Thallium	2.50	2.50 mg/kg		35	75-125	35	80-120	
Vanadium	1.00	1.00 mg/kg		35	75-125	35	80-120	
Zinc	2.50	2.50 mg/kg		35	75-125	35	80-120	
Yttrium 371.029						35		

Metals, Target Analyte List in Soil (varies)

Preservation: [Group Analysis]

Container: **Amount Required:** **Hold Time:** 5 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD

No Analytes listed

Analytical Method Information

Printed: 02/03/2021 2:00 pm

Pesticides, 8081 target list in Soil (EPA 8081B)

Preservation: Cool 4°C

Container: 06_4 oz. WM Clear Glass Cool to 4° C **Amount Required:** 100 g **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
4,4'-DDD	0.330	0.330 ug/kg			30-150	30	40-140	30
4,4'-DDD [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
4,4'-DDE	0.330	0.330 ug/kg			30-150	30	40-140	30
4,4'-DDE [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
4,4'-DDT	0.330	0.330 ug/kg			30-150	30	40-140	30
4,4'-DDT [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Aldrin	0.330	0.330 ug/kg			30-150	30	40-140	30
Aldrin [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
alpha-BHC	0.330	0.330 ug/kg			30-150	30	40-140	30
alpha-BHC [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
alpha-Chlordane	0.330	0.330 ug/kg			30-150	30	40-140	30
alpha-Chlordane [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
beta-BHC	0.330	0.330 ug/kg			30-150	30	40-140	30
beta-BHC [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Chlordane, total	6.60	6.60 ug/kg						30
Chlordane, total [2C]	6.60	6.60 ug/kg				30		30
delta-BHC	0.330	0.330 ug/kg			30-150	30	40-140	30
delta-BHC [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Dieldrin	0.330	0.330 ug/kg			30-150	30	40-140	30
Dieldrin [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Endosulfan I	0.330	0.330 ug/kg			30-150	30	40-140	30
Endosulfan I [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Endosulfan II	0.330	0.330 ug/kg			30-150	30	40-140	30
Endosulfan II [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Endosulfan sulfate	0.330	0.330 ug/kg			30-150	30	40-140	30
Endosulfan sulfate [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Endrin	0.330	0.330 ug/kg			30-150	30	40-140	30
Endrin [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Endrin aldehyde	0.330	0.330 ug/kg			30-150	30	40-140	30
Endrin aldehyde [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Endrin ketone	0.330	0.330 ug/kg			30-150	30	40-140	30
Endrin ketone [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
gamma-BHC (Lindane)	0.330	0.330 ug/kg			30-150	30	40-140	30
gamma-BHC (Lindane) [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
gamma-Chlordane	0.330	0.330 ug/kg			30-150	30	40-140	30
gamma-Chlordane [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Heptachlor	0.330	0.330 ug/kg			30-150	30	40-140	30
Heptachlor [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Heptachlor epoxide	0.330	0.330 ug/kg			30-150	30	40-140	30
Heptachlor epoxide [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Methoxychlor	1.65	1.65 ug/kg			30-150	30	40-140	30
Methoxychlor [2C]	0.330	0.330 ug/kg			30-150	30	40-140	30
Toxaphene	16.7	16.7 ug/kg				30		30
Toxaphene [2C]	33.0	33.0 ug/kg				30		30
Mirex	0.330	0.330 ug/kg			30-150	30	40-140	30
Surr: Decachlorobiphenyl			30-150					
Surr: Decachlorobiphenyl [2C]			30-150					
Surr: Tetrachloro-m-xylene			30-150					
Surr: Tetrachloro-m-xylene [2C]			30-150					

Analytical Method Information

Printed: 02/03/2021 2:02 pm

Polychlorinated Biphenyls (PCB) in Soil (EPA 8082A)

Preservation: Cool 4°C

Container: 06_8 oz. WM Clear Glass Cool to 4° C **Amount Required:** 100g **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Aroclor 1016	0.0167	0.0167 mg/kg			40-140	50	40-130	25
Aroclor 1016 (1)								
Aroclor 1016 (2)								
Aroclor 1016 (3)								
Aroclor 1016 (4)								
Aroclor 1016 (5)								
Aroclor 1016 [2C]	0.0167	0.0167 mg/kg			40-140	50	40-130	25
Aroclor 1016 (1) [2C]								
Aroclor 1016 (2) [2C]								
Aroclor 1016 (3) [2C]								
Aroclor 1016 (4) [2C]								
Aroclor 1016 (5) [2C]								
Aroclor 1221	0.0167	0.0167 mg/kg						
Aroclor 1221 (1)								
Aroclor 1221 (2)								
Aroclor 1221 (3)								
Aroclor 1221 [2C]	0.0167	0.0167 mg/kg						
Aroclor 1221 (1) [2C]								
Aroclor 1221 (2) [2C]								
Aroclor 1221 (3) [2C]								
Aroclor 1232	0.0167	0.0167 mg/kg						
Aroclor 1232 (1)								
Aroclor 1232 (2)								
Aroclor 1232 (3)								
Aroclor 1232 (4)								
Aroclor 1232 (5)								
Aroclor 1232 [2C]	0.0167	0.0167 mg/kg						
Aroclor 1232 (1) [2C]								
Aroclor 1232 (2) [2C]								
Aroclor 1232 (3) [2C]								
Aroclor 1232 (4) [2C]								
Aroclor 1232 (5) [2C]								
Aroclor 1242	0.0167	0.0167 mg/kg						
Aroclor 1242 (1)								
Aroclor 1242 (2)								
Aroclor 1242 (3)								
Aroclor 1242 (4)								
Aroclor 1242 (5)								
Aroclor 1242 [2C]	0.0167	0.0167 mg/kg						
Aroclor 1242 (1) [2C]								
Aroclor 1242 (2) [2C]								
Aroclor 1242 (3) [2C]								
Aroclor 1242 (4) [2C]								
Aroclor 1242 (5) [2C]								
Aroclor 1248	0.0167	0.0167 mg/kg						
Aroclor 1248 (1)								
Aroclor 1248 (2)								
Aroclor 1248 (3)								
Aroclor 1248 (4)								
Aroclor 1248 (5)								
Aroclor 1248 [2C]	0.0167	0.0167 mg/kg						
Aroclor 1248 (1) [2C]								
Aroclor 1248 (2) [2C]								
Aroclor 1248 (3) [2C]								

Analytical Method Information

(Continued)

Polychlorinated Biphenyls (PCB) in Soil (EPA 8082A) (Continued)

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Aroclor 1248 (4) [2C]								
Aroclor 1248 (5) [2C]								
Aroclor 1254	0.0167	0.0167 mg/kg				50		25
Aroclor 1254 (1)								
Aroclor 1254 (2)								
Aroclor 1254 (3)								
Aroclor 1254 (4)								
Aroclor 1254 (5)								
Aroclor 1254 [2C]	0.0167	0.0167 mg/kg						
Aroclor 1254 (1) [2C]								
Aroclor 1254 (2) [2C]								
Aroclor 1254 (3) [2C]								
Aroclor 1254 (4) [2C]								
Aroclor 1254 (5) [2C]								
Aroclor 1260	0.0167	0.0167 mg/kg			40-140	50	40-130	25
Aroclor 1260 (1)								
Aroclor 1260 (2)								
Aroclor 1260 (3)								
Aroclor 1260 (4)								
Aroclor 1260 (5)								
Aroclor 1260 [2C]	0.0167	0.0167 mg/kg			40-140	50	40-150	25
Aroclor 1260 (1) [2C]								
Aroclor 1260 (2) [2C]								
Aroclor 1260 (3) [2C]								
Aroclor 1260 (4) [2C]								
Aroclor 1260 (5) [2C]								
Aroclor 1262	0.0167	0.0167 mg/kg						
Aroclor 1262 (1)								
Aroclor 1262 (2)								
Aroclor 1262 (3)								
Aroclor 1262 (4)								
Aroclor 1262 (5)								
Aroclor 1262 [2C]	0.0167	0.0167 mg/kg						
Aroclor 1262 (1) [2C]								
Aroclor 1262 (2) [2C]								
Aroclor 1262 (3) [2C]								
Aroclor 1262 (4) [2C]								
Aroclor 1262 (5) [2C]								
Aroclor 1268	0.0167	0.0167 mg/kg						
Aroclor 1268 (1)								
Aroclor 1268 (2)								
Aroclor 1268 (3)								
Aroclor 1268 (4)								
Aroclor 1268 (5)								
Aroclor 1268 [2C]	0.0167	0.0167 mg/kg						
Aroclor 1268 (1) [2C]								
Aroclor 1268 (2) [2C]								
Aroclor 1268 (3) [2C]								
Aroclor 1268 (4) [2C]								
Aroclor 1268 (5) [2C]								
Total PCBs	0.0167	0.0167 mg/kg						
Total PCBs [2C]	0.0167	0.0167 mg/kg						
Surr: Tetrachloro-m-xylene			30-140					
Surr: Tetrachloro-m-xylene [2C]			30-140					
Surr: Decachlorobiphenyl			30-140					
Surr: Decachlorobiphenyl [2C]			30-140					

Analytical Method Information

PFAS, NYSDEC Target List in Soil (EPA 537m)

Preservation: Cool 4°C

Container: 10_250mL Plastic Cool to 4° C **Amount Required:** 250 mL **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Perfluorobutanesulfonic acid (PFBS)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluorohexanoic acid (PFHxA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluoroheptanoic acid (PFHpA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluorohexanesulfonic acid (PFHxS)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluorooctanoic acid (PFOA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluorooctanesulfonic acid (PFOS)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluorononanoic acid (PFNA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluorodecanoic acid (PFDA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluoroundecanoic acid (PFUnA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluorododecanoic acid (PFDoA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluorotridecanoic acid (PFTrDA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluorotetradecanoic acid (PFTA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
N-MeFOSAA	0.500	0.500 ug/kg		30	25-150	35	50-130	30
N-EtFOSAA	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluoropentanoic acid (PFPeA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluoro-1-octanesulfonamide (FOSA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluoro-1-heptanesulfonic acid (PFHpS)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluoro-1-decanesulfonic acid (PFDS)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Perfluoro-n-butanoic acid (PFBA)	0.500	0.500 ug/kg		30	25-150	35	50-130	30
Surr: M3PFBS			25-150					
Surr: M5PFHxA			25-150					
Surr: M4PFHpA			25-150					
Surr: M3PFHxS			25-150					
Surr: Perfluoro-n-[13C8]octanoic acid (M8PFOA)			25-150					
Surr: M6PFDA			25-150					
Surr: M7PFUdA			25-150					
Surr: Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)			25-150					
Surr: M2PFTeDA			10-150					
Surr: Perfluoro-n-[13C4]butanoic acid (MPFBA)			25-150					
Surr: Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)			25-150					
Surr: Perfluoro-n-[13C5]pentanoic acid (M5PFPeA)			25-150					
Surr: Perfluoro-1-[13C8]octanesulfonamide (M8FOSA)			10-150					
Surr: d3-N-MeFOSAA			25-150					
Surr: d5-N-EtFOSAA			25-150					
Surr: M2-6:2 FTS			25-150					
Surr: M2-8:2 FTS			25-150					
Surr: M9PFNA			25-150					
MPFOA								

Analytical Method Information

Printed: 02/03/2021 2:04 pm

Semi-Volatiles, 1,4-Dioxane 8270 SIM-Soil in Soil (EPA 8270D SIM)

Preservation: Cool 4°C

Container: 06_4 oz. WM Clear Glass Cool to 4° C **Amount Required:** 250 mL **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
1,4-Dioxane		10.0 ug/kg		30	40-130	30	40-130	30
Surr: 1,4-Dioxane-d8			39-127.5					
1,2-Dichlorobenzene-d4								

Analytical Method Information

Printed: 02/03/2021 2:11 pm

Semi-Volatiles, NJDEP/TCL/Part 375 List in Soil (EPA 8270D)

Preservation: Cool 4°C

Container: 06_4 oz. WM Clear Glass Cool to 4° C **Amount Required:** 100 g **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
1,1-Biphenyl	20.9	41.7 ug/kg			24-112	30	22-103	30
1,2,4,5-Tetrachlorobenzene	41.7	83.3 ug/kg			18-152	30	10-144	30
1,2,4-Trichlorobenzene	20.9	41.7 ug/kg			15-139	30	23-130	30
1,2-Dichlorobenzene	20.9	41.7 ug/kg			29-106	30	26-113	30
1,2-Diphenylhydrazine (as Azobenzene)	20.9	41.7 ug/kg			10-135	30	10-140	30
1,3-Dichlorobenzene	20.9	41.7 ug/kg			34-100	30	32-113	30
1,4-Dichlorobenzene	20.9	41.7 ug/kg			26-107	30	28-111	30
2,3,4,6-Tetrachlorophenol	41.7	83.3 ug/kg			30-130	30	30-130	30
2,4,5-Trichlorophenol	20.9	41.7 ug/kg			10-148	30	14-138	30
2,4,6-Trichlorophenol	20.9	41.7 ug/kg			12-138	30	27-122	30
2,4-Dichlorophenol	20.9	41.7 ug/kg			16-144	30	23-133	30
2,4-Dimethylphenol	20.9	41.7 ug/kg			11-133	30	15-131	30
2,4-Dinitrophenol	41.7	83.3 ug/kg			10-132	30	10-149	30
2,4-Dinitrotoluene	20.9	41.7 ug/kg			42-113	30	30-123	30
2,6-Dinitrotoluene	20.9	41.7 ug/kg			36-124	30	30-125	30
2-Chloronaphthalene	20.9	41.7 ug/kg			31-116	30	22-115	30
2-Chlorophenol	20.9	41.7 ug/kg			28-114	30	25-121	30
2-Methylnaphthalene	20.9	41.7 ug/kg			10-143	30	16-127	30
2-Methylphenol	20.9	41.7 ug/kg			10-160	30	10-146	30
2-Nitroaniline	41.7	83.3 ug/kg			33-122	30	24-126	30
2-Nitrophenol	20.9	41.7 ug/kg			12-127	30	17-129	30
3- & 4-Methylphenols	20.9	41.7 ug/kg			16-115	30	20-109	30
3,3-Dichlorobenzidine	20.9	41.7 ug/kg			10-134	30	10-147	30
3-Nitroaniline	41.7	83.3 ug/kg			24-128	30	23-123	30
4,6-Dinitro-2-methylphenol	41.7	83.3 ug/kg			10-149	30	10-149	30
4-Bromophenyl phenyl ether	20.9	41.7 ug/kg			32-148	30	30-138	30
4-Chloro-3-methylphenol	20.9	41.7 ug/kg			14-138	30	16-138	30
4-Chloroaniline	20.9	41.7 ug/kg			10-124	30	10-117	30
4-Chlorophenyl phenyl ether	20.9	41.7 ug/kg			10-153	30	18-132	30
4-Nitroaniline	41.7	83.3 ug/kg			10-151	30	14-125	30
4-Nitrophenol	41.7	83.3 ug/kg			10-141	30	10-136	30
Acenaphthene	20.9	41.7 ug/kg			13-133	30	17-124	30
Acenaphthylene	20.9	41.7 ug/kg			25-125	30	16-124	30
Acetophenone	20.9	41.7 ug/kg			25-105	30	28-105	30
Aniline	83.5	167 ug/kg			10-112	30	10-111	30
Anthracene	20.9	41.7 ug/kg			27-128	30	24-124	30
Atrazine	20.9	41.7 ug/kg			10-139	30	22-120	30
Benzaldehyde	20.9	41.7 ug/kg			24-96	30	21-100	30
Benzidine	83.5	167 ug/kg				30		30
Benzo(a)anthracene	20.9	41.7 ug/kg			20-147	30	25-134	30
Benzo(a)pyrene	20.9	41.7 ug/kg			18-153	30	29-144	30
Benzo(b)fluoranthene	20.9	41.7 ug/kg			10-163	30	20-151	30
Benzo(g,h,i)perylene	20.9	41.7 ug/kg			10-157	30	10-153	30
Benzo(k)fluoranthene	20.9	41.7 ug/kg			10-157	30	10-148	30
Benzoic acid	20.9	41.7 ug/kg			10-130	30	10-116	30
Benzyl alcohol	20.9	41.7 ug/kg			20-122	30	17-128	30
Benzyl butyl phthalate	20.9	41.7 ug/kg			10-129	30	10-132	30
Bis(2-chloroethoxy)methane	20.9	41.7 ug/kg			12-128	30	10-129	30
Bis(2-chloroethyl)ether	20.9	41.7 ug/kg			18-113	30	14-125	30
Bis(2-chloroisopropyl)ether	20.9	41.7 ug/kg			10-130	30	14-122	30
Bis(2-ethylhexyl)phthalate	20.9	41.7 ug/kg			10-138	30	10-141	30
Caprolactam	41.7	83.3 ug/kg			10-100	30	10-123	30
Carbazole	20.9	41.7 ug/kg			24-139	30	31-120	30

Analytical Method Information

(Continued)

Semi-Volatiles, NJDEP/TCL/Part 375 List in Soil (EPA 8270D) (Continued)

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Chrysene	20.9	41.7 ug/kg			18-133	30	24-116	30
Dibenzo(a,h)anthracene	20.9	41.7 ug/kg			10-146	30	17-147	30
Dibenzofuran	20.9	41.7 ug/kg			26-134	30	23-123	30
Diethyl phthalate	20.9	41.7 ug/kg			30-119	30	23-122	30
Dimethyl phthalate	20.9	41.7 ug/kg			34-120	30	28-127	30
Di-n-butyl phthalate	20.9	41.7 ug/kg			20-128	30	19-123	30
Di-n-octyl phthalate	20.9	41.7 ug/kg			10-133	30	10-132	30
Fluoranthene	20.9	41.7 ug/kg			10-155	30	36-125	30
Fluorene	20.9	41.7 ug/kg			12-150	30	16-130	30
Hexachlorobenzene	20.9	41.7 ug/kg			16-142	30	10-129	30
Hexachlorobutadiene	20.9	41.7 ug/kg			11-150	30	22-153	30
Hexachlorocyclopentadiene	20.9	41.7 ug/kg			10-115	30	10-134	30
Hexachloroethane	20.9	41.7 ug/kg			14-106	30	20-112	30
Indeno(1,2,3-cd)pyrene	20.9	41.7 ug/kg			10-155	30	10-155	30
Isophorone	20.9	41.7 ug/kg			14-127	30	14-131	30
Naphthalene	20.9	41.7 ug/kg			15-132	30	20-121	30
Nitrobenzene	20.9	41.7 ug/kg			18-125	30	20-121	30
N-Nitrosodimethylamine	20.9	41.7 ug/kg			10-123	30	10-124	30
N-nitroso-di-n-propylamine	20.9	41.7 ug/kg			23-115	30	21-119	30
N-Nitrosodiphenylamine	20.9	41.7 ug/kg			16-166	30	10-163	30
Pentachlorophenol	20.9	41.7 ug/kg			10-160	30	10-143	30
Phenanthrene	20.9	41.7 ug/kg			10-151	30	24-123	30
Phenol	20.9	41.7 ug/kg			11-124	30	15-123	30
Pyrene	20.9	41.7 ug/kg			13-148	30	24-132	30
Pyridine	83.5	167 ug/kg			10-125	30	10-92	30
Benzo(a)pyrene (BAP)								
Equivalent-BAPE								
Surr: SURR: 2-Fluorophenol			20-108					
Surr: SURR: Phenol-d5			23-114					
Surr: SURR: Nitrobenzene-d5			22-108					
Surr: SURR: 2-Fluorobiphenyl			21-113					
Surr: SURR: 2,4,6-Tribromophenol			19-110					
Surr: SURR: Terphenyl-d14			24-116					
ISTD: 1,4-Dichlorobenzene-d4								
ISTD: Naphthalene-d8								
ISTD: Acenaphthene-d10								
ISTD: Phenanthrene-d10								
ISTD: Chrysene-d12								
ISTD: Perylene-d12								

Analytical Method Information

Printed: 02/03/2021 2:13 pm

Volatile Organics, NJDEP/TCL/Part 375 List in Soil (EPA 8260C)

Preservation: Cool 4°C

Container: 03_5035 Vial Set **Amount Required:** 20 g. **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
1,1,1,2-Tetrachloroethane	2.5	5.0 ug/kg			15-161	33	75-129	30
1,1,1-Trichloroethane	2.5	5.0 ug/kg			42-145	30	71-137	30
1,1,2,2-Tetrachloroethane	2.5	5.0 ug/kg			16-167	56	79-129	30
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	2.5	5.0 ug/kg			11-160	31	58-146	30
1,1,2-Trichloroethane	2.5	5.0 ug/kg			44-145	40	83-123	30
1,1-Dichloroethane	2.5	5.0 ug/kg			46-142	36	75-130	30
1,1-Dichloroethylene	2.5	5.0 ug/kg			30-153	31	64-137	30
1,1-Dichloropropylene	2.5	5.0 ug/kg			40-133	28	77-127	30
1,2,3-Trichlorobenzene	2.5	5.0 ug/kg			10-157	47	81-140	30
1,2,3-Trichloropropane	2.5	5.0 ug/kg			38-155	48	81-126	30
1,2,4-Trichlorobenzene	2.5	5.0 ug/kg			10-151	52	80-141	30
1,2,4-Trimethylbenzene	2.5	5.0 ug/kg			10-170	242	84-125	30
1,2-Dibromo-3-chloropropane	2.5	5.0 ug/kg			36-138	54	74-142	30
1,2-Dibromoethane	2.5	5.0 ug/kg			40-142	39	86-123	30
1,2-Dichlorobenzene	2.5	5.0 ug/kg			10-147	52	85-122	30
1,2-Dichloroethane	2.5	5.0 ug/kg			48-133	32	71-133	30
1,2-Dichloropropane	2.5	5.0 ug/kg			47-141	37	81-122	30
1,3,5-Trimethylbenzene	2.5	5.0 ug/kg			10-150	62	82-126	30
1,3-Dichlorobenzene	2.5	5.0 ug/kg			10-144	51	84-124	30
1,3-Dichloropropane	2.5	5.0 ug/kg			43-142	36	83-123	30
1,4-Dichlorobenzene	2.5	5.0 ug/kg			10-160	52	84-124	30
1,4-Dioxane	50	100 ug/kg			10-191	196	10-228	30
2,2-Dichloropropane	2.5	5.0 ug/kg			38-130	31	67-136	30
2-Butanone	2.5	5.0 ug/kg			10-189	67	58-147	30
2-Chlorotoluene	2.5	5.0 ug/kg			14-144	49	78-127	30
2-Hexanone	2.5	5.0 ug/kg			10-181	60	70-139	30
4-Chlorotoluene	2.5	5.0 ug/kg			15-138	39	79-125	30
4-Methyl-2-pentanone	2.5	5.0 ug/kg			10-166	47	72-132	30
Acetone	5.0	10 ug/kg			10-196	150	36-155	30
Acrolein	5.0	10 ug/kg			10-192	128	10-238	30
Acrylonitrile	2.5	5.0 ug/kg			13-161	48	66-141	30
Benzene	2.5	5.0 ug/kg			43-139	64	77-127	30
Bromobenzene	2.5	5.0 ug/kg			23-142	44	77-129	30
Bromochloromethane	2.5	5.0 ug/kg			38-145	30	74-129	30
Bromodichloromethane	2.5	5.0 ug/kg			38-147	37	81-124	30
Bromoform	2.5	5.0 ug/kg			29-156	51	80-136	30
Bromomethane	2.5	5.0 ug/kg			10-166	42	32-177	30
Carbon disulfide	2.5	5.0 ug/kg			10-131	36	10-136	30
Carbon tetrachloride	2.5	5.0 ug/kg			35-145	31	66-143	30
Chlorobenzene	2.5	5.0 ug/kg			21-154	32	86-120	30
Chloroethane	2.5	5.0 ug/kg			15-160	40	51-142	30
Chloroform	2.5	5.0 ug/kg			47-142	29	76-131	30
Chloromethane	2.5	5.0 ug/kg			10-159	31	49-132	30
cis-1,2-Dichloroethylene	2.5	5.0 ug/kg			42-144	30	74-132	30
cis-1,3-Dichloropropylene	2.5	5.0 ug/kg			18-159	39	81-129	30
Cyclohexane	2.5	5.0 ug/kg			70-130	30	70-130	30
Dibromochloromethane	2.5	5.0 ug/kg			10-179	41	10-200	30
Dibromomethane	2.5	5.0 ug/kg			47-143	41	83-124	30
Dichlorodifluoromethane	2.5	5.0 ug/kg			10-145	34	28-158	30
Ethyl Benzene	2.5	5.0 ug/kg			11-158	42	84-125	30
Hexachlorobutadiene	2.5	5.0 ug/kg			10-158	45	83-133	30
Isopropylbenzene	2.5	5.0 ug/kg			10-162	57	81-127	30
Methyl acetate	2.5	5.0 ug/kg			10-149	64	41-143	30

Analytical Method Information

(Continued)

Volatile Organics, NJDEP/TCL/Part 375 List in Soil (EPA 8260C) (Continued)

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Methyl tert-butyl ether (MTBE)	2.5	5.0 ug/kg			42-152	47	74-131	30
Methylcyclohexane	2.5	5.0 ug/kg			70-130	30	70-130	30
Methylene chloride	5.0	10 ug/kg			28-151	49	57-141	30
Naphthalene	2.5	10 ug/kg			10-158	95	86-141	30
n-Butylbenzene	2.5	5.0 ug/kg			10-162	96	80-130	30
n-Propylbenzene	2.5	5.0 ug/kg			10-155	56	74-136	30
o-Xylene	2.5	5.0 ug/kg			10-158	51	83-123	30
p- & m- Xylenes	5.0	10 ug/kg			10-156	47	82-128	30
p-Isopropyltoluene	2.5	5.0 ug/kg			10-147	60	85-125	30
sec-Butylbenzene	2.5	5.0 ug/kg			10-157	56	83-125	30
Styrene	2.5	5.0 ug/kg			13-171	39	86-126	30
tert-Butyl alcohol (TBA)	2.5	5.0 ug/kg			34-179	35	70-130	30
tert-Butylbenzene	2.5	5.0 ug/kg			10-160	79	80-127	30
Tetrachloroethylene	2.5	5.0 ug/kg			30-167	33	80-129	30
Toluene	2.5	5.0 ug/kg			21-160	50	85-121	30
trans-1,2-Dichloroethylene	2.5	5.0 ug/kg			29-153	30	72-132	30
trans-1,3-Dichloropropylene	2.5	5.0 ug/kg			18-155	30	78-132	30
Trichloroethylene	2.5	5.0 ug/kg			24-169	30	84-123	30
Trichlorofluoromethane	2.5	5.0 ug/kg			35-142	30	62-140	30
Vinyl acetate	2.5	5.0 ug/kg			10-119	82	67-136	30
Vinyl Chloride	2.5	5.0 ug/kg			12-160	35	52-130	30
Xylenes, Total	7.5	15 ug/kg						
Surr: SURR: 1,2-Dichloroethane-d4			77-125					
Surr: SURR: Toluene-d8			85-120					
Surr: SURR: p-Bromofluorobenzene			76-130			30		
ISTD: Fluorobenzene						30		30
ISTD: Chlorobenzene-d5								
ISTD: 1,2-Dichlorobenzene-d4								

MDL/RL LIST - NPW

Analytical Method Information

Chromium, Hexavalent in Water (EPA 7196A)

Preservation: Cool 4°C

Container: 10_250mL Plastic Cool to 4° C **Amount Required:** 100 mL **Hold Time:** 1 day

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Chromium, Hexavalent	0.0100	0.0100 mg/L		20	75-125		80-120	20

Analytical Method Information

Printed: 02/03/2021 1:40 pm

Cyanide, Total in Water (SM 4500 CN C/E)

Preservation: Dechlorinate; NaOH to pH>10

Container: 10_250 mL Plastic NAOH pH>10 Cool 4° C **Amount Required:** 100 **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Cyanide, total	0.0100	0.0100 mg/L		15	79-105		76.2-107	

Analytical Method Information

Printed: 02/03/2021 1:45 pm

Herbicides, Target List in Water (EPA 8151A)

Preservation: Cool 4°C

Container: 07_1000mL Amber Glass Cool to 4° C **Amount Required:** 100 mL **Hold Time:** 7 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
2,4,5-T	5.00	5.00 ug/L			30-150	30	10-140	30
2,4,5-T [2C]	5.00	5.00 ug/L			30-150	30	10-140	30
2,4,5-TP (Silvex)	5.00	5.00 ug/L			30-150	30	10-139	30
2,4,5-TP (Silvex) [2C]	5.00	5.00 ug/L			30-150	30	10-139	30
2,4-D	5.00	5.00 ug/L			30-150	30	10-140	30
2,4-D [2C]	5.00	5.00 ug/L			30-150	30	10-140	30
2,4-DB	5.00	5.00 ug/L			30-150	30	10-137	30
2,4-DB [2C]	5.00	5.00 ug/L			30-150	30	10-137	30
Dalapon	5.00	5.00 ug/L			30-150	30	40-140	30
Dalapon [2C]	5.00	5.00 ug/L			30-150	30	40-140	30
Dicamba	5.00	5.00 ug/L			30-150	30	10-124	30
Dicamba [2C]	5.00	5.00 ug/L			30-150	30	10-124	30
Surr: 2,4-Dichlorophenylacetic acid (DCAA)			30-150					
Surr: 2,4-Dichlorophenylacetic acid (DCAA) [2C]			30-150					

Analytical Method Information

Printed: 02/03/2021 2:59 pm

Mercury by 7473, Dissolved in Water (EPA 7473)

Preservation: Add HNO3 to pH<2, Cool 4°C

Container: 10_250mL Plastic pH <2 w/ HNO3 **Amount Required:** 100 mL **Hold Time:** 28 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Mercury	0.0002000	0.0002000 mg/L		20	75-125		80-120	

Metals, Target Analyte, ICP Dissolved in Water (EPA 6010D)

Preservation: Add HNO3 to pH<2, Cool 4°C

Container: 10_250mL Plastic pH <2 w/ HNO3 **Amount Required:** 250 **Hold Time:** 180 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Aluminum	0.0500	0.0500 mg/L		20		20	80-120	
Barium	0.0250	0.0250 mg/L		20	75-125	20	80-120	
Beryllium	0.000500	0.000500 mg/L		25	75-125	25	80-120	
Calcium	0.0500	0.0500 mg/L		20		20	80-120	
Chromium	0.00500	0.00500 mg/L		20	75-125	20	80-120	
Cobalt	0.00400	0.00400 mg/L		20	75-125	25	80-120	
Copper	0.0200	0.0200 mg/L		20	75-125	20	80-120	
Iron	0.250	0.250 mg/L		20	75-125	20	80-120	
Lead	0.00500	0.00500 mg/L		20	75-125	20	80-120	
Magnesium	0.0500	0.0500 mg/L		20		20	80-120	
Manganese	0.00500	0.00500 mg/L		20	75-125	20	80-120	
Nickel	0.0100	0.0100 mg/L		20	75-125	20	80-120	
Potassium	0.0500	0.0500 mg/L		20		20	80-120	
Selenium	0.0250	0.0250 mg/L		20	75-125	20	80-120	
Silver	0.00500	0.00500 mg/L		20	75-125	20	80-120	
Sodium	0.500	0.500 mg/L		20		20	80-120	
Vanadium	0.0100	0.0100 mg/L		20	75-125	20	80-120	
Zinc	0.0250	0.0250 mg/L		20	75-125	20	80-120	

Metals, Target Analyte, ICPMS Dissolved in Water (EPA 6020B)

Preservation: Add HNO3 to pH<2, Cool 4°C

Container: 10_250mL Plastic pH <2 w/ HNO3 **Amount Required:** 200 **Hold Time:** 180 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Antimony	1.00	1.00 ug/L		20	75-125	20	80-120	
Arsenic	1.00	1.00 ug/L		20	75-125	20	80-120	
Beryllium	0.300	0.300 ug/L		20	75-125	20	80-120	
Cadmium	0.500	0.500 ug/L		20	75-125	20	80-120	
Molybdenum	1.00	1.00 ug/L		20	75-125	20	80-120	
Selenium	1.00	1.00 ug/L		20	75-125	20	80-120	
Thallium	1.00	1.00 ug/L		20	75-125	20	80-120	

Metals, Target Analyte, ICPMS Dissolved List in Water (varies)

Preservation: [Group Analysis]

Container: **Amount Required:** **Hold Time:** 5 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD

No Analytes listed

Analytical Method Information

Printed: 02/03/2021 3:00 pm

Mercury by 7473 in Water (EPA 7473)

Preservation: Add HNO3 to pH<2, Cool 4°C

Container: 10_250mL Plastic pH <2 w/ HNO3 **Amount Required:** 100 mL **Hold Time:** 28 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Mercury	0.000200	0.000200 mg/L		20	75-125		80-120	

Metals, Target Analyte, ICP in Water (EPA 6010D)

Preservation: Add HNO3 to pH<2, Cool 4°C

Container: 10_250mL Plastic pH <2 w/ HNO3 **Amount Required:** 250 **Hold Time:** 180 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Aluminum	0.0500	0.0500 mg/L		20	75-125	20	80-120	
Barium	0.0250	0.0250 mg/L		20	75-125	20	80-120	
Beryllium	0.000500	0.000500 mg/L		25	75-125	25	80-120	
Calcium	0.0500	0.0500 mg/L		20	75-125	20	80-120	
Chromium	0.00500	0.00500 mg/L		20	75-125	20	80-120	
Cobalt	0.00400	0.00400 mg/L		20	75-125	25	80-120	
Copper	0.0200	0.0200 mg/L		20	75-125	20	80-120	
Iron	0.250	0.250 mg/L		20	75-125	20	80-120	
Lead	0.00500	0.00500 mg/L		20	75-125	20	80-120	
Magnesium	0.0500	0.0500 mg/L		20	75-125	20	80-120	
Manganese	0.00500	0.00500 mg/L		20	75-125	20	80-120	
Nickel	0.0100	0.0100 mg/L		20	75-125	20	80-120	
Potassium	0.0500	0.0500 mg/L		20	75-125	20	80-120	
Selenium	0.0250	0.0250 mg/L		20	75-125	20	80-120	
Silver	0.00500	0.00500 mg/L		20	75-125	20	80-120	
Sodium	0.500	0.500 mg/L		20	75-125	20	80-120	
Vanadium	0.0100	0.0100 mg/L		20	75-125	20	80-120	
Zinc	0.0250	0.0250 mg/L		20	75-125	20	80-120	

Metals, Target Analyte, ICPMS in Water (EPA 6020B)

Preservation: Add HNO3 to pH<2, Cool 4°C

Container: 10_250mL Plastic pH <2 w/ HNO3 **Amount Required:** 200 **Hold Time:** 180 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Antimony	1.00	1.00 ug/L		20	75-125	20	80-120	
Arsenic	1.00	1.00 ug/L		20	75-125	20	80-120	
Beryllium	0.300	0.300 ug/L		20	75-125	20	80-120	
Cadmium	0.500	0.500 ug/L		20	75-125	20	80-120	
Molybdenum	1.00	1.00 ug/L		20	75-125	20	80-120	
Selenium	1.00	1.00 ug/L		20	75-125	20	80-120	
Thallium	1.00	1.00 ug/L		20	75-125	20	80-120	

Metals, Target Analyte, ICPMS List in Water (varies)

Preservation: [Group Analysis]

Container: **Amount Required:** **Hold Time:** 5 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD

No Analytes listed

Analytical Method Information

Printed: 02/03/2021 2:00 pm

Pesticides, 8081 target list in Water (EPA 8081B)

Preservation: Cool 4°C

Container: 07_1000mL Amber Glass Cool to 4° C **Amount Required:** 1000 mL **Hold Time:** 7 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
4,4'-DDD	0.00400	0.00400 ug/L			30-150	20	40-140	20
4,4'-DDD [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
4,4'-DDE	0.00400	0.00400 ug/L			30-150	20	40-140	20
4,4'-DDE [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
4,4'-DDT	0.00400	0.00400 ug/L			30-150	20	40-140	20
4,4'-DDT [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
Aldrin	0.00400	0.00400 ug/L			30-150	20	40-140	20
Aldrin [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
alpha-BHC	0.00400	0.00400 ug/L			30-150	20	40-140	20
alpha-BHC [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
alpha-Chlordane	0.00400	0.00400 ug/L			30-150	20	40-140	20
alpha-Chlordane [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
beta-BHC	0.00400	0.00400 ug/L			30-150	20	40-140	20
beta-BHC [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
Chlordane, total	0.0200	0.0200 ug/L				20		20
Chlordane, total [2C]	0.0200	0.0200 ug/L				20		20
delta-BHC	0.00400	0.00400 ug/L			30-150	20	40-140	20
delta-BHC [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
Dieldrin	0.00200	0.00200 ug/L			30-150	20	40-140	20
Dieldrin [2C]	0.00200	0.00200 ug/L			30-150	20	40-140	20
Endosulfan I	0.00400	0.00400 ug/L			30-150	20	40-140	20
Endosulfan I [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
Endosulfan II	0.00400	0.00400 ug/L			30-150	20	40-140	20
Endosulfan II [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
Endosulfan sulfate	0.00400	0.00400 ug/L			30-150	20	40-140	20
Endosulfan sulfate [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
Endrin	0.00400	0.00400 ug/L			30-150	20	40-140	20
Endrin aldehyde	0.0100	0.0100 ug/L			30-150	20	40-140	20
Endrin [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
Endrin aldehyde [2C]	0.0100	0.0100 ug/L			30-150	20	40-140	20
Endrin ketone	0.0100	0.0100 ug/L			30-150	20	40-140	20
Endrin ketone [2C]	0.0100	0.0100 ug/L			30-150	20	40-140	20
gamma-BHC (Lindane)	0.00400	0.00400 ug/L			30-150	20	40-140	20
gamma-BHC (Lindane) [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
gamma-Chlordane	0.0100	0.0100 ug/L			30-150	20	40-140	20
gamma-Chlordane [2C]	0.0100	0.0100 ug/L			30-150	20	40-140	20
Heptachlor	0.00400	0.00400 ug/L			30-150	20	40-140	20
Heptachlor [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
Heptachlor epoxide	0.00400	0.00400 ug/L			30-150	20	40-140	20
Heptachlor epoxide [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
Methoxychlor	0.00400	0.00400 ug/L			30-150	20	40-140	20
Methoxychlor [2C]	0.00400	0.00400 ug/L			30-150	20	40-140	20
Toxaphene	0.100	0.100 ug/L				20		20
Toxaphene [2C]	0.100	0.100 ug/L				20		20
Mirex	0.00400	0.00400 ug/L			30-150	20	40-140	20
Surr: Decachlorobiphenyl			30-150					
Surr: Decachlorobiphenyl [2C]			30-150					
Surr: Tetrachloro-m-xylene			30-150					
Surr: Tetrachloro-m-xylene [2C]			30-150					

Analytical Method Information

Printed: 02/03/2021 2:02 pm

Polychlorinated Biphenyls (PCB) in Water (EPA 8082A)

Preservation: Cool 4°C

Container: 07_1000mL Amber Glass Cool to 4° C **Amount Required:** 1000 mL **Hold Time:** 7 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Aroclor 1016	0.0500	0.0500 ug/L		50	40-140	50	40-120	30
Aroclor 1016 (1)								
Aroclor 1016 (2)								
Aroclor 1016 (3)								
Aroclor 1016 (4)								
Aroclor 1016 (5)								
Aroclor 1016 [2C]	0.0500	0.0500 ug/L		50	40-140	50	40-120	30
Aroclor 1016 (1) [2C]								
Aroclor 1016 (2) [2C]								
Aroclor 1016 (3) [2C]								
Aroclor 1016 (4) [2C]								
Aroclor 1016 (5) [2C]								
Aroclor 1221	0.0500	0.0500 ug/L						
Aroclor 1221 (1)								
Aroclor 1221 (2)								
Aroclor 1221 (3)								
Aroclor 1221 [2C]	0.0500	0.0500 ug/L						
Aroclor 1221 (1) [2C]								
Aroclor 1221 (2) [2C]								
Aroclor 1221 (3) [2C]								
Aroclor 1232	0.0500	0.0500 ug/L						
Aroclor 1232 (1)								
Aroclor 1232 (2)								
Aroclor 1232 (3)								
Aroclor 1232 (4)								
Aroclor 1232 (5)								
Aroclor 1232 [2C]	0.0500	0.0500 ug/L						
Aroclor 1232 (1) [2C]								
Aroclor 1232 (2) [2C]								
Aroclor 1232 (3) [2C]								
Aroclor 1232 (4) [2C]								
Aroclor 1232 (5) [2C]								
Aroclor 1242	0.0500	0.0500 ug/L						
Aroclor 1242 (1)								
Aroclor 1242 (2)								
Aroclor 1242 (3)								
Aroclor 1242 (4)								
Aroclor 1242 (5)								
Aroclor 1242 [2C]	0.0500	0.0500 ug/L						
Aroclor 1242 (1) [2C]								
Aroclor 1242 (2) [2C]								
Aroclor 1242 (3) [2C]								
Aroclor 1242 (4) [2C]								
Aroclor 1242 (5) [2C]								
Aroclor 1248	0.0500	0.0500 ug/L						
Aroclor 1248 (1)								
Aroclor 1248 (2)								
Aroclor 1248 (3)								
Aroclor 1248 (4)								
Aroclor 1248 (5)								
Aroclor 1248 [2C]	0.0500	0.0500 ug/L						
Aroclor 1248 (1) [2C]								
Aroclor 1248 (2) [2C]								
Aroclor 1248 (3) [2C]								

Analytical Method Information

(Continued)

Polychlorinated Biphenyls (PCB) in Water (EPA 8082A) (Continued)

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Aroclor 1248 (4) [2C]								
Aroclor 1248 (5) [2C]								
Aroclor 1254	0.0500	0.0500 ug/L		50		50		30
Aroclor 1254 (1)								
Aroclor 1254 (2)								
Aroclor 1254 (3)								
Aroclor 1254 (4)								
Aroclor 1254 (5)								
Aroclor 1254 [2C]	0.0500	0.0500 ug/L						
Aroclor 1254 (1) [2C]								
Aroclor 1254 (2) [2C]								
Aroclor 1254 (3) [2C]								
Aroclor 1254 (4) [2C]								
Aroclor 1254 (5) [2C]								
Aroclor 1260	0.0500	0.0500 ug/L		50	40-140	50	40-120	30
Aroclor 1260 (1)								
Aroclor 1260 (2)								
Aroclor 1260 (3)								
Aroclor 1260 (4)								
Aroclor 1260 (5)								
Aroclor 1260 [2C]	0.0500	0.0500 ug/L		50	40-140	50	40-120	30
Aroclor 1260 (1) [2C]								
Aroclor 1260 (2) [2C]								
Aroclor 1260 (3) [2C]								
Aroclor 1260 (4) [2C]								
Aroclor 1260 (5) [2C]								
Aroclor 1262	0.0500	0.0500 ug/L						
Aroclor 1262 (1)								
Aroclor 1262 (2)								
Aroclor 1262 (3)								
Aroclor 1262 (4)								
Aroclor 1262 (5)								
Aroclor 1262 [2C]	0.0500	0.0500 ug/L						
Aroclor 1262 (1) [2C]								
Aroclor 1262 (2) [2C]								
Aroclor 1262 (3) [2C]								
Aroclor 1262 (4) [2C]								
Aroclor 1262 (5) [2C]								
Aroclor 1268	0.0500	0.0500 ug/L						
Aroclor 1268 (1)								
Aroclor 1268 (2)								
Aroclor 1268 (3)								
Aroclor 1268 (4)								
Aroclor 1268 (5)								
Aroclor 1268 [2C]	0.0500	0.0500 ug/L						
Aroclor 1268 (1) [2C]								
Aroclor 1268 (2) [2C]								
Aroclor 1268 (3) [2C]								
Aroclor 1268 (4) [2C]								
Aroclor 1268 (5) [2C]								
Total PCBs	0.0500	0.0500 ug/L						
Total PCBs [2C]	0.0500	0.0500 ug/L						
Surr: Tetrachloro-m-xylene			30-120					
Surr: Tetrachloro-m-xylene [2C]			30-120					
Surr: Decachlorobiphenyl			30-120					
Surr: Decachlorobiphenyl [2C]			30-120					

Analytical Method Information

Printed: 02/02/2021 9:40 am

PFAS, NYSDEC Target List in Water (EPA 537m)

Preservation: Cool 4°C

Container: 10_250mL Plastic Cool to 4° C **Amount Required:** 250 mL **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Perfluorobutanesulfonic acid (PFBS)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluorohexanoic acid (PFHxA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluoroheptanoic acid (PFHpA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluorohexanesulfonic acid (PFHxS)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluorooctanoic acid (PFOA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluorooctanesulfonic acid (PFOS)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluorononanoic acid (PFNA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluorodecanoic acid (PFDA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluoroundecanoic acid (PFUnA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluorododecanoic acid (PFDoA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluorotridecanoic acid (PFTrDA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluorotetradecanoic acid (PFTA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
N-MeFOSAA	2.00	2.00 ng/L		30	25-150	35	50-130	30
N-EtFOSAA	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluoropentanoic acid (PFPeA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluoro-1-octanesulfonamide (FOSA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluoro-1-heptanesulfonic acid (PFHpS)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluoro-1-decanesulfonic acid (PFDS)	2.00	2.00 ng/L		30	25-150	35	50-130	30
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	5.00	5.00 ng/L		30	25-150	35	50-130	30
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Perfluoro-n-butanoic acid (PFBA)	2.00	2.00 ng/L		30	25-150	35	50-130	30
Surr: M3PFBS			25-150					
Surr: M5PFHxA			25-150					
Surr: M4PFHpA			25-150					
Surr: M3PFHxS			25-150					
Surr: Perfluoro-n-[13C8]octanoic acid (M8PFOA)			25-150					
Surr: M6PFDA			25-150					
Surr: M7PFUdA			25-150					
Surr: Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)			25-150					
Surr: M2PFTeDA			10-150					
Surr: Perfluoro-n-[13C4]butanoic acid (MPFBA)			25-150					
Surr: Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)			25-150					
Surr: Perfluoro-n-[13C5]pentanoic acid (M5PFPeA)			25-150					
Surr: Perfluoro-1-[13C8]octanesulfonamide (M8FOSA)			10-150					
Surr: d3-N-MeFOSAA			25-150					
Surr: d5-N-EtFOSAA			25-150					
Surr: M2-6:2 FTS			25-150					
Surr: M2-8:2 FTS			25-150					
Surr: M9PFNA			25-150					
MPFOA		0.100 ng/L						

Analytical Method Information

Printed: 02/03/2021 2:04 pm

Semi-Volatiles, 1,4-Dioxane 8270 SIM-Aqueous in Water (EPA 8270D SIM)

Preservation: Cool 4°C

Container: 09_500 mL Glass Amber **Amount Required:** 500 mL **Hold Time:** 7 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
1,4-Dioxane	0.200	0.300 ug/L		30	50-130	30	50-130	30
Surr: 1,4-Dioxane-d8	0.200		36.6-118					
1,2-Dichlorobenzene-d4								

Analytical Method Information

Printed: 02/03/2021 2:12 pm

Semi-Volatiles, NJDEP/TCL/Part 375 List in Water (EPA 8270D)

Preservation: Cool 4°C

Container: 07_1000mL Amber Glass Cool to 4° C **Amount Required:** 1000 mL **Hold Time:** 7 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
1,1-Biphenyl	2.50	5.00 ug/L			40-140	20	21-102	20
1,2,4,5-Tetrachlorobenzene	2.50	5.00 ug/L			40-140	20	28-105	20
1,2,4-Trichlorobenzene	2.50	5.00 ug/L			31-92	20	35-91	20
1,2-Dichlorobenzene	2.50	5.00 ug/L			31-91	20	42-85	20
1,2-Diphenylhydrazine (as Azobenzene)	2.50	5.00 ug/L			40-140	20	16-137	20
1,3-Dichlorobenzene	2.50	5.00 ug/L			24-93	20	45-80	20
1,4-Dichlorobenzene	2.50	5.00 ug/L			26-95	20	42-82	20
2,3,4,6-Tetrachlorophenol	2.50	5.00 ug/L			30-130	20	30-130	20
2,4,5-Trichlorophenol	2.50	5.00 ug/L			44-96	20	36-112	20
2,4,6-Trichlorophenol	2.50	5.00 ug/L			39-107	20	41-107	20
2,4-Dichlorophenol	2.50	5.00 ug/L			38-99	20	43-92	20
2,4-Dimethylphenol	2.50	5.00 ug/L			10-116	20	25-92	20
2,4-Dinitrophenol	2.50	5.00 ug/L			10-168	20	10-149	20
2,4-Dinitrotoluene	2.50	5.00 ug/L			26-120	20	41-114	20
2,6-Dinitrotoluene	2.50	5.00 ug/L			28-118	20	49-106	20
2-Chloronaphthalene	2.50	5.00 ug/L			33-99	20	40-96	20
2-Chlorophenol	2.50	5.00 ug/L			25-106	20	35-84	20
2-Methylnaphthalene	2.50	5.00 ug/L			29-102	20	33-101	20
2-Methylphenol	2.50	5.00 ug/L			10-118	20	10-90	20
2-Nitroaniline	2.50	5.00 ug/L			48-99	20	31-122	20
2-Nitrophenol	2.50	5.00 ug/L			36-103	20	37-97	20
3- & 4-Methylphenols	2.50	5.00 ug/L			10-102	20	10-101	20
3,3-Dichlorobenzidine	2.50	5.00 ug/L			10-140	20	25-155	20
3-Nitroaniline	2.50	5.00 ug/L			10-169	20	29-128	20
4,6-Dinitro-2-methylphenol	2.50	5.00 ug/L			10-142	20	10-135	20
4-Bromophenyl phenyl ether	2.50	5.00 ug/L			35-109	20	38-116	20
4-Chloro-3-methylphenol	2.50	5.00 ug/L			20-117	20	28-101	20
4-Chloroaniline	2.50	5.00 ug/L			24-116	20	10-154	20
4-Chlorophenyl phenyl ether	2.50	5.00 ug/L			31-112	20	34-112	20
4-Nitroaniline	2.50	5.00 ug/L			24-143	20	15-143	20
4-Nitrophenol	2.50	5.00 ug/L			10-119	20	10-112	20
Acenaphthene	0.0500	0.0500 ug/L			17-132	20	24-114	20
Acenaphthylene	0.0500	0.0500 ug/L			13-124	20	26-112	20
Acetophenone	2.50	5.00 ug/L			40-140	20	47-92	20
Aniline	2.50	5.00 ug/L			10-133	20	10-107	20
Anthracene	0.0500	0.0500 ug/L			40-105	20	35-114	20
Atrazine	0.500	0.500 ug/L			40-140	20	43-101	20
Benzaldehyde	2.50	5.00 ug/L			40-140	20	17-117	20
Benzidine	10.0	20.0 ug/L				20		20
Benzo(a)anthracene	0.0500	0.0500 ug/L			23-141	20	38-127	20
Benzo(a)pyrene	0.0500	0.0500 ug/L			46-118	20	30-146	20
Benzo(b)fluoranthene	0.0500	0.0500 ug/L			22-133	20	36-145	20
Benzo(g,h,i)perylene	0.0500	0.0500 ug/L			10-126	20	10-163	20
Benzo(k)fluoranthene	0.0500	0.0500 ug/L			18-152	20	16-149	20
Benzoic acid	25.0	50.0 ug/L			10-162	20	30-130	20
Benzyl alcohol	2.50	5.00 ug/L			10-114	20	18-75	20
Benzyl butyl phthalate	2.50	5.00 ug/L			31-121	20	28-129	20
Bis(2-chloroethoxy)methane	2.50	5.00 ug/L			23-110	20	27-112	20
Bis(2-chloroethyl)ether	2.50	5.00 ug/L			10-132	20	24-114	20
Bis(2-chloroisopropyl)ether	2.50	5.00 ug/L			12-132	20	21-124	20
Bis(2-ethylhexyl)phthalate	0.500	0.500 ug/L			14-131	20	10-171	20
Caprolactam	2.50	5.00 ug/L			40-140	20	10-29	20
Carbazole	2.50	5.00 ug/L			10-169	20	49-116	20

Analytical Method Information

(Continued)

Semi-Volatiles, NJDEP/TCL/Part 375 List in Water (EPA 8270D) (Continued)

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Chrysene	0.0500	0.0500 ug/L			30-127	20	33-120	20
Dibenzo(a,h)anthracene	0.0500	0.0500 ug/L			10-131	20	10-149	20
Dibenzofuran	2.50	5.00 ug/L			37-103	20	42-105	20
Diethyl phthalate	2.50	5.00 ug/L			41-106	20	38-112	20
Dimethyl phthalate	2.50	5.00 ug/L			38-105	20	49-106	20
Di-n-butyl phthalate	2.50	5.00 ug/L			24-121	20	36-110	20
Di-n-octyl phthalate	2.50	5.00 ug/L			25-141	20	12-149	20
Fluoranthene	0.0500	0.0500 ug/L			29-123	20	33-126	20
Fluorene	0.0500	0.0500 ug/L			20-133	20	28-117	20
Hexachlorobenzene	0.0200	0.0200 ug/L			24-120	20	27-120	20
Hexachlorobutadiene	0.500	0.500 ug/L			26-98	20	25-106	20
Hexachlorocyclopentadiene	2.50	5.00 ug/L			10-103	20	10-99	20
Hexachloroethane	0.500	0.500 ug/L			11-102	20	33-84	20
Indeno(1,2,3-cd)pyrene	0.0500	0.0500 ug/L			10-130	20	10-150	20
Isophorone	2.50	5.00 ug/L			19-113	20	29-115	20
Naphthalene	0.0500	0.0500 ug/L			26-104	20	30-99	20
Nitrobenzene	0.250	0.250 ug/L			25-107	20	32-113	20
N-Nitrosodimethylamine	0.500	0.500 ug/L			10-110	20	10-63	20
N-nitroso-di-n-propylamine	2.50	5.00 ug/L			16-127	20	36-118	20
N-Nitrosodiphenylamine	2.50	5.00 ug/L			46-116	20	27-145	20
Pentachlorophenol	0.250	0.250 ug/L			10-181	20	19-127	20
Phenanthrene	0.0500	0.0500 ug/L			29-121	20	31-112	20
Phenol	2.50	5.00 ug/L			10-107	20	10-37	20
Pyrene	0.0500	0.0500 ug/L			34-129	20	42-125	20
Pyridine	2.50	5.00 ug/L			10-73	20	10-46	20
Surr: SURR: 2-Fluorophenol			19.7-63.1					
Surr: SURR: Phenol-d5			10.1-41.7					
Surr: SURR: Nitrobenzene-d5			50.2-113					
Surr: SURR: 2-Fluorobiphenyl			39.9-105					
Surr: SURR: 2,4,6-Tribromophenol			39.3-151					
Surr: SURR: Terphenyl-d14			30.7-106					
ISTD: 1,4-Dichlorobenzene-d4								
ISTD: Naphthalene-d8								
ISTD: Acenaphthene-d10								
ISTD: Phenanthrene-d10								
ISTD: Chrysene-d12								
ISTD: Perylene-d12								

Analytical Method Information

Volatile Organics, NJDEP/TCL/Part 375 List in Soil (EPA 8260C)

Preservation: Cool 4°C

Container: 03_5035 Vial Set **Amount Required:** 20 g. **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
1,1,1,2-Tetrachloroethane	2.5	5.0 ug/kg			15-161	33	75-129	30
1,1,1-Trichloroethane	2.5	5.0 ug/kg			42-145	30	71-137	30
1,1,2,2-Tetrachloroethane	2.5	5.0 ug/kg			16-167	56	79-129	30
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	2.5	5.0 ug/kg			11-160	31	58-146	30
1,1,2-Trichloroethane	2.5	5.0 ug/kg			44-145	40	83-123	30
1,1-Dichloroethane	2.5	5.0 ug/kg			46-142	36	75-130	30
1,1-Dichloroethylene	2.5	5.0 ug/kg			30-153	31	64-137	30
1,1-Dichloropropylene	2.5	5.0 ug/kg			40-133	28	77-127	30
1,2,3-Trichlorobenzene	2.5	5.0 ug/kg			10-157	47	81-140	30
1,2,3-Trichloropropane	2.5	5.0 ug/kg			38-155	48	81-126	30
1,2,4-Trichlorobenzene	2.5	5.0 ug/kg			10-151	52	80-141	30
1,2,4-Trimethylbenzene	2.5	5.0 ug/kg			10-170	242	84-125	30
1,2-Dibromo-3-chloropropane	2.5	5.0 ug/kg			36-138	54	74-142	30
1,2-Dibromoethane	2.5	5.0 ug/kg			40-142	39	86-123	30
1,2-Dichlorobenzene	2.5	5.0 ug/kg			10-147	52	85-122	30
1,2-Dichloroethane	2.5	5.0 ug/kg			48-133	32	71-133	30
1,2-Dichloropropane	2.5	5.0 ug/kg			47-141	37	81-122	30
1,3,5-Trimethylbenzene	2.5	5.0 ug/kg			10-150	62	82-126	30
1,3-Dichlorobenzene	2.5	5.0 ug/kg			10-144	51	84-124	30
1,3-Dichloropropane	2.5	5.0 ug/kg			43-142	36	83-123	30
1,4-Dichlorobenzene	2.5	5.0 ug/kg			10-160	52	84-124	30
1,4-Dioxane	50	100 ug/kg			10-191	196	10-228	30
2,2-Dichloropropane	2.5	5.0 ug/kg			38-130	31	67-136	30
2-Butanone	2.5	5.0 ug/kg			10-189	67	58-147	30
2-Chlorotoluene	2.5	5.0 ug/kg			14-144	49	78-127	30
2-Hexanone	2.5	5.0 ug/kg			10-181	60	70-139	30
4-Chlorotoluene	2.5	5.0 ug/kg			15-138	39	79-125	30
4-Methyl-2-pentanone	2.5	5.0 ug/kg			10-166	47	72-132	30
Acetone	5.0	10 ug/kg			10-196	150	36-155	30
Acrolein	5.0	10 ug/kg			10-192	128	10-238	30
Acrylonitrile	2.5	5.0 ug/kg			13-161	48	66-141	30
Benzene	2.5	5.0 ug/kg			43-139	64	77-127	30
Bromobenzene	2.5	5.0 ug/kg			23-142	44	77-129	30
Bromochloromethane	2.5	5.0 ug/kg			38-145	30	74-129	30
Bromodichloromethane	2.5	5.0 ug/kg			38-147	37	81-124	30
Bromoform	2.5	5.0 ug/kg			29-156	51	80-136	30
Bromomethane	2.5	5.0 ug/kg			10-166	42	32-177	30
Carbon disulfide	2.5	5.0 ug/kg			10-131	36	10-136	30
Carbon tetrachloride	2.5	5.0 ug/kg			35-145	31	66-143	30
Chlorobenzene	2.5	5.0 ug/kg			21-154	32	86-120	30
Chloroethane	2.5	5.0 ug/kg			15-160	40	51-142	30
Chloroform	2.5	5.0 ug/kg			47-142	29	76-131	30
Chloromethane	2.5	5.0 ug/kg			10-159	31	49-132	30
cis-1,2-Dichloroethylene	2.5	5.0 ug/kg			42-144	30	74-132	30
cis-1,3-Dichloropropylene	2.5	5.0 ug/kg			18-159	39	81-129	30
Cyclohexane	2.5	5.0 ug/kg			70-130	30	70-130	30
Dibromochloromethane	2.5	5.0 ug/kg			10-179	41	10-200	30
Dibromomethane	2.5	5.0 ug/kg			47-143	41	83-124	30
Dichlorodifluoromethane	2.5	5.0 ug/kg			10-145	34	28-158	30
Ethyl Benzene	2.5	5.0 ug/kg			11-158	42	84-125	30
Hexachlorobutadiene	2.5	5.0 ug/kg			10-158	45	83-133	30
Isopropylbenzene	2.5	5.0 ug/kg			10-162	57	81-127	30
Methyl acetate	2.5	5.0 ug/kg			10-149	64	41-143	30

Analytical Method Information
(Continued)

Printed: 02/03/2021 2:13 pm

Volatile Organics, NJDEP/TCL/Part 375 List in Soil (EPA 8260C) (Continued)

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Methyl tert-butyl ether (MTBE)	2.5	5.0 ug/kg			42-152	47	74-131	30
Methylcyclohexane	2.5	5.0 ug/kg			70-130	30	70-130	30
Methylene chloride	5.0	10 ug/kg			28-151	49	57-141	30
Naphthalene	2.5	10 ug/kg			10-158	95	86-141	30
n-Butylbenzene	2.5	5.0 ug/kg			10-162	96	80-130	30
n-Propylbenzene	2.5	5.0 ug/kg			10-155	56	74-136	30
o-Xylene	2.5	5.0 ug/kg			10-158	51	83-123	30
p- & m- Xylenes	5.0	10 ug/kg			10-156	47	82-128	30
p-Isopropyltoluene	2.5	5.0 ug/kg			10-147	60	85-125	30
sec-Butylbenzene	2.5	5.0 ug/kg			10-157	56	83-125	30
Styrene	2.5	5.0 ug/kg			13-171	39	86-126	30
tert-Butyl alcohol (TBA)	2.5	5.0 ug/kg			34-179	35	70-130	30
tert-Butylbenzene	2.5	5.0 ug/kg			10-160	79	80-127	30
Tetrachloroethylene	2.5	5.0 ug/kg			30-167	33	80-129	30
Toluene	2.5	5.0 ug/kg			21-160	50	85-121	30
trans-1,2-Dichloroethylene	2.5	5.0 ug/kg			29-153	30	72-132	30
trans-1,3-Dichloropropylene	2.5	5.0 ug/kg			18-155	30	78-132	30
Trichloroethylene	2.5	5.0 ug/kg			24-169	30	84-123	30
Trichlorofluoromethane	2.5	5.0 ug/kg			35-142	30	62-140	30
Vinyl acetate	2.5	5.0 ug/kg			10-119	82	67-136	30
Vinyl Chloride	2.5	5.0 ug/kg			12-160	35	52-130	30
Xylenes, Total	7.5	15 ug/kg						
Surr: SURR: 1,2-Dichloroethane-d4			77-125					
Surr: SURR: Toluene-d8			85-120					
Surr: SURR: p-Bromofluorobenzene			76-130			30		
ISTD: Fluorobenzene						30		30
ISTD: Chlorobenzene-d5								
ISTD: 1,2-Dichlorobenzene-d4								

APPENDIX E

Quality Assurance Glossary

APPENDIX E

QUALITY ASSURANCE GLOSSARY

"Alteration" means altering a sample collected for analysis in any way other than by adding a preservative, such as nitric acid to lower pH. Examples of alteration include, but are not limited to: filtering, settling and decanting, centrifuging and decanting and acid extracting.

"Analytical Services Protocol" or "ASP" means DEC's compilation of approved EPA laboratory methods for sample preparation, analysis and data handling procedures.

"Correlation sample" means a sample taken, when using a field-testing technology, to be analyzed by an ELAP-certified laboratory to determine the correlation between the laboratory and field analytical results.

"Effective solubility" means the theoretical aqueous solubility of an organic constituent in groundwater that is in chemical equilibrium with a separate-phase (NAPL) mixed product (product containing several organic chemicals). The effective solubility of a particular organic chemical can be estimated by multiplying its mole fraction in the product mixture by its pure-phase solubility.

"Environmental Laboratory Accreditation Program" or "ELAP" means a program conducted by the NYSDOH which certifies environmental laboratories through on-site inspections and evaluation of principles of credentials and proficiency testing. Information regarding ELAP is available at the NYSDOH Wadsworth Laboratory website.

"Filtration" means the filtering of a groundwater or surface water sample, collected for metals analysis, at the time of collection and prior to preservation. Filtering includes but is not limited to the use of any membrane, fabric, paper or other filter medium, irrespective of pore size, to remove particulates from suspension.

"Final delineation sample" means a sample taken to make a decision regarding the extent of contamination at a site during the investigation and the design of the remedy or confirmation/documentation sampling during remedial construction, which is to be analyzed by an ELAP-certified laboratory.

"Intermediate sample" means a sample taken during the investigation or remediation process that will be followed by another sampling event to confirm that remediation was successful or to confirm that the extent of contamination has been defined to below a level of concern.

"Method detection limit" or "MDL" means the minimum concentration of a substance detected and which can be reported with a reasonable degree of accuracy. It is the lowest concentration that can be measured, a lab-specific number, developed from minimum detection limits, and is also referred to as the practical quantitation limit (PQL).

"Nephelometric Turbidity Unit" or "NTU" is the unit by which turbidity in a sample is measured.

APPENDIX F

Roux's Standard Operating Procedures

Date: May 5, 2000
Revision: April 7, 2015

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide procedures and standards for record keeping and maintenance, for all field activities conducted by Roux Associates, Inc. (Roux Associates).

Strict quality assurance/quality control (QA/QC) is necessary to properly and accurately document and preserve all project-related information. Quality assurance is implemented to corroborate that quality control procedures are followed. Quality control provides a means to monitor investigation activities (e.g., sampling and laboratory performance) as a check on the quality of the data.

Valid data and information are integral to all aspects of Roux Associates' field activities. These aspects include, but are not necessarily limited to, activities that involve: drilling; sediment, sludge, and soil sampling (lithologic, and soil-quality and analysis); well construction and development; aquifer testing and analysis; water-quality sampling and analysis (surface water and ground water); free-product sampling and analysis; air-quality sampling and analysis; geophysical testing; demolition activities; waste removal operations; engineering installations; etc. The data will be confirmed by QA/QC methods established and set forth in the work plan/scope of work. Without checks on the field and analytical procedures, the potential exists for contradictory results, and associated incomplete or incorrect results from the interpretation of potentially questionable data.

Documentation will be entered in a bound field notebook and must be transcribed with extreme care, in a clear and concise manner, as the information recorded will become part of the permanent legal record. Field notes are considered the legal record of site activities, and as such they must be taken in a standard and consistent manner. If abbreviations are used, then they must first be spelled out for clarity (i.e., to avoid ambiguity and misunderstanding). All entries must be dated and initialed, and the time (military time) of the entry included. Field notebooks and forms must be assigned to an individual project and properly identified (i.e., client name, project number, location and name of site, individual recording information, dates, times, etc.). Change of possession of field notebooks or forms must be documented with the date and time, and initialed by both individuals. Following each day's entries, the field notebook or form must be photocopied in the event that the original documentation is lost or stolen. All field notebooks must have the company name and address legibly printed in indelible ink along with the message "If found, then please forward to Roux Associates, Inc. at the above address - REWARD OFFERED."

Information must be recorded while onsite because it may be difficult to recall details at a later date. Furthermore, information must be documented immediately as it provides unbiased information which will be used for writing the report when the field activities are completed. Project-related documentation is an irreplaceable, important record for other individuals who may become involved in the project, and provides the project manager with a complete history of project-related activities. Written information must be accompanied by maps, sketches, and photographs where appropriate, especially if these supplemental sources of information assist in the documentation process. A new page must be used in the field notebook for each new day's entries (i.e., unused portions of a previous page must have an "X" placed through it). The end of the day's records must be initialed and dated.

As part of record keeping and QA/QC activities, state and federal regulatory agencies should be contacted to check if special or different protocols are required and/or if particular or unconventional methods are required for the given field activity. Thus, the record keeping and QA/QC activities implemented by Roux Associates are based on technically sound standard practices and incorporate Roux Associates own, extensive experience in conducting environmental field activities.

2.0 MATERIALS

In order to track investigation activities, specific materials are required. These materials include the following:

a. A bound, waterproof field notebook.

b. Appropriate Roux Associates' or project-specific forms (e.g., daily log, geologic log, monitoring well construction log, well sampling data form, location sketch, chain of custody, telephone conversation record, meeting notes, etc.).

c. Appropriate labels (e.g., sample, Roux Associates' Custody Seal, etc.)

d. Approved work plan/scope of work.

e. Health and safety plan (HASP).

f. Appropriate Roux Associates' SOPs.

g. Black pens, and indelible markers.

h. Digital camera.

3.0 DOCUMENTATION

3.1 Before the Roux Associates personnel leave the field, they must ensure that their field notes include comprehensive descriptions of the hydrogeologic conditions, and all investigation-related activities and results (onsite and offsite). This will safeguard against the inability to reconstruct and comprehend all aspects of the field investigation after its completion, and will serve to facilitate the writing of an accurate report. Properly documented information provides the QA/QC tracking (back-up) required for all Roux Associates' projects. General types of information that must be recorded (where pertinent to the investigation being conducted) include, but may not necessarily be limited to, the following:

a. List of Roux Associates personnel on site.

b. Name, date, and time of arrival on site by Roux Associates personnel, including temporary departures from, and returns to, the site during the work day.

c. Client and project number.

d. Name and location of study area.

e. Date and time of arrival on site by non-Roux Associates personnel (names and affiliation) and equipment (e.g., subcontractors and facility personnel, and drilling equipment, respectively, etc.), including temporary departures from, and returns to, the site during the work day, and departure at the end of the work day.

f. List of non-Roux Associates personnel (e.g. subcontractors, client representatives) on site.

g. Weather conditions at the beginning of the day as well as any changes in weather that occur during the working day.

h. Health and safety procedures including level of protection, monitoring of vital signs, frequency of air monitoring, and any change (i.e., downgrade or upgrade) in the level of protection for Roux Associates and other on-site personnel (e.g., subcontractors, facility personnel, etc.).

i. Health and safety procedures not in compliance with the HASP (for all on-site personnel).

j. Site reconnaissance information (e.g., topographic features, geologic features, surface-water bodies, seeps, areas of apparent contamination, facility/plant structures, etc.).

k. Air monitoring results (i.e., photoionization detector [PID], etc. measurements).

l. Task designation and work progress.

m. Work-related and site-related discussions with subcontractors, regulatory agency personnel, facility personnel, the general public, and Roux Associates personnel.

n. Delays, unusual situations, problems and accidents.

o. Field work not conducted in accordance with the work plan/scope of work, and rationale and justification for any change(s) in field procedures including discussions with personnel regarding the change(s) and who authorized the change(s).

p. QA/QC procedures not conducted in accordance with the QA/QC procedures established in the work plan/scope of work and rationale and justification for any change(s) in QA/QC procedures including discussions with personnel regarding the change(s) and who authorized the change(s).

q. Equipment and instrument calibration information, results and/or problems.

r. Decontamination and calibration procedures.

s. Activities in and around the site and work area by any and all on-site personnel which may impact field activities.

t. Sketches, maps, and/or photographs (with dates and times) of the site, structures, equipment, etc. that would facilitate explanations of site conditions.

u. Contamination evidenced as a result of work-related activities (e.g., visible contaminants [sheen] in drilling fluids or on drilling equipment; sheen on, or staining of, sediments; color of, or separate [nonaqueous] phase on, water from borehole or well; vapors or odors emanating from a borehole or well; etc.). Logbook entries should be objective, factual, and free of personal feelings or other terminology which might prove inappropriate. Avoid using nontechnical or subjective terms (e.g., , oily, strong-smelling).

v. Date and time of final departure from the site of all personnel at the end of the work day.

3.2 Pens with permanent ink will be used to record all data. Data or other information that has been entered incorrectly will be corrected by drawing a line through the incorrect entry and **initialing and dating** the linedthrough entry. Under no circumstances should the incorrect material be erased, made illegible or obscured so that it cannot be read.

3.3 In addition to the general types of information that must be recorded (as presented in Section 3.1), task-specific information must also be properly documented. Task-specific information which is required is provided in each respective task-oriented SOP, and the documentation procedures outlined in each SOP must be followed.

END OF PROCEDURE

Date: May 5, 2000
Revision: April 16, 2015

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for sample handling and management which will allow consistent and accurate results. Valid chemistry data are integral to investigations that characterize media-quality conditions. This SOP is designed to ensure that once samples are collected, they are preserved, packed and delivered in a manner which will maintain sample integrity. The procedures outlined are applicable to most sampling events and any required modifications must be clearly described in the work plan.

2.0 CONSIDERATIONS

Sample containers, sampling equipment decontamination, quality assurance/quality control (QA/QC), sample preservation, and sample handling are all components of this SOP.

2.1 Sample Containers

Prior to collection of a sample, considerations must be given to the type of container that will be used to store and transport the sample. The type and number of containers selected is usually based on factors such as sample matrix, potential contaminants to be encountered, analytical methods requested, and the laboratory's internal quality assurance requirements. In most cases, the overriding considerations will be the analytical methodology, or the state or federal regulatory requirements because these regulations generally encompass the other factors. The sample container selected is usually based on some combination of the following criteria:

a. Reactivity of Container Material with Sample

Choosing the proper composition of sample containers will help to ensure that the chemical and physical integrity of the sample is maintained. For sampling potentially hazardous material, glass is the recommended container type because it is chemically inert to most substances. Plastic containers are not recommended for most hazardous wastes because the potential exists for contaminants to adsorb to the surface of the plastic or for the plasticizer to leach into the sample.

In some instances, however, the sample characteristics or analytes of interest may dictate that plastic containers be used instead of glass. Because some metals species will adhere to the sides of the glass containers in an aqueous matrix, plastic bottles (e.g., nalgene) must be used for samples collected for metals analysis. A separate, plastic container should accompany glass containers if metals analysis is to be performed along with other analyses. Likewise, other sample characteristics may dictate that glass cannot be used. For example, in the case of a strong alkali waste or hydrofluoric solution, plastic containers may be more suitable because glass containers may be etched by these compounds and create adsorptive sites on the container's surface.

b. Volume of the Container

The volume of sample to be collected will be dictated by the analysis being performed and the sample matrix. The laboratory must supply bottles of sufficient volume to perform the required analysis. In most cases, the methodology dictates the volume of sample material required to complete the analysis. However, individual laboratories may provide larger volume containers for various analytes to ensure sufficient quantities for duplicates or other QC checks.

To facilitate transfer of the sample from the sampler into the container and to minimize spillage and sample disturbance, wide-mouth containers are recommended when not precluded by method requirements. Aqueous volatile organic samples must be placed into 40-milliliter (ml) glass vials with polytetrafluoroethylene (PTFE) (e.g., TeflonTM) septums. Non-aqueous volatile organic samples for “low-level” volatile analysis should be collected in the same type of vials or using EnCore samplers provided by the laboratory. Non-aqueous volatile organic samples for “mid or high-level” volatile analysis may be collected in 4-ounce (oz) wide-mouth jars provided by the laboratory. These jars should have PTFE-lined screw caps.

c. Color of Container

Whenever possible, amber glass containers should be used to prevent photodegradation of the sample, except when samples are being collected for metals analysis. If amber containers are not available, then containers holding samples should be protected from light (i.e., place in cooler with ice immediately after filling).

d. Container Closures

Container closures must screw on and off the containers and form a leak-proof seal. Container caps must not be removed until the container is ready to be filled with the sample, and the container cap must be replaced (securely) immediately after filling it. Closures should be constructed of a material which is inert with respect to the sampled material, such as PTFE (e.g., TeflonTM). Alternately, the closure may be separated from the sample by a closure liner that is inert to the sample material such as PTFE sheeting. If soil or sediment samples are being collected, the threads of the container must be wiped clean with a dedicated paper towel or cloth so the cap can be threaded properly.

e. Decontamination of Sample Containers

Sample containers must be laboratory cleaned by the laboratory performing the analysis. The cleaning procedure is dictated by the specific analysis to be performed on the sample. Sample containers must be carefully examined to ensure that all containers appear clean and in good condition. The vacuum pressure of Summa canisters should match the pressure provided from of laboratory that provided the canisters for each canister. Do not mistake the preservative as unwanted residue. The bottles should not be field cleaned. If there is any question regarding the integrity of the bottle, then the laboratory must be contacted immediately and the bottle(s) replaced.

f. Sample Bottle Storage and Transport

No matter where the sample bottles are, whether at the laboratory waiting to be packed for shipment or in the field waiting to be filled with sample, care must be taken to avoid contamination. Sample shuttles or coolers, and sample bottles must be stored and transported in clean environments. Sample bottles and clean sampling equipment must never be stored near solvents, gasoline, or other equipment that is a potential source of cross-contamination. When under chain of custody, sample bottles must be secured in locked vehicles, and custody sealed in shuttles or in the presence of authorized personnel. Information which documents that proper storage and transport procedures have been followed must be included in the field notebook and on appropriate field forms.

2.2 Decontamination of Sampling Equipment

Proper decontamination of all re-usable sampling equipment is critical for all sampling episodes. The SOP for Decontamination of Field Equipment and SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for decontamination of various types of equipment.

2.3 Quality Assurance/Quality Control Samples

QA/QC samples are intended to provide control over the proper collection and tracking of environmental measurements, and subsequent review, interpretation and validation of generated analytical data. The SOPs for Collection of Quality Control Samples, for Evaluation and Validation of Data, and for Field Record Keeping and Quality Assurance/Quality Control must be referred to for detailed guidance regarding these respective procedures. SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for QA/QC procedures.

2.4 Sample Preservation Requirements

Certain analytical methodologies for specific analytes require chemical additives in order to stabilize and maintain sample integrity. Generally, this is accomplished under the following two scenarios:

a. Sample bottles are preserved at the laboratory prior to shipment into the field.

b. Preservatives are added in the field immediately after the samples are collected.

Many laboratories provide pre-preserved bottles as a matter of convenience and to help ensure that samples will be preserved immediately upon collection. A problem associated with this method arises if not enough sample could be collected, resulting in too much preservative in the sample. More commonly encountered problems with this method include the possibility of insufficient preservative provided to achieve the desired pH level or the need for additional preservation due to chemical reactions caused by the addition of sample liquids to pre-preserved bottles. The use of pre-preserved bottles is acceptable; however, field sampling teams must always be prepared to add additional preservatives to samples if the aforementioned situations occur. Furthermore, care must be exercised not to overfill sample bottles containing preservatives to prevent the sample and preservative from spilling and therefore diluting the preservative (i.e., not having enough preservative for the volume of sample).

When samples are preserved after collection, special care must be taken. The transportation and handling of concentrated acids in the field requires additional preparation and adherence to appropriate preservation procedures. All preservation acids used in the field should be trace-metal or higher-grade.

2.5 Sample Handling/Shipping

After the proper sample bottles have been received under chain-of-custody, properly decontaminated equipment has been used to collect the sample, and appropriate preservatives have been added to maintain sample integrity, the final step for the field personnel is checking the sample bottles prior to proper packing and delivery of the samples to the laboratory.

All samples should be organized and the labels checked for accuracy. The caps should be checked for tightness and any 40-ml volatile organic compound (VOC) bottles must be checked for bubbles. This can be achieved by gently tapping the bottom of the voa to dislodge potential air bubbles. Each sample bottle must be placed in an individual "zip-lock" bag to protect the label, and placed on ice. Clear packing tape may also be used to protect the integrity of the sample label. The bottles must be carefully packed to prevent breakage during transport. Use of bubble wrap is recommended. When several bottles have been collected for an individual sample, they should not be placed adjacent to each other in the cooler to prevent possible breakage of all bottles for a given sample. If there are any samples which are known or suspected to be highly contaminated, these should be placed in an individual cooler under separate chain-of-custody to prevent possible cross contamination. Sufficient ice (wet or blue packs) should be placed in the cooler to maintain the temperature at 4 degrees Celsius (°C) until delivery at the laboratory.

Consult the work plan to determine if a particular ice is specified as the preservation for transportation (e.g., the United States Environmental Protection Agency does not like the use of blue packs because they claim that the samples will not hold at 4°C). If additional coolers are required, then they should be purchased.

The chain-of-custody form should be properly completed, placed in a "zip-lock" bag, and placed in the cooler. One copy must be maintained for the project files. The cooler should be sealed with packing tape and a custody seal. The custody seal number should be noted in the field book. Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time. If overnight mail is utilized, then the shipping bill must be maintained for the files and the laboratory must be called the following day to confirm receipt.

2.6 Chain-of-Custody Procedures

The Field Manager is responsible for the care and custody of the samples until they are transferred or properly dispatched. The Field Manager will complete the CoC form immediately after sample collection in an effort to establish sample custody in the field before sample shipment. The following information will be included on the CoC:

- Sample identification and sample container identification number, if applicable;
- Date and time the samples were collected;
- Matrix of the sample;
- The number of containers for each sample;
- Analysis requested and preservation codes;
- Name of sampler(s) and the person shipping the samples and documentation;

- Name, telephone number and email address of the Project Manager; and

- Signature of the sampler.

Any corrections to the CoC will be made by putting a single strike through the incorrect entry and initialing and dating it. When the shipping container (i.e., cooler) is packed for shipping, personnel relinquishing the container will sign the CoC. The CoC will accompany the samples to the laboratory and a copy of the CoC will be retained by the Field Manager and placed in the project file. The completed CoC will be supplied by the laboratory with the standard data package.

The QA Manager will be responsible for reviewing all sampling activities to verify whether proper custody procedures were followed during the field work. Any deviations in the custody procedures will be noted in the Final Report.

3.0 EQUIPMENT AND MATERIALS

3.1 General equipment and materials may include, but not necessarily be limited to, the following:

a. Sample bottles of proper size and type with labels.

b. Cooler with ice (wet or blue pack).

c. Field notebook, appropriate field form(s), chain-of-custody form(s), custody seals.

d. Black pen and indelible marker.

e. Packing tape, "bubble wrap", and "zip-lock" bags.

f. Overnight (express) mail forms, and laboratory addres or courier contact information

g. Health and safety plan (HASP).

h. Work plan/scope of work.

i. Pertinent SOPs for specified tasks and their respective equipment and materials.

3.2 Preservatives for specific samples/analytes as specified by the laboratory. Preservatives must be stored in secure, spillproof glass containers with their content, concentration, and date of preparation and expiration clearly labeled.

3.3 Miscellaneous equipment and materials including, but not necessarily limited to, the following:

a. Graduated pipettes.

b. Pipette bulbs.

c. Litmus paper.

d. Glass stirring rods.

e. Protective goggles.

f. Disposable gloves.

g. Lab apron.

h. First aid kit.

i. Portable eye wash station.

j. Water supply for immediate flushing of spillage, if appropriate.

k. Shovel and container for immediate containerization of spillage-impacted soils, if appropriate.

4.0 PROCEDURE

4.1 Examine all bottles and verify that they are clean and of the proper type, number, and volume for the sampling to be conducted.

4.2 Label bottles carefully and clearly with project name and number, site location, sample identification, date, time, and the sampler's initials using an indelible marker.

4.3 Collect samples in the proper manner (refer to specific sampling media SOPs).

4.4 Conduct preservation activities as required after each sample has been collected. Field preservation must be done immediately and must not be done later than 30 minutes after sample collection.

4.5 Conduct QC sampling, as required.

4.6 Seal each container carefully and place in an individual "zip lock" bag.

4.7 Organize and carefully pack all samples in the cooler immediately after collection (e.g., bubble wrap). Insulate samples so that breakage will not occur.

4.8 Complete and place the chain-of-custody form in the cooler after all samples have been collected. Maintain one copy for the project file. If the cooler is to be transferred several times prior to shipment or delivery to the laboratory, it may be easier to tape the chain-of-custody to the exterior of the sealed cooler. When exceptionally hazardous samples are known or suspected to be present, this should be identified on the chain-of-custody as a courtesy to the laboratory personnel.

4.9 Add additional ice as necessary to ensure that it will last until receipt by the laboratory.

4.10 Seal the cooler with packing tape and a custody seal. Record the number of the custody seal in the field notebook and on the field form. If there are any exceptionally hazardous samples, then shipping regulations should be examined to ensure that the sample containers and coolers are in compliance and properly labeled.

4.11 Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time.

4.12 Maintain the shipping bill for the project files if overnight mail is utilized and call the laboratory the following day to confirm receipt.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish the criteria to be followed for the evaluation of data quality and for data validation. Because valid media-quality data are integral to environmental investigations that characterize site conditions, the quality of the data generated by a laboratory is extremely important to the successful completion of a project. The level of data evaluation and validation required is determined by the project data quality objectives and must be outlined in the work plan/scope of work. Data collected to establish qualitative trends, for example, do not require the same level of validation as data generated to support litigation.

The data evaluation procedure described in Section 2.0 of this SOP is designed to provide a measure of comparability regarding quality control (QC) samples, i.e., between duplicate or replicate samples and to detect any contamination or bias in analyses of blanks. They may be used for both intra-laboratory and inter-laboratory comparisons.

The data validation procedure described in Section 3.0 of this SOP is designed to provide a stringent review of analytical chemical data with respect to sample receipt and handling, analytical methods used, and data reporting and deliverables.

Prior to performing any data evaluation or validation, it is crucial that all appropriate regulatory agencies be contacted and their data validation requirements be determined, as these requirements vary from agency to agency and may vary among different Regions of the United States Environmental Protection Agency (USEPA).

2.0 PROCEDURE FOR EVALUATION OF DATA

2.1 Not all analytical data packages will require a full data validation procedure as described in Section 3.0. The procedures described in this section provide an initial screening to help decide if full data validation is warranted. These data evaluation procedures are used as a quality assurance (QA) check for water-quality data, and are not generally applicable to soil-quality data. They are to be used when a full data validation procedure (described in Section 3.0) is not required.

2.2 Primary/Replicate, Primary Split and Primary/Laboratory Duplicate Comparisons

X = primary sample concentration

Y = replicate/split/laboratory duplicate sample concentration

Z = {(X-Y)/[(X+Y)/2]} x 100

IDC = initial concentration requiring dilution, if samples have been diluted. If samples did not require dilution, then use the first range (i.e., QL-10[QL]).

QL = Quantitation Limit(1)

Organic Constituents

Range	Quantitative	Qualitative	Unusable
QL - 10(QL)	Z $\leq$ 60%	100% > Z > 60%	Z $\geq$ 100%
10(QL) - IDC	Z $\leq$ 40%	100% > Z > 40%	Z $\geq$ 100%
X or Y > IDC	Z $\leq$ 60%	100% > Z > 60%	Z $\geq$ 100%

Inorganic Constituents

Analytical Method	Quantitative	Qualitative	Unusable
Wet Chemistry testing	Z $\leq$ 60%	100% > Z > 60%	Z $\geq$ 100%
Atomic Absorption (AA)	Z $\leq$ 40%	100% > Z > 40%	Z $\geq$ 100%
Inductively Coupled Plasma (ICP)	Z $\leq$ 40%	100% > Z > 40%	Z $\geq$ 100%

2.3 Comparison of Blanks

X = primary sample concentration(2)

D = highest concentration in associated blank(s)

Y = X/dilution factor

	Quantitative	Qualitative	Unusable
Field Blank	D $\leq$ 0.1X	0.5X > D >0.1X	D $\geq$ 0.5X
Trip Blank	D $\leq$ 0.1X	0.5X > D > 0.1X	D $\geq$ 0.5X
Lab Blank	D $\leq$ 0.1Y	0.5Y > D > 0.1Y	D $\geq$ 0.5Y

(1)The quantitation limit will be dependent upon the specific methodology and the matrix, and will be either the minimum detection limit (MDL) or the practical quantitation limit (PQL).

(2)Results reported as BDL (below the detection limit) will be considered Quantitative because the primary samples have not been affected by the bias(es) which resulted in concentrations reported in the blank sample(s).

3.0 PROCEDURE FOR DATA VALIDATION

3.1 Determine study-specific data quality needs and pertinent regulatory agency data validation requirements.

3.2 Contact the appropriate regulatory agency(ies) to obtain their data validation procedure manual. This manual will indicate acceptable ranges for QC parameters to be investigated and procedures to follow for data which do not meet these requirements.

3.3 For inorganic compounds, the requirements that will be examined during the validation process are:

a. Holding times.

b. Instrument calibration, including initial and continuing calibration verification.

c. Blank(s).

d. Laboratory control sample(s).

e. Inductively Coupled Plasma (ICP) interference check samples.

f. Duplicate sample(s).

g. Matrix spike sample(s).

h. Furnace atomic absorption QC.

i. ICP serial dilution(s).

j. Sample result verifications.

k. Field duplicates.

l. General data assessment.

3.4 For organic compounds, the requirements that will be examined during the validation process are:

a. Holding times.

b. Gas Chromatograph/Mass Spectrometer (GC/MS) tuning.

c. GC calibration, initial and continuing.

d. Blanks.

e. Surrogate recoveries.

f. Matrix spike/matrix spike duplicates.

g. Internal standards performances.

h. Target Compounds List (TCL) compound identifications.

i. Reported detection limits.

j. Tentatively identified compounds (TICs).

k. Overall system performance.

l. General data assessment.

3.5 The parameters which do not conform to requirements are then listed and the data are qualified according to the guidelines provided in the appropriate regulatory agency's data validation procedure manual. The qualified data package is then reviewed and the project data reviewer, the project geochemist and/or the project manager makes a professional judgement concerning the validity of the data package, and its usability for the project.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish guidelines for conducting soil gas surveys utilizing a portable photoionization detector (PID).

2.0 CONSIDERATIONS

The specific procedure and equipment selection will be dependent upon the data objectives of the sampling program. For example, the sampling program may range from a preliminary screening utilizing several random locations to an extensive grid system with numerous horizontal and vertical sampling locations. The soil gas survey plan should be carefully designed and fully described in the work plan or proposal.

A soil gas survey is a method to approximate the distribution of volatile organic compounds (VOCs) in soil or ground water based on the concentration of VOCs in the pore space of the vadose zone. The advantage of a soil gas survey is that a broad site assessment can be conducted at a reduced cost with instantaneous qualitative analytical results. The survey can aid in the decision-making process for future soil sampling and well locations in order to optimize the data collected from these locations. Soil gas surveys can also be performed areas such as buildings and basements where access restrictions limit the use of conventional equipment.

Proper design of a soil gas survey requires an understanding of site features, equipment limitations, and hydrogeologic factors. Many site-specific factors, such as geology, depth to water, soil moisture, contaminant concentration and distribution, weather, natural and man-made migration pathways, organic content of soil, contaminant volatility and solubility, etc. will influence the results of a soil gas survey. Additionally, contaminant ionization potentials and response factors should be considered. It is beyond the scope of this SOP to discuss the specific potential impact of each of these factors. Collection and interpretation of soil gas data requires a thorough understanding of the relationships between these factors. As a result, only experienced personnel should design, conduct, and interpret soil gas surveys.

3.0 MATERIALS/EQUIPMENT

a. A work plan or proposal which outlines soil gas survey requirements.

b. Field book, field form(s) and maps.

c. Decontamination supplies (including non-phosphate, laboratory grade detergent, buckets, brushes, distilled water, potable water, regulatory-required reagents, aluminum foil, plastic sheeting, etc.).

d. Survey stakes or flags.

e. Device to remove surface material (shovel, jack hammer, concrete core drill, electric drill, etc.).

f. Magnetometer.

g. Cable locator.

h. Hand auger.

i. Slam bar.

j. Soil gas probes.

k. Hand sledge hammer.

l. Tool box.

m. Inert tubing of appropriate diameter with screw clamps.

n. Low volume, calibrated vacuum pump.

o. Extension cords.

p. Inorganic clay (modeling).

q. Photoionization meter and charging unit (two units, if possible).

r. Calibration gases and regulators.

s. 100-foot cloth tape measure.

t. 10-foot steel tape measure.

u. Disposable sampling gloves.

v. Backfill and repair materials (clean sand, asphalt patch, concrete patch material, etc.).

w. Broom.

4.0 CALIBRATION

The photoionization meter must be calibrated according to the manufacturer's specifications at a minimum frequency of once per day prior to collecting photoionization readings. In addition, periodic checks with the standard gas (e.g., every 2 hours or every ten samples) will be conducted to confirm that the calibration has not drifted. The time, date and calibration procedure must be clearly documented in the field book. If at any time the photoionization results appear erratic or inconsistent with field observations, then the unit must be recalibrated. If calibration is difficult to achieve, then the unit's lamp should be checked for dirt or moisture and cleaned, as necessary. During humid or wet conditions, the unit should be calibrated on a more frequent basis as determined by field personnel.

5.0 DECONTAMINATION

All reusable downhole equipment must be thoroughly cleaned according to regulatory-approved procedures. The soil gas probes should be pre-cleaned, wrapped in aluminum foil, and dedicated to an individual sampling location. Equipment such as drill bits, hand augers, slam bars, etc. must be thoroughly decontaminated between sampling locations to prevent cross-contamination. Procedures for cleaning field equipment can be found in the decontamination SOP. Equipment rinsate blanks should be collected to document proper decontamination.

6.0 PROCEDURE

6.1. Utilizing the work plan or proposal, locate soil gas sampling points and mark with a survey flag or nail. Do not use spray paint or solvent-based markers. Verify that the selected locations will achieve the desired data requirements based on the original survey design in the work plan.

6.2. Ensure the absence of subsurface utilities using, as necessary, a utility mark-out service, magnetometer, cable locator, and site reconnaissance.

6.3. Once all soil gas locations have been established, use a calibrated photoionization meter to determine ambient air concentrations (background). If facility operations will impact background readings, then arrangements should be made to conduct the soil gas survey during non-operational times.

6.4. Secure access to the subsurface using shovel, jack hammer, concrete core drill, gas drill, electric drill, etc. Clean surface debris from around the sampling location and utilize plastic sheeting to prevent cross-contamination of equipment.

6.5. Depending upon subsurface materials utilize a hand auger, slam bar, electric drill, etc. to advance the small diameter boring to a depth of 0.5 to 1.0 foot less than the desired sampling depth. Do not use a gasoline-powered drill for advancing the boring.

6.6. Log all geologic materials (if possible) paying special attention to any horizontal stratification or materials which may have preferential permeability.

6.7. Insert a pre-cleaned, stainless steel vapor probe (with perforated end first) into the borehole and drive it 0.5 to 1.0 feet into undisturbed sediments to the desired sampling interval. Refer to the field equipment decontamination SOP for minimum decontamination procedures for all downhole equipment. Pull back on the protective sheath (if present) exposing the perforated portion of the vapor probe.

6.8. Seal the annular space at the surface with inorganic clay (modeling clay) to prevent migration of vapors or surface material from entering the borehole.

6.9. Connect a section of dedicated and disposable teflon tubing to the soil gas probe and clamp off the tubing to establish an air-tight seal. Commercially available manifolds are permitted if properly decontaminated and constructed of stainless steel and/or teflon.

6.10. Connect a vacuum pump to the teflon tubing, release the clamp, and purge the probe to create inflow of potential vapors. Do not allow water to pass through the probe and enter the PID. Reclamp the tubing. The purge volume and rate should be clearly defined in the work plan. The selected rate and volume must remain consistent for all locations for a given survey.

6.11. Connect the calibrated photoionization meter to the teflon tubing creating an air-tight seal, release the clamp, and take a reading. The peak and average readings must be recorded.

6.12. If necessary, reclamp the tubing and secure the location for collection of a duplicate reading at a later time.

6.13. When activities are completed at the location, remove the soil gas probe and thoroughly decontaminate according to regulatory-approved protocols. Backfill the hole using native material or clean fill and restore the surface with appropriate patching material (asphalt, concrete, soil, etc.). Clean the area with a broom and dispose of all non-reusable materials in an appropriate manner.

6.14. Completely document all appropriate information in the field notebook including, but not limited to the following: sample location; sample identification; method of advancing boring; geologic material encountered; documentation of calibration; evacuation procedures including time and volume; photoionization readings including peak, average and time collected; duplicate readings, if any; and any difficulties encountered. A site map should be prepared with exact measurements to sampling points in case future investigation is necessary.

END OF PROCEDURE

Date: January 9, 2011

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for the sampling and screening of soil vapor monitoring points.

As part of the SOP for the sampling of soil vapor monitoring points, sample collection equipment and devices must be considered, and pre and post-sampling procedures (e.g., purging sample tubing prior to sample collection and screening monitoring point after collection) must be implemented.

All soil vapor sampling will be performed in general accordance with the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor in the State of New York dated October 2006.

2.0 EQUIPMENT AND MATERIALS

2.1 In order to sample the soil vapor monitoring points, specific equipment and materials are required. The equipment and materials list may include, but not necessarily be limited to, the following:

a. Safety first. Obtain the appropriate work permit, Job Safety Analysis (JSA) and personal protection equipment (PPE), as specified in the site Health and Safety Plan (HASP).

b. Three-way valve.

c. Teflon-lined polyethylene tubing.

d. Master-flex tubing.

e. Tracer gas (i.e., lab grade Helium).

g. Five gallon plastic bucket.

h. Vacuum pump with a constant low flow module calibrated to a maximum rate of 0.2 Liters per minute.

i. Flow meter capable of achieving a flow rate of 0.2 Liters per minute or less.

j. Watch/Timer.

k. Appropriate monitoring instruments (e.g., MultiRae, CO_2 and O_2 meters, or equivalent) to measure natural attenuation parameters including volatile organic compounds (VOCs), lower explosive limit (LEL), oxygen, hydrogen sulfide, carbon monoxide and carbon dioxide. LEL will be measured as a percentage of the lower explosion limit for methane (where 100% LEL equals 50,000 ppm of methane), and the remaining parameters will be measured as percent volume using multi-gas meters calibrated daily with appropriate multi-gas standards.

l. Calibration gases (isobutylene) and zeroing devices (i.e., air scrubbers)

m. Roux Associates' soil vapor sampling data form and field notebook.

n. Plastic sheeting.

o. Teflon™ tape.

p. Black pen and water-proof marker.

q. Tools (e.g., security bolt key, wrenches, screwdrivers, hammer, tubing cutter, etc.) or alternatives recommended in the JSA.

r. Nitrile and cut-proof gloves.

s. Laboratory-supplied Summa® canister(s) and flow regulator(s).

t. Chain-of-custody form(s) and custody seal(s).

u. Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) or equivalent summary.

v. Site health and safety plan (HASP).

w. Overnight (express) mail forms, if courier isn’t used.

3.0 DECONTAMINATION

3.1 Make sure all equipment is decontaminated and cleaned before use (refer to the SOP for Decontamination of Field Equipment for detailed decontamination methods; a summary for pumps is provided below). Use new, clean materials when decontamination is not appropriate (e.g., disposable gloves, sample tubing). Document, initial and date the decontamination procedures on the appropriate field form and in the field notebook.

a. Decontaminate a vacuum pump by: disassembling the vacuum pump and cleaning the internal parts with methanol. *Vacuum pumps should not be cleaned in the field*. Vacuum pumps should be decontaminated/cleaned by the facility that supplied/sold the equipment prior to the sampling event.

4.0 CALIBRATION OF FIELD ANALYSIS EQUIPMENT

Calibrate field analysis equipment according to manufacturer's manual before use (e.g., Photoionization Detector). Document, initial and date the calibration procedures on the appropriate field form, and in the field notebook.

5.0 PROCEDURE FOR SAMPLING/SCREENING/ SOIL VAPOR MONITORING POINTS

5.1 Soil Vapor Sample Collection Procedures - Soil vapor sampling should be performed in a manner consistent with prior investigations utilizing the following procedural steps:

5.1.1 Document, initial and date monitoring point identification, pre-sampling information, and problems encountered on the appropriate field form and in the field notebook, as needed.

5.1.2 Inspect the protective curb box and the monitoring point sample tubing, and note any items of concern such as missing tubing cap, or bent or damaged tubing and protective curb box.

5.1.3 Place a seal (i.e., model clay) surrounding the sample tubing to further minimize the potential for infiltration of the atmospheric air present at land surface directly above the soil vapor monitoring point (ambient air).

5.1.4 Connect the sample tubing to a "T" connector three-way assembly, with one end of the "T" connector leading to a vacuum pump and the other end leading to a pre-evacuated Summa canister with a calibrated regulator.

5.1.5 Purge the soil vapor sample tubing and the surrounding sand pack of approximately three volumes of air using a vacuum pump set at a rate of approximately but not greater than 0.2 liters per minute.

5.1.6 To verify that ambient air is not diluting the soil vapor sample during collection, test monitoring points using a tracer gas (helium), prior to sample collection. Place a plastic container (i.e., bucket) with a seal over the monitoring point, including the "T" connector and inject helium into the bucket to enrich the interior of the bucket with the tracer gas (this should be done while purging the monitoring point). Measure the rate of helium from the sample tubing as well as the helium-enriched area within the bucket using the MGD-2002 Helium Detector (by Dielectric) or equivalent meter. If the screening results show that the rate of helium detected in the sample tubing is greater than 10% of that found in the bucket, reset the seals around the sampling equipment and the sample tubing and purge again. This process of resetting and purging should be continued until the tracer gas is no longer detected at levels greater than 10% of the enriched area.

5.1.7 Following the purging and tracer gas verification steps, close the valve leading to the pump, and turn off the pump. Redirect the soil vapor to a 6-liter Summa canister for sample collection. Use a laboratory supplied calibrated flow controller (2 hour flow controllers for sub-slab soil vapor samples and 8 hour controllers for indoor air and ambient air samples) to restrict the sample collection rate to 0.2 liters per minute or less. The flow controller valve should be closed and sample collection completed when the vacuum reading of the Summa canister reaches -4 inches of mercury (shown on the flow controller gauge). If the Summa canister vacuum reaches less than 1 inch of mercury, contact the project manager to determine if sample should be analyzed.

5.1.8 Once the sample is collected, the soil vapor monitoring point should be screened, if warranted, with redundant gas meters for the lower explosive limit (LEL), hydrogen sulfide, VOCs, oxygen, carbon monoxide and carbon dioxide. The screening process includes double-checking the screening data through the utilization of separate, redundant gas meters. If there is a discrepancy between the redundant gas meters and the screening parameter mentioned above, the meter should be recalibrated according to manufacturer's manual and the soil vapor point should be rescreened. All screening data should be recorded on the appropriate field screening data form and in the field notebook.

5.1.9 Collect quality control (QC) samples as required in the work plan to monitor sampling and laboratory performance. One duplicate sample should be collected for every 20 samples. The duplicate sample should be collected immediately after collecting original sample, before screening with redundant gas meters.

5.1.10 Upon completion of sample collection and screening steps, cap the sample tubing below grade within the flush-mount curb box enclosure to allow for subsequent sampling events.

5.1.11 Complete all necessary field forms, field notebook entries, and the chain-of-custody form(s). Chain-of-custody form(s) must be signed and dated prior to shipping samples. Retain one copy of each chain-of-custody form. Secure the cooler with sufficient packing tape and a custody seal.

5.1.12 Samples collected from Monday through Friday will be delivered within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Consult the work plan to determine if any of the analytes require a shorter delivery time.

6.0 REFERENCES

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

END OF PROCUDURE

Date: October 23, 2015

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide procedures and standards for photographic documentation of project activities conducted by Roux Associates, Inc. (Roux Associates). Field staff are encouraged to use photographic documentation to display site features or ongoing field work. The exact number of still or video images is left to the professional discretion of field staff in consultation with the Project Manager. This instruction addresses how the photographic images will be incorporated into the project file documentation.

All photography collected for project use should be in a digital format and only document the field activities and / or site features associated with the specific project. Digital cameras have become the primary means of gathering evidence and this medium has many advantages. These advantages include enhanced image resolution, the capability to immediately view the image after it is collected, and the ability to collect still images using a single piece of equipment. The digital camera reduces printing time and cost because the digital images do not need to be taken to a photo lab for developing; rather, the digital images can be viewed on the computer and printed as needed.

2.1 MATERIALS

In order to provide photo documentation of field activities and site features, specific materials are required. These materials include the following:

a. A bound, waterproof field notebook.

b. Digital camera or camera phone.

c. A standard reference marker (a ruler or other object with a known length).

d. Approved work plan/scope of work.

e. Health and safety plan (HASP).

f. Appropriate Roux Associates' SOPs.

g. Black pens, and indelible markers.

3.1 OPERATION

3.2 General Photographic Activities in the Field: The following sections provide general guidelines that should be followed to visually document field activities and site features using digital cameras or cell phone cameras. Listed below are general suggestions that the photographer should consider when performing activities under this SOP:

a. The photographer should be prepared to take a variety of shots, from close-up to wide-angle. Many shots will be repetitive in nature or format, especially close-up site feature photographs.

b. The lighting for sample and feature photography should be oriented toward a flat condition with little or no shadow. A flash may be used to adjust low lighting settings or to prevent shadows.

c. Digital cameras have multiple photographic quality settings. A camera that obtains a higher resolution (quality) has a higher number of pixels and will store less photographs per digital storage medium. When possible, the camera should be set to the highest resolution.

d. The photograph should include a standard reference marker if scale is difficult to determine in the photograph.

e. If photographs are being collected in unfamiliar locations or of unknown objects, Roux Associates personnel are encouraged to record the photographic activities in their assigned field notebook. The following information would provide the user reference for post-processing of the photo:

- Photographer name
- Date and time the photograph was taken (military time)
- Description of the location where the photo was taken
- A brief description of the activity/ item photographed, and other pertinent information about the photograph.

Pens with permanent ink will be used to record all data. Data or other information that has been entered incorrectly will be corrected by drawing a line through the incorrect entry and initialing and dating the lined through entry. Under no circumstances should the incorrect material be erased, made illegible or obscured so that it cannot be read.

4.1 POST-OPERATION (ARCHIVING PHOTO)

4.2 At the end of each day’s photographic session, the field personnel should ensure that the field logbook is complete. At the conclusion of the field day, the field personnel should follow these procedures to ensure the proper achival of the digital photographs:

a. Upload the photos to the network drive in a folder that includes the corresponding date of the photographs, located in the proper project folder.

b. If a large amount a photographs are planned to be collected for the project, a log may be usedful in for storing pertinent information about the photos and may facilitate searching the photo database. Information that may be included in the photo log includes photograph date and time, location, photographer, and any other corresponding notes.

c. Once the above steps are completed, double check to save your edits before deleting the photos off the the camera to ensure storage space for future photo documentation.

END OF PROCEDURE

Date: January 9, 2011
Revision: May 5, 2015

1.0 PURPOSE

The purpose for this standard operating procedure (SOP) is to establish the guidelines for decontamination of all field equipment potentially exposed to contamination during field investigation activities (i.e. drilling, soil and water sampling).

The objective of decontamination is to ensure that all field samplingequipment is decontaminated (free of potential contaminants): 1) prior to being brought onsite to avoid the introduction of potential contaminants to the site; 2) between drilling and sampling events/activities onsite to eliminate the potential for cross-contamination between boreholes and/or wells; and 3) prior to the removal of equipment from the site to prevent the transportation of potentially contaminated equipment offsite.

The decontamination line is setup so that the first station is used to clean the most contaminated item. It progresses to the last station where the least contaminated item is cleaned. A site is typically divided up into the following boundaries: Hot Zone or Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), and the Support or Safe Zone (SZ). The decontamination line should be setup in the Contamination Reduction Corridor (CRC).

In considering decontamination procedures, state and federal regulatory agency requirements must be considered because of potential variability between state and federal requirements. Decontamination procedures must be in compliance with state and/or federal protocols in order that regulatory agency(ies) scrutiny of the procedures and data collected do not result in non acceptance (invalidation) of the work undertaken and data collected.

The equipment and materials list for decontamination activities may include, but not necessarily be limited to, the following:

a. A work plan and health and safety plan which outlines decontamination procedures and requirements.

b. Field notebook and field form(s).

c. Decontamination solutions, including as necessary: non-phosphate, laboratory-grade detergent; distilled/deionized water; potable water; cleaning solvents if needed [e.g., hexane, acetone, nitric acid).

d. Long and short handled brushes,

e. Bottle brushes

f. Drop cloth/plastic sheeting

g. Paper towels

h. Plastic or galvanized tubs or buckets

i. Pressure washers or steam cleaners

j. Solvent sprayers

k. Trash / bilge pumps

l. Aluminum foil

m. 55-gallon drums.

2.0 PROCEDURE FOR DRILLING EQUIPMENT

The following is a minimum decontamination procedure for drilling equipment. Drilling equipment decontamination procedures will be documented on an appropriate field form or in the field notebook, especially any variation from the method itemized below:

2.1 Safety first. Obtain the appropriate Job Safety Analysis (JSA) and personal protection equipment (PPE), as specified in the site Health and Safety Plan (HASP). Prior to mobilization to a site, the expected types of contamination should be evaluated to determine if the field cleaning and decontamination activities will generate rinsates and other waste waters that might be considered RCRA hazardous waste or may require special handling.

2.2 The drill rig and all associated equipment should be properly decontaminated by the contractor before arriving at the site.

2.3 The augers, drilling casings, rods, samplers, tools, and any piece of equipment that can come in contact (directly or indirectly) with the soil, requires proper decontamination on-site prior to commencing drilling. The project work plan or HASP, and appropriate regulatory requirements, should be consulted to determine site-specific decontamination requirements.

2.4 The same decontamination procedures used prior to drilling will be followed between boreholes (at a fixed on-site location[s], if appropriate) and before leaving the site at the end of the investigation.

2.5 All on-site steam cleaning or (decontamination) activities will be monitored and documented by a member(s) of the staff of Roux Associates, Inc. and should be performed on a decontamination pad that meets the following specifications:

1. The pad should be constructed in an area known or believed to be free of surface contamination.

2. A temporary pad should be lined with a water impermeable material with no seams within the pad. This material should be either easily replaced disposable) or repairable.The pad should be regularly inspected to ensure there are no leaks.

3. Water should be removed from the decontamination pad frequently.

2.6 If drilling activities are conducted in the presence of thick, sticky oils (e.g., PCB oil) which coat drilling equipment, then special decontamination procedures may have to be utilized before steam cleaning (e.g., hexane scrub and wash).

2.7 Containment of decontamination fluids may be necessary (e.g., rinseate from steam cleaning) or will be required (e.g., hexane), and disposal must be in accordance with state and/or federalregulatory requirements.

3.0 PROCEDURE FOR SOIL-SAMPLING EQUIPMENT

The following is a minimum decontamination procedure for soil-sampling equipment (e.g., split spoons, stainless-steel spatulas). Soil-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

3.1 Safety first. Obtain JSA and PPE, as specified in the site HASP.

3.2 Wear disposable gloves while cleaning equipment to avoid cross-contamination and change gloves as needed.

3.3 Steam clean the sampler or rinse with potable water. If soil-sampling activities are conducted in the presence of thick, sticky oils (e.g., PCB oil) which coat sampling equipment, then special decontamination procedures may have to be utilized before steam cleaning and washing in detergent solution (e.g., hexane scrub and wash).

3.4 Prepare a non-phosphate, laboratory-grade detergent solution and distilled or potable water in a clean bucket.

3.5 Disassemble the sampler, as necessary and immerse all parts and other sampling equipment in the solution.

3.6 Scrub all equipment in the bucket with a brush to remove any adhering particles.

3.7 Rinse all equipment with copious amounts of potable water followed by distilled or deionized water.

3.8 Place clean equipment on a clean plastic sheet (e.g., polyethylene)

3.9 Reassemble the cleaned sampler, as necessary.

3.10 After equipment has been cleaned, all individuals involved in equipment handling should don clean gloves, or wrap the equipment with a suitable material (e.g., plastic bag, aluminum foil).

As part of the decontamination procedure for soil-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

4.0 PROCEDURE FOR WATER-SAMPLING EQUIPMENT

The following is a decontamination procedure for water-sampling equipment (e.g., bailers, pumps). Water-sampling equipment decontamination procedures, especially any variation from the method itemized below, will be documented on an appropriate field form or in the field notebook.

4.1 Safety first. Obtain the JSAs and PPE, as specified in the site HASP.

4.2 Decontamination procedures for bailers follow:

a. Wear disposable gloves while cleaning bailer to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a bucket.

c. Disassemble sampling equipment. Discard all used sampling tubes and cords in an appropriate manner. Disconnect all power sources from electrical equipment (i.e. pumps). Scrub each piece of equipment with a brush and solution.

d. Rinse all sampling equipment with copious amounts of potable, distilled or deionized water, Reassemble equipment as per the manufacturer’s instructions.

f. Air dry.

g. Wrap equipment with a suitable material (e.g., clean plastic bag, aluminum foil).

4.3 Decontamination procedures for pumps follow:

a. Wear disposable gloves while cleaning pump to avoid cross-contamination and change gloves as needed.

b. Prepare a non-phosphate, laboratory-grade detergent solution and potable water in a clean bucket, clean garbage can, or clean 55-gallon drum.

c. Flush the pump and discharge hose (if not disposable) with the detergent solution, and discard disposable tubing and/or cord in an appropriate manner.

d. Flush the pump and discharge hose (if not disposable) with potable water.

e. Place the pump on clear plastic sheeting.

f. Wipe any pump-related equipment (e.g., electrical lines, cables, discharge hose) that entered the well with a clean cloth and detergent solution, and rinse or wipe with a clean cloth and potable water.

g. Air dry.

h. Wrap equipment with a suitable material (e.g., clean plastic bag).

As part of the decontamination procedure for water-sampling equipment, state and/or federal protocols must be considered. These may require procedures above those specified as minimum for Roux Associates, Inc., such as the use of nitric acid, acetone, etc. Furthermore, the containment and proper disposal of decontamination fluids must be considered with respect to regulatory agency(ies) requirements.

END OF PROCEDURE