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REMEDIAL INVESTIGATION WORK PLAN
515-519 WEST 43RD STREET REDEVELOPMENT SITE
515-519 WEST 43RD STREET AND 514-518 WEST 44TH STREET
NEW YORK, NEW YORK

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

for
BH Group 43 LLC
Brooklyn, New York

File No. 0211280
December 2024

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9 December 2024
File No. 0211280-000

New York State Department of Environmental Conservation
Region 2 – Division of Environmental Remediation
47-40 21st Street
Long Island City, New York 11101-5401

Attention: Ms. Jane O'Connell

Subject: Draft Remedial Investigation Work Plan
515-519 West 43rd Street Redevelopment Site
515-519 West 43rd Street and 514-518 West 44th Street
New York, New York

Dear Ms. O'Connell,

H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York), on behalf of BH Group 43 LLC is submitting for the review and approval of the New York State Department of Environmental Conservation (NYSDEC) this Draft Remedial Investigation Work Plan (RIWP) for the proposed 515-519 West 43rd Street Redevelopment Site located at 515-519 West 43rd Street and 514-518 West 44th Street in New York, New York (Site). This document was submitted as part of the Brownfield Cleanup Program Application for the Site. This RIWP has been developed based on the NYSDEC's "Technical Guidance for Site Investigation and Remediation" (Division of Environmental Remediation [DER]-10, dated May 2010).

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

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

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Certification

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

FINAL WILL BE CERTIFIED

James M. Bellew *Date*

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

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List of Acronyms and Abbreviations

$\mu g/m^3$	Micrograms per Cubic Meter
A	
ACM	Asbestos-containing Material
Applicant	BH Group 43, LLC
ASP	Analytical Services Protocol
AST	Aboveground Storage Tank
B	
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	Below Ground Surface
bsg	Below Sidewalk Grade
BTEX	Benzene, toluene, ethylbenzene, and xylenes
C	
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulations
CVOC	Chlorinated Volatile Organic Compound
D	
DER-10	Division of Environmental Remediation-10 *(specifically "May 2010 NYSDEC Technical Guidance for Site Investigation and Remediation")*
DUSR	Data Usability Summary Report
E	
EA	Exposure Assessment
EBI	EBI Consulting
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Approval Program
EPA	U.S. Environmental Protection Agency
ESA	Environmental Site Assessment
ESI	Environmental Site Investigation
F	
FSP	Field Sampling Plan
ft	Feet
G	
GPR	Ground Penetrating Radar
GPRS	Ground Penetrating Radar Systems, LLC

List of Acronyms and Abbreviations (continued)

H	
Haley & Aldrich of New York	H & A of New York Engineering and Geology, LLP
HASP	Health and Safety Plan
I	
In.	inch
L	
L/min	Liters per Minute
Langan	Langan Engineering and Environmental Solutions
LNAPL	Light Non-aqueous Phase Liquid
LSDF	Low-Sulfur Diesel Fuel
M	
mg/kg	Milligrams per Kilogram
MW	Monitoring Well
N	
NOVA	NOVA Geophysical Engineering Services
NTU	Nephelometric turbidity unit
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
O	
OSHA	Occupational Safety and Health Administration
P	
Pace	Pace Analytical
PACM	Potential Asbestos-containing Materials
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Perchloroethylene/Tetrachloroethene
PFAS	Per- and Polyfluoroalkyl Substances
PGWSCO	Protection of Groundwater Soil Cleanup Objective
PID	Photoionization Detector
PPM	Parts per Million

List of Acronyms and Abbreviations (continued)

Q	
QA/QC	Quality Assurance/Quality Control
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
R	
RAWP	Remedial Action Work Plan
REC	Recognized Environmental Condition
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
RRSCOs	Restricted-Residential Soil Cleanup Objectives
S	
SC	Site Characterization
SCO	Soil Cleanup Objective
SEFA	EPA Spreadsheets for Environmental Footprint Analysis
SIM	Selective Ion Monitoring
Site	The property located at 515-519 West 43rd Street, New York, New York
Sq Ft	Square Feet
STARS	New York Spills Technology and Remediation Series
SVOC	Semi-Volatile Organic Compound
T	
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TRC	TRC Engineers Inc.
U	
UST	Underground Storage Tank
UUSCOs	Unrestricted Use Soil Cleanup Objectives
V	
VOCs	Volatile Organic Compounds

1. Introduction

On behalf of the Applicant, BH Group 43 LLC, H & A of New York Engineering and Geology LLP (Haley & Aldrich of New York) has prepared this Remedial Investigation Work Plan (RIWP) for the 515-519 West 43rd Street Redevelopment Site, located at 515-519 West 43rd Street and 514-518 West 44th Street (see Figure 1) in the Hell's Kitchen neighborhood of New York, New York (Site). This RIWP was prepared in accordance with the regulations and guidance applicable to the Brownfield Cleanup Program (BCP).

The Site is identified as Block 1072, Lots 21 (515-519 West 43rd Street), 42 (514 West 44th Street), and 44 (518 West 44th Street) on the New York City tax map. The Site is approximately 15,070 square feet (sq ft) (0.346 acres) and is currently improved with a three-story building and one-story addition encompassing all of Lot 21 with a partial cellar located on the southern portion of Lot 21, a one-story auto repair and taxi garage encompassing all of Lot 42, and a one-story auto repair and taxi garage encompassing all of Lot 44. The cellar and first floors of the one- to three-story building on Lot 21 are currently occupied by "Avis," an automotive rental company, and the second and third floors are currently vacant. The two one-story garages on Lots 42 and 44 are currently occupied by "Rosenberg Auto Repair Inc.," an auto repair and maintenance shop. The Site is bounded to the north by West 44th Street followed by Public School 051, The Elias Howe School; to the east by a 15-story mixed residential and commercial building; to the south by West 43rd Street followed by a 35-story mixed residential and commercial building; and to the west by M479 Beacon High School and a one-story automotive repair shop. The Site location is shown on Figure 1. Existing Site features are shown on Figure 2 and surrounding land use is depicted on Figure 3.

To facilitate the implementation of the RIWP proposed herein, the existing structures will require selective demolition. Further details regarding the anticipated building demolition are discussed in Section 3.1.

The Site is located within a residential district, R9, with the intended post-development use as a multi-story residential building.

1.1 PURPOSE

The objective of the Remedial Investigation (RI) is to characterize the nature and extent of environmental impacts at the Site and to provide sufficient information to evaluate remedial alternatives, as required. Based on previous investigations conducted at the Site, including a Limited Phase II Environmental Site Investigation (ESI) conducted by Haley & Aldrich of New York in July and October 2024, the primary contaminants of concern at the Site include petroleum-related volatile organic compounds (VOCs) in soil and soil vapor, and semi-volatile organic compounds (SVOCs; specifically polycyclic aromatic hydrocarbons [PAHs]) and metals (specifically lead) in soil. Additional investigation is necessary to determine the potential source(s) of contamination.
Summaries of the soil and soil vapor analytical data collected at the Site during the Limited Phase II ESI are displayed on Figures 4 and 5.

The previous investigations did not comprehensively delineate the extent of soil, groundwater, and soil vapor contamination at the Site. Results of the additional sample analyses proposed in this RIWP will be used to confirm the results of the previous Site characterization activities, address data gaps, delineate any on-Site source(s), and determine a course for remedial action.

2. Background

2.1 CURRENT LAND USE

The Site is currently active. The Site is improved with a three-story building and one-story addition encompassing all of Lot 21 with a partial cellar located on the southern portion of Lot 21, a one-story auto repair and taxi garage encompassing all of Lot 42, and a one-story auto repair and taxi garage encompassing all of Lot 44. The cellar and first floors of the one- to three-story building on Lot 21 are currently occupied by “Avis,” an automotive rental company, and the second and third floors are currently vacant. The two one-story garages on Lots 42 and 44 are currently occupied by “Rosenberg Auto Repair Inc.,” an auto repair and maintenance shop.

2.2 SITE HISTORY

According to a Phase I Environmental Site Assessment (ESA) conducted by Haley & Aldrich of New York in October 2024, the Site has been developed for residential and commercial uses since at least 1890. Historical uses of the Site included a “Job Printer” on Lot 21 and “Farrier” on Lot 44 by 1911; the “Park & Tilford” warehouse on Lot 21 and auto repair operations with a buried 550-gallon gasoline tank on Lot 44 by 1930; a service station and garage on Lot 21 and a print shop on Lot 42 by 1950; a parking garage on Lot 21, an auto repair shop on Lot 42, and a motor freight station on Lot 44 by 1968; auto repair shops in the one-story addition on Lot 21 and the garage on Lot 44 by 1979; and commercial operations on Lot 21 by 1991. The subject property remains relatively unchanged through the present and is currently operating as an automotive rental service and two active auto repair and taxi garages.

2.3 SURROUNDING LAND USE

The Site is located within an urban area of the Hell’s Kitchen neighborhood of New York, New York, characterized by low-rise commercial buildings and multi-story mixed-use commercial and residential buildings. There are two sensitive receptors within a 500-foot (ft) radius of the Site as listed below:

1) Beacon High School – 522 West 44th Street, New York, New York, 10036, listed as a public school.
2) P.S. 051 Elias Howe – 525 West 44th Street, New York, New York, 10036, listed as a public school.

Properties immediately surrounding the Site are zoned for commercial and residential uses.

2.4 SURROUNDING LAND USE HISTORY

The area surrounding the Site has been used primarily for manufacturing, commercial, and residential uses from the late 1800s to the present day. From the 1950s to the 1960s, a westerly line of the Penn Central Railroad was constructed below grade including a one-story freight station to the south of the Site. Various buildings associated with tanks, including auto repair shops, filling stations, and factories, were shown to be in use from the late 1800s to the present day.

2.5 PREVIOUS INVESTIGATIONS

The following previous investigations and reports were prepared for the Site and are included in Appendix A:

- *Phase I and Limited Phase II Environmental Site Assessment*, prepared by Langan Engineering and Environmental Solutions (Langan), prepared for Cendant Car Rental Group, Inc., 13 January 2005.
- *Phase I Environmental Site Assessment,* prepared by Haley & Aldrich of New York, prepared for BH Group 43 LLC, 6 November 2024.
- *515-519 West 43rd Street and 514-518 West 44th Street Limited Environmental Site Investigation Summary,* prepared by Haley & Aldrich of New York, prepared for BH Group 43 LLC, 6 November 2024.

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

***Phase I and Limited Phase II Environmental Site Assessment,* prepared by Langan Engineering and Environmental Solutions, prepared for Cendant Car Rental Group, Inc. 13 January 2005.**

Langan conducted a Phase I and a Limited Phase II ESA for 515 West 43rd Street in January 2005. Langan identified two Recognized Environmental Conditions (RECs) associated with the property during the Phase I, including two 500-gallon underground storage tanks (USTs) observed during the Site reconnaissance and the presence of potential asbestos-containing materials (PACM) inside the building. The report indicated that the USTs were enclosed in concrete and formerly stored gasoline. The owner hired a contractor to perform pressure tests; however, due to test failures, the tanks were abandoned-in-place in 1975 as recommended by the local Fire Marshall. Langan also noted observing pump motors along the cellar wall in the vicinity of the former tanks. The pumps reportedly supplied a dispenser located on the first floor. Langan reported that the Site contact was unaware of any releases from the USTs, and no documentation regarding the USTs, such as registration or closure documentation, was available for review.

As a part of the Limited Phase II ESA, Langan collected seven bulk samples from the friable PACM to determine whether the sampled content was asbestos-containing material (ACM). The results of the sampling did not detect asbestos in concentrations exceeding 1 percent by weight; therefore, this indicates that the material did not contain asbestos. No further action was recommended for this REC.

Additionally, Langan advanced five soil borings, three soil borings in the vicinity of the abandoned USTs located beneath the cellar floor slab and two on the first floor for geotechnical purposes. Langan collected two soil samples from the cellar borings from between 0.5 and 1.5 ft and submitted them for laboratory analysis of New York Spills Technology and Remediation Series (STARS) compounds. The results indicated that no compounds exceeded New York State Department of Environmental Conservation (NYSDEC) soil cleanup criteria or the STARS screening values; however, Langan reported elevated photoionization detector (PID) readings at 0.5 to 2 ft below the cellar slab in all three borings installed near the former USTs, with a maximum reading of 182 parts per million (ppm). Of note, the report available for review was partial and did not contain boring logs or figures to detail the locations of these former tanks or soil borings. The text of the report stated that the USTs were located under an elevated concrete slab where a UST pipe manhole was observed, and based on observations during the reconnaissance of the Site for this Phase I ESA, it was ascertained that this area was located in the southeastern portion of the cellar.

Phase I Environmental Site Assessment, **prepared by Haley & Aldrich of New York, prepared for BH Group 43 LLC, 1 November 2024.**

A Phase I ESA was conducted for the Site for BH Group 43 LLC in November 2024. At the time of the Phase I ESA Site reconnaissance in August and October 2024, the buildings were active. Haley & Aldrich of New York indicated the following RECs associated with the Site.

REC #1: Former and Current Use of the Subject Property for Auto-Related Purposes and the Presence of USTs

Historical records indicate that the subject property was operated by a service station in the 1950s and as auto garages from the 1930s to present. Additionally, according to the Phase I ESA completed by Langan, two gasoline 550-gallon USTs were located beneath the cellar's concrete floor of the main building on Lot 21, which were abandoned-in-place, as per recommendation from the local Fire Marshall in 1970, due to failed pressure tests. The Site contact informed Langan the tanks formerly contained gasoline and were situated within a concrete vault. Langan also noted observing pump motors along the cellar wall in vicinity of the former tanks. The pumps reportedly supplied a dispenser located on the first floor. Langan reported that the Site contact was unaware of any releases from these USTs. Additionally, historical Sanborn maps show a 550-gallon gasoline UST buried in the northwestern portion of the subject property on Lot 44. There are no records that these tanks were registered with the NYSDEC or documentation of tank removal/closure available for review. Without proper documentation, it is unknown if residual contamination remains in the former tank areas or former dispenser operations. Currently, a 4,000-gallon gasoline UST, located under the slab of the first-floor area on Lot 21, and a 250-gallon waste oil aboveground storage tank (AST) associated with auto repair activities, located in the northeastern portion of the garage on Lot 42, are in service at the Site.

Auto-related facilities commonly utilize hazardous materials, including petroleum products and chlorinated solvents. The historical and current uses of the subject property, combined with the historical and current presence of USTs, is considered a REC, as potential or undocumented releases of petroleum products, solvents, and/or other hazardous materials may have adversely affected groundwater, soil, and/or soil vapor at the subject property.

REC #2: Documented Chlorinated Volatile Organic Compound (CVOC) Contamination in Groundwater and Soil Vapor in Upgradient and/or Adjacent Properties

As summarized in the regulatory database report, a Limited Phase II ESI performed at the hydraulically upgradient, east-adjacent property located at 505-513 West 43rd Street by EBI Consulting (EBI) in October 2009 identified elevated levels of CVOCs in groundwater. EBI determined that the likely source of the contamination was former railroad operations at the property and migration from off-Site sources. Additionally, as summarized in the regulatory database report, a Limited Phase II ESI performed at the west-adjacent property located at 521 West 43rd Street by TRC Engineers Inc. (TRC) in July 2010 identified contamination in soil vapor (including petroleum-related VOCs and CVOCs), as well as light non-aqueous phase liquid (LNAPL) observed on perched groundwater. TRC did not identify a groundwater or soil source of CVOC impacts in soil vapor. Petroleum-related impacts and the presence of LNAPL are potentially the result of former Site operations, including varnish and machinery storage, garages, a pharmaceutical company, a printing press, motor repair shops, and other manufacturing operations. Due to the proximity to the subject property, impacted soil vapor or groundwater may have migrated from this property and could be present under the subject property. Therefore, the documented contamination on these adjacent properties is considered a REC.

REC #3: Staining on Walls/Floors and Poor Housekeeping Throughout the Subject Property

Staining was observed in multiple areas of the property, including the west stairwell on the second floor and on all walls and floors of the building on Lot 21, and on the floors in both of the garages on Lots 42 and 44. Staining on the floors appears to be related to cleaning materials on Lot 21 and automotive repair services on Lots 42 and 44; however, staining on the walls in the building on Lot 21 appears to be seeping in from potential exterior areas; however, a source was not able to be identified. Poor housekeeping was observed on the first floor and cellar of the building on Lot 21, and hazardous materials appeared not to be stored in containment in certain areas in each of the subject property buildings. Containers showing evidence of previous uncontained discharge, such as visual splatter, smears, and discoloration on external areas of the containers, were observed on the concrete floor in the cellar on Lot 21. In addition, six 55-gallon-capacity drums of unknown contents were observed on Lot 21. While indications of spills and/or staining were not observed near the drums, spill prevention measures were not implemented, and the drums were not properly labeled. Due to poor housekeeping observed during the Site reconnaissance, as well as staining observed on floors and apparent seepage through walls, this is considered a REC.

***515-519 West 43rd Street and 514-518 West 44th Street Limited Environmental Site Investigation Summary*, prepared by Haley & Aldrich of New York, prepared for BH Group 43 LLC, 1 November 2024.**

Haley & Aldrich of New York completed a Limited Phase II ESI at the Site to investigate soil, groundwater, and soil vapor quality beneath the Site. The investigation was performed on 1 July 2024, 10 July 2024, 11 October 2024, and 16 October 2024 and included: a geophysical investigation using ground-penetrating radar (GPR) to identify subsurface anomalies indicative of USTs and to clear underground utilities (Appendix B); the installation of 14 soil borings to depths between 3 and 15 ft below ground surface (bgs); and the installation of six temporary soil vapor points. Groundwater was not encountered during this investigation. In total, 25 soil samples and six soil vapor samples were collected. Field observations and laboratory analytical results are summarized below:

Soil

Urban fill, generally consisting of light brown to brown, medium to coarse sand with fines, brick, coal fragments, stone, and pebbles was observed from the surface to depths between 7.5 and 10 ft bgs in the soil borings located on the first floor of the building on Lot 21; to depths between 3 and 7 ft bgs on Lot 42; and to depths between 8 and 10 ft bgs on Lot 44. Soil observed from the partial cellar on Lot 21 generally consisted of brown to dark brown medium to coarse silty sand with potential weathered rock, pebbles, and bedrock fragments. Refusal was encountered in the cellar at 3 to 4 ft bgs (approximately 13 to 14 ft below sidewalk grade [bsg]).

Soil analytical results were compared to NYSDEC Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use Soil Cleanup Objectives (UUSCOs), Restricted-Residential Use Soil Cleanup Objectives (RRSCOs) and Protection of Groundwater Soil Cleanup Objectives (PGWSCOs).

Five VOCs were detected at concentrations above UUSCOs, RRSCOs, and/or PGWSCOs in soil samples collected. Three VOCs were detected at concentrations above UUSCOs, RRSCOs, and PGWSCOs in sample SB-07_2-4, including 1,2,4-trimethylbenzene at a concentration of 230 milligrams per kilogram (mg/kg), 1,3,5-trimethylbenzene at a concentration of 75 mg/kg, and total xylenes at a concentration of 140 mg/kg. Two VOCs were also identified in SB-07_2-4 above UUSCOs and PGWSCOs, including ethylbenzene at a concentration of 2.1 mg/kg and naphthalene at a concentration of 34 mg/kg. Two VOCs were identified at concentrations above UUSCOs and PGWSCOs in SB-02_2-4, including 1,2,4-trimethylbenzene at a concentration of 11 mg/kg and total xylenes at an estimated concentration of 1.9 mg/kg.

Seven SVOCs, specifically PAHs, were detected at concentrations above UUSCOs, RRSCOs, and/or PGWSCOs in soil samples SB-01_0-2, SB-01_8-10, SB-04_0-2, and SB-13_0-2. Maximum PAH concentrations were observed in SB-13_0-2, including benzo(a)anthracene (maximum concentration of 47 mg/kg), benzo(a)pyrene (maximum concentration of 43 mg/kg), benzo(b)fluoranthene (maximum concentration of 54 mg/kg), benzo(k)fluoranthene (maximum concentration of 19 mg/kg), chrysene (maximum concentration of 48 mg/kg), dibenzo(a,h)anthracene (maximum concentration of 6.5 mg/kg), and indeno(1,2,3-cd)pyrene (maximum concentration of 28 mg/kg). No other SVOCs were detected in any soil samples above applicable standards.

Seven metals were detected above UUSCOs, RRSCOs, and/or PGWSCOs in multiple soil samples collected. Lead was detected above UUSCOS, RRSCOs, and PGWSCOs at a maximum concentration of 2,720 mg/kg in SB-13_5-7. Barium was detected above UUSCOs and RRSCOs at a maximum concentration of 487 mg/kg in SB-09_3-5. Zinc was detected above UUSCOs and PGWSCOs at a maximum concentration of 3,300 mg/kg in SB-13_5-7. Copper, mercury, and nickel were detected above UUSCOs at maximum concentrations of 87.4 mg/kg in SB-14_6-8, 0.714 mg/kg in SB-03_2-4, and 78 mg/kg in SB-02_2-4, respectively. Arsenic was detected above UUSCOs in SB-04_0-2 only at a concentration of 13.4 mg/kg. No other metals were detected in any soil samples above applicable standards.

Soil Vapor

No standard currently exists for soil vapor samples in New York State.

Total VOC concentrations in sub-slab and soil vapor samples ranged from 74.14 micrograms per cubic meter ($\mu g/m^3$) in SV-03 to a maximum concentration of 4,009.90 $\mu g/m^3$ in SV-06. Total benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations ranged from 7.517 $\mu g/m^3$ in SV-01 to a maximum concentration of 2,257.20 $\mu g/m^3$ in SV-06. Total CVOC concentrations ranged from non-detect in SV-06 to a maximum concentration of 154.25 $\mu g/m^3$ in SV-05.

Several petroleum-related VOCs were detected above laboratory reporting limits in multiple soil vapor samples collected, including 1,2,4-trimethylbenzene (maximum concentration of 90.5 $\mu g/m^3$ in SV-05), 1,3,5-trimethylbenzene (maximum concentration of 23 $\mu g/m^3$ in SV-05), 2,2,4-trimethylpentane (maximum concentration of 45.9 $\mu g/m^3$ in SV-02), benzene (maximum concentration of 68.4 $\mu g/m^3$ in SV-02), toluene (maximum concentration of 573 $\mu g/m^3$ in SV-06), ethylbenzene (maximum concentration of 291 $\mu g/m^3$ in SV-06), naphthalene (maximum concentration of 6.29 $\mu g/m^3$ in SV-05), and total xylenes (maximum concentration of 1,362 $\mu g/m^3$ in SV-06).

Several CVOCs were detected above laboratory detection limits in multiple soil vapor samples collected, including tetrachloroethene (PCE; maximum concentration of 135 $\mu g/m^3$ in SV-05), trichloroethene (TCE; maximum concentration of 4.44 $\mu g/m^3$ in SV-01), methylene chloride (maximum concentration of 4.93 $\mu g/m^3$ in SV-05), and chloroform (maximum concentration of 111 $\mu g/m^3$ in SV-01). 1,1,1-trichloroethane was detected above laboratory detection limits in one sub-slab vapor sample, SV-05, at a concentration of 11.6 $\mu g/m^3$.

Acetone, n-heptane, and hexane were detected in each soil vapor sample above laboratory detection limits at maximum concentrations of 815 $\mu g/m^3$ in SV-06, 56.1 $\mu g/m^3$ in SV-06, and 49 $\mu g/m^3$ in SV-05, respectively. Ethanol was detected in multiple samples with a maximum concentration of 520 $\mu g/m^3$ in SV-06. The emerging contaminant 1,4-dioxane was detected in SV-05 only at a concentration of 5.73 $\mu g/m^3$.

3. Remedial Investigation

This section describes the field activities to be conducted during the RI and provides the sampling scope, objectives, methods, anticipated number of samples, and sample locations. A summary of the sampling and analysis plan is provided in Table 1 and on Figure 2. The following activities will be conducted to fill data gaps and determine the nature and extent of contamination at the Site.

3.1 SELECTIVE DEMOLITION

The existing structures prohibit the implementation of a comprehensive RI due to the configuration of the interior structural walls and low ceilings, specifically in the southern portion of the building on Lot 21 and in the southern portions of the buildings on Lots 42 and 44. Limited building demolition will facilitate the investigation and the implementation of a Site-wide GPR scan to evaluate the potential presence of historical tanks as detailed below in Section 3.2. Prior to the commencement of building demolition, BH Group 43 LLC will obtain the required permits to perform the work.

3.2 UTILITY MARKOUT

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

3.3 SOIL SAMPLING

To further characterize soil conditions, additional on-Site soil samples will be collected to meet NYSDEC Division of Environmental Remediation (DER)-10 requirements for RIs. The sampling and analysis plan is summarized in Table 1. Proposed sample locations are presented on Figure 2.

As part of this RI, a total of 15 soil borings will be installed to bedrock, estimated at approximately 10 to 15 ft bgs (approximately 3 to 4 ft bgs within the partial cellar), by a track-mounted direct-push drill rig (Geoprobe®), or other drilling technology as needed, operated by a licensed operator. Soil samples will be collected from dedicated liners using stainless-steel macrocores, casings, or sampling spoons. Samples will be collected using laboratory-provided clean bottle ware. VOC grab samples will be collected using terra cores or encores.

Soils will be logged continuously by a geologist or engineer using a modified Burmister Soil Classification System. The presence of staining, odors, and PID readings will be noted. Sampling methods are described in the Field Sampling Plan (FSP) provided in Appendix C. A Quality Assurance Project Plan

(QAPP) is provided in Appendix D. Laboratory data will be reported in Analytical Services Protocols (ASP) Category B deliverable format.

Soil samples representative of Site conditions will be collected at 15 locations widely distributed across the Site. Based on the Site conditions and results from the prior investigations, three borings will be advanced on the first floor and eight borings will be advanced within the cellar on Lot 21, two soil borings will be advanced on Lot 42, and two soil borings will be advanced on Lot 44. Up to three grab samples will be collected from each soil boring that is drilled from approximate sidewalk grade. One surface sample will be collected from the 0 to 2 ft interval immediately beneath the impervious Site cover (i.e., surface soils), a second sample will be collected from an intermediate depth (within the last 2 ft of the fill layer estimated at 7 to 9 ft bgs, but subject to field observations), and a third sample will be collected from the 2-ft interval above the estimated groundwater interface (estimated to be encountered between 10 and 12 ft bgs, but subject to field observations). If groundwater is not encountered above bedrock, the third sample will be collected from the 2-ft interval above bedrock or weathered bedrock. For borings advanced within the cellar, located approximately 10 ft bsg, a surface sample and a sample collected from either the groundwater interface or 2-ft interval above bedrock will be collected from each soil boring. The number of samples collected during the RI may vary based on field conditions.

Soil samples will be analyzed for:

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

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

3.4 GROUNDWATER SAMPLING

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

Up to eight 2-inch (in.) permanent monitoring wells will be installed at least 5 ft below the groundwater interface. Monitoring wells will have a 2-in. annular space and be installed using either #0 or #00 certified clean sand fill. Wells will be screened to straddle the groundwater interface, assumed to be between approximately 10 and 12 ft bgs. Groundwater was not encountered during previous investigations at the Site and the groundwater interface depth will be evaluated during initial work on the implementation of this RI to establish the proper range of well screening in the field. Observations will be communicated with NYSDEC daily in field reports, further detailed in Section 8.1.

Monitoring wells will be developed by surging a pump in the well several times to pull fine-grained material from the well. Development will be completed until the water turbidity is 50 nephelometric turbidity units (NTU) or less or ten well volumes are removed, if possible. Groundwater sampling will occur at a minimum of one week after monitoring well development. The well casings will be surveyed by a New York State-licensed surveyor and gauged during a round of synoptic groundwater depth readings to facilitate the preparation of a groundwater contour map and to determine the direction of groundwater flow.

The sampling and analysis plan is summarized in Table 1. Proposed monitoring well locations are provided on Figure 2. Proposed locations will be dependent on field observation and will be communicated with NYSDEC in daily reporting.

Monitoring wells will be sampled and analyzed for:

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

Samples to be analyzed for PFAS will be collected and analyzed in accordance with the NYSDEC-issued April 2023 “Sampling, Analysis and Assessment of PFAS.”

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

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

3.5 INVESTIGATION-DERIVED WASTE

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

3.6 SOIL VAPOR SAMPLING

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

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

3.7 PROPOSED SAMPLING RATIONALE

Haley & Aldrich of New York has proposed the sampling plan described herein, and as shown on Figure 2, in consideration of observations reported during the January 2005 Phase I and Phase II ESA by Langan and the November 2024 Phase I ESA and Phase II ESI by Haley & Aldrich of New York as discussed in Section 2.5. Consideration was also taken regarding the Site-wide excavation to 14 ft bgs in the proposed redevelopment plans.

During the previous investigations conducted at the Site, soil and soil vapor samples were collected and groundwater was reportedly not encountered. The sample map from the previous investigations shows data gaps, including the lack of full suite analysis of soil at the Site, no sampling of groundwater, lack of investigation in the vicinity of the former UST areas, and lack of investigation in the southern portions of each building due to drilling constraints caused by the existing buildings and building operations. Further investigation is recommended to determine if the former USTs located throughout the Site have impacted subsurface soil, groundwater, and soil vapor quality.

Sampling locations have been proposed to investigate areas of the Site with identified data gaps. Proposed sampling locations will include groundwater, soil, and soil vapor sampling to address data gaps and confirm if there is an on-Site source of contamination or a potential off-Site source migrating onto the Site.

The Proposed Sample Location Map (included as Figure 2) is designed to generate sufficient data to identify the source of contamination and classify subsurface conditions throughout the Site as a whole, with a particular focus on sample locations in areas of the Site that have historically revealed evidence of contamination.

4. Green and Sustainable Remediation and Climate Resiliency

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

4.1 BEST PRACTICES AND TECHNIQUES

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

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

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

1. All vehicles and fuel-consuming equipment on the Site will be shut off if not in use for more than three minutes;

2. Work will be sequenced, to the extent practicable, to allow the direct loading of waste containers for off-Site disposal;
3. Work will be sequenced, to the extent practicable, to limit unnecessary mobilizations to and throughout the Site; and,
4. To the extent practicable, energy-efficient systems and office equipment will be utilized.

4.2 REPORTING

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

4.3 CLIMATE RESILIENCY EVALUATION

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

4.4 ENVIRONMENTAL FOOTPRINT ANALYSIS

The remedy plan is still under development and is dependent on findings from implementing this investigation; therefore, a preliminary analysis has been performed for the RI using the EPA Spreadsheets for Environmental Footprint Analysis (SEFA). The proposed RI components included in this analysis are the installation of soil borings, permanent groundwater monitoring wells, soil vapor points, and soil, groundwater, and soil vapor sampling. Results of the preliminary analysis, available in Appendix G, indicate the majority of greenhouse gas emissions, potentially exceeding 5 metric tons, to be the product of consumables and transportation associated with the conceptual investigation.

5. Quality Assurance and Quality Control (QA/QC)

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

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

6. Data Use

6.1 DATA SUBMITTAL

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

6.2 DATA VALIDATION

Data packages will be sent to a qualified data validation specialist to evaluate the accuracy and precision of the analytical results. A Data Usability Summary Report (DUSR) will be created to confirm the compliance of methods with the protocols described in the NYSDEC ASP. DUSRs will summarize and confirm the usability of the data for project-related decisions. Data validation will be completed in accordance with the DUSR guidelines from the NYSDEC DER. DUSRs will be included with the submittal of an RIR, further discussed in Section 8. Additional details on the DUSRs are provided in the QAPP in Appendix D.

7. Project Organization

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

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

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

James M. Bellew, will be the Qualified Environmental Professional (QEP) and Principal-in-Charge for this work. In this role, Mr. Bellew will be responsible for the overall completion of each task as per the requirements outlined in this work plan and in accordance with the DER-10 guidance.

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

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

Owen Hennigan will be the field person responsible for implementing the field effort for this work. Mr. Hennigan's responsibilities will include implementing the work plan activities and directing the subcontractors to ensure the successful completion of all field activities.

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

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

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

8. Health and Safety

8.1 HEALTH AND SAFETY PLAN

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

8.2 COMMUNITY AIR MONITORING PLAN (CAMP)

The proposed investigation work will be completed outdoors at the Site. Where intrusive drilling operations with the potential to disturb the subsurface are planned, community air monitoring will be implemented to protect the downwind receptors. Above-grade work is not anticipated to require community air monitoring. During intrusive work, a Haley & Aldrich of New York representative will continually monitor the breathing air in the vicinity of the immediate work area using a hand-held PID to measure total VOCs in air at concentrations as low as 1 ppm. The air in the work zone also will be monitored for visible dust generation.

If VOC measurements above 5 ppm are sustained for 15 minutes or visible dust generation is observed, the ground-intrusive work will be temporarily halted and a more rigorous monitoring of VOCs and dust using recordable meters will be implemented in accordance with the NYSDOH Generic CAMP. During activities not disturbing the subsurface, personnel on the Site will monitor for visual dust and odors only. CAMP data will be provided to the NYSDEC in the daily reports, further detailed in Section 9. The NYSDOH CAMP guidance document is included in Appendix I.

8.3 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT (QHHEA)

A comprehensive QHHEA (on Site and off Site) will be performed following the collection of all RI data. The exposure assessment will be performed in accordance with Section 3.3(c)4 of DER-10 and the NYSDOH guidance for performing a qualitative Exposure Assessment (EA) (DER-10; Appendix 3B). The results of the QHHEA will be provided in the RIR. According to Section 3.10 of DER-10, and the Fish and Wildlife Resources Impact Analysis Decision Key in DER-10, Appendix 3C, a Fish and Wildlife Exposure Assessment will be performed (if needed) based on the RI results.

9. Reporting

9.1 DAILY REPORTING

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

9.2 REMEDIAL INVESTIGATION REPORT

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

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

The RIR may be combined with the Remedial Action Work Plan (RAWP) as an RIR/RAWP. The RIR/RAWP will include all data collected during the RI and adhere to the technical requirements of DER-10.

10. Schedule

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

Anticipated RI/BCP Schedule	
BCP Application, RIWP, and 30-Day Public Comment Period (Concurrent with BCP application)	September 2024 to January 2025
Execute BCA	January 2025
NYSDEC Approval of RIWP, and Citizen Participation Plan	February 2025
RI Implementation	March 2025
RIR/RAWP Submittal and 45-Day Public Comment Period	April to June 2025
NYSDEC Approval of RIR/RAWP and issuance of Decision Document	July 2025

References

1. 515-519 West 43rd Street Limited Environmental Site Investigation Summary, prepared by Haley & Aldrich of New York, prepared for BH Group 43 LLC, 6 November 2024.

2. Brownfield Cleanup Program Application. 515-519 West 43rd Street Redevelopment Site Prepared by H & A of New York Engineering and Geology, LLP for BH Group 43 LLC for submission to the New York State Department of Environmental Conservation. Submitted in November 2024.

3. DER-31: Green Remediation, New York State Department of Environmental Conservation. January 2011.

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

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

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

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

8. Phase I and Limited Phase II Environmental Site Assessment, prepared by Langan Engineering and Environmental Solutions, prepared for Cendant Car Rental Group, Inc. 13 January 2005.

9. Phase I Environmental Site Assessment, prepared by Haley & Aldrich of New York, prepared for BH Group 43 LLC, 6 November 2024.

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

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

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TABLE

TABLE 1
SAMPLING AND ANALYSIS PLAN
515-519 WEST 43RD STREET AND 514-518 WEST 44TH STREET
BROOKLYN, NEW YORK

Boring Number	Sample Depth	Target Compound List VOCs (8260)	Target Compound List SVOCs (8270)	Total Analyte List Metals (6010/6020)	PCBs (8082)	Pesticides (8081)	PFAS (1633)	1,4-Dioxane (8270E-SIM)	VOCs (TO-15)
SOIL									
B-01	0-2'	X	X	X	X	X	X	X	
	Base of Fill Layer (7-9')	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-02	0-2'	X	X	X	X	X	X	X	
	Base of Fill Layer (7-9')	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-03	0-2'	X	X	X	X	X	X	X	
	Base of Fill Layer (7-9')	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-04	0-2'	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-05	0-2'	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-06	0-2'	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-07	0-2'	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-08	0-2'	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-09	0-2'	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-10	0-2'	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-11	0-2'	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-12	0-2'	X	X	X	X	X	X	X	
	Base of Fill Layer (7-9')	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-13	0-2'	X	X	X	X	X	X	X	
	Base of Fill Layer (7-9')	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-14	0-2'	X	X	X	X	X	X	X	
	Base of Fill Layer (7-9')	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
B-15	0-2'	X	X	X	X	X	X	X	
	Base of Fill Layer (7-9')	X	X	X	X	X	X	X	
	Groundwater interface (10-12')	X	X	X	X	X	X	X	
GROUNDWATER									
MW-01	Straddle water table	X	X	X	X	X	X	X	
MW-02	Straddle water table	X	X	X	X	X	X	X	
MW-03	Straddle water table	X	X	X	X	X	X	X	
MW-04	Straddle water table	X	X	X	X	X	X	X	
MW-05	Straddle water table	X	X	X	X	X	X	X	
MW-06	Straddle water table	X	X	X	X	X	X	X	
MW-07	Straddle water table	X	X	X	X	X	X	X	
MW-08	Straddle water table	X	X	X	X	X	X	X	
SOIL VAPOR									
SVP-01	1-2 ft above groundwater interface								X
SVP-02	1-2 ft above groundwater interface								X
SVP-03	1-2 ft above groundwater interface								X
SVP-04	1-2 ft above groundwater interface								X
SVP-05	1-2 ft above groundwater interface								X
SVP-06	1-2 ft above groundwater interface								X
SVP-07	1-2 ft above groundwater interface								X
SVP-08	1-2 ft above groundwater interface								X

Notes:
VOCs - Volatile Organic Compounds
SVOCs - Semi-volatile Organic Compounds
PCBs - Polychlorinated biphenyls
PFAS - Per- and Polyfluoroalkyl Substances

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

FIGURES

N

MAP SOURCE: ESRI
SITE COORDINATES: 40°45'39"N, 73°59'45"W

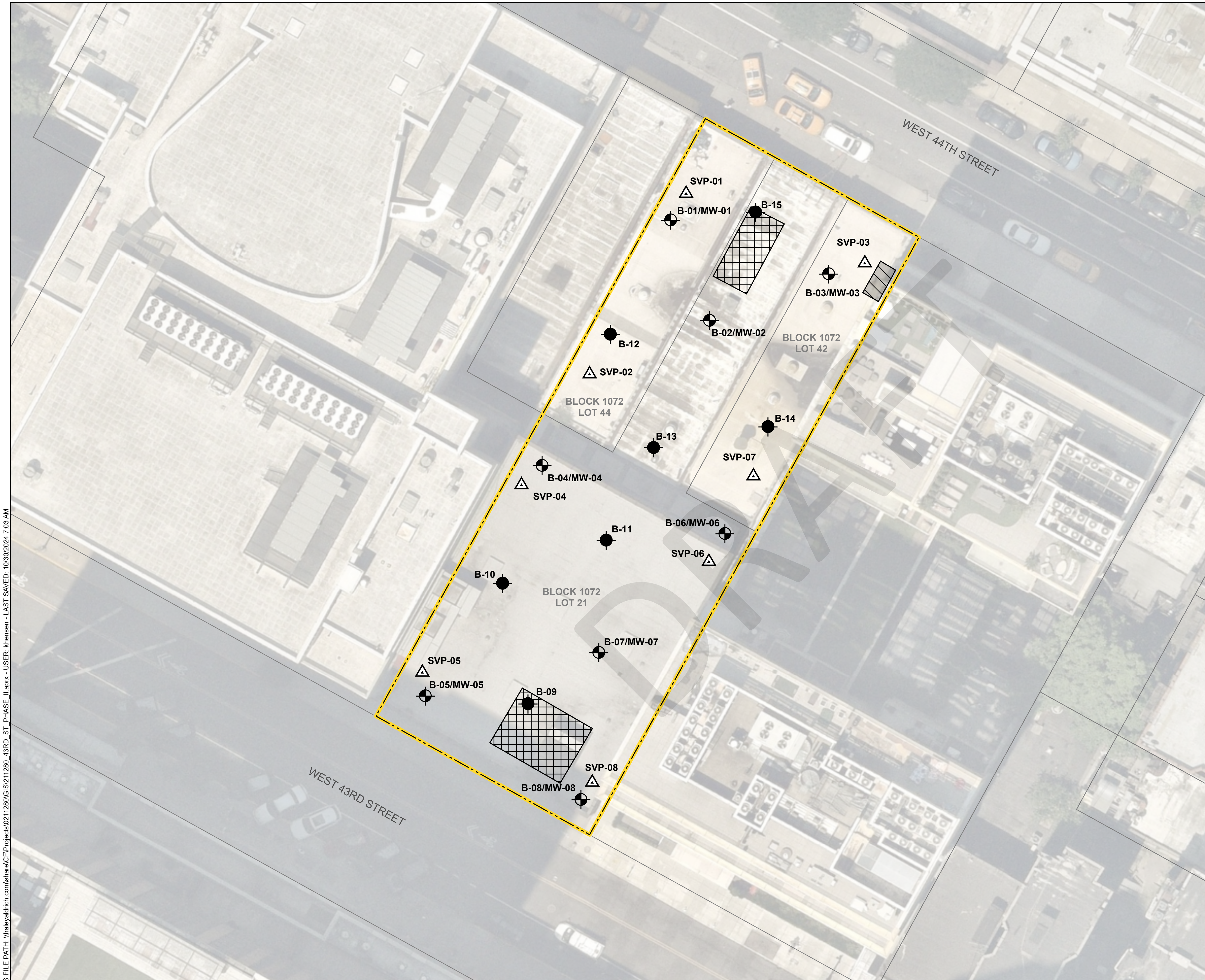
HALEY ALDRICH

515-519 WEST 43RD STREET AND 514-518 WEST 44TH STREET
MANHATTAN, NEW YORK

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
OCTOBER 2024

FIGURE 1



LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- APPROXIMATE UST LOCATION (CURRENT OR FORMER)
- APPROXIMATE AST LOCATION
- PROPOSED SOIL BORING LOCATION
- PROPOSED SOIL BORING/MONITORING WELL LOCATION
- PROPOSED SOIL VAPOR PROBE LOCATION

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ASSESSOR PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 18 JUNE 2024

N

0 30 60
SCALE IN FEET

HALEY ALDRICH

ATSM PHAES II ENVIRONMENTAL SITE ASSESSMENT
515-519 WEST 43RD STREET
MANHATTAN, NEW YORK

SITE PLAN

OCTOBER 2024

FIGURE 2

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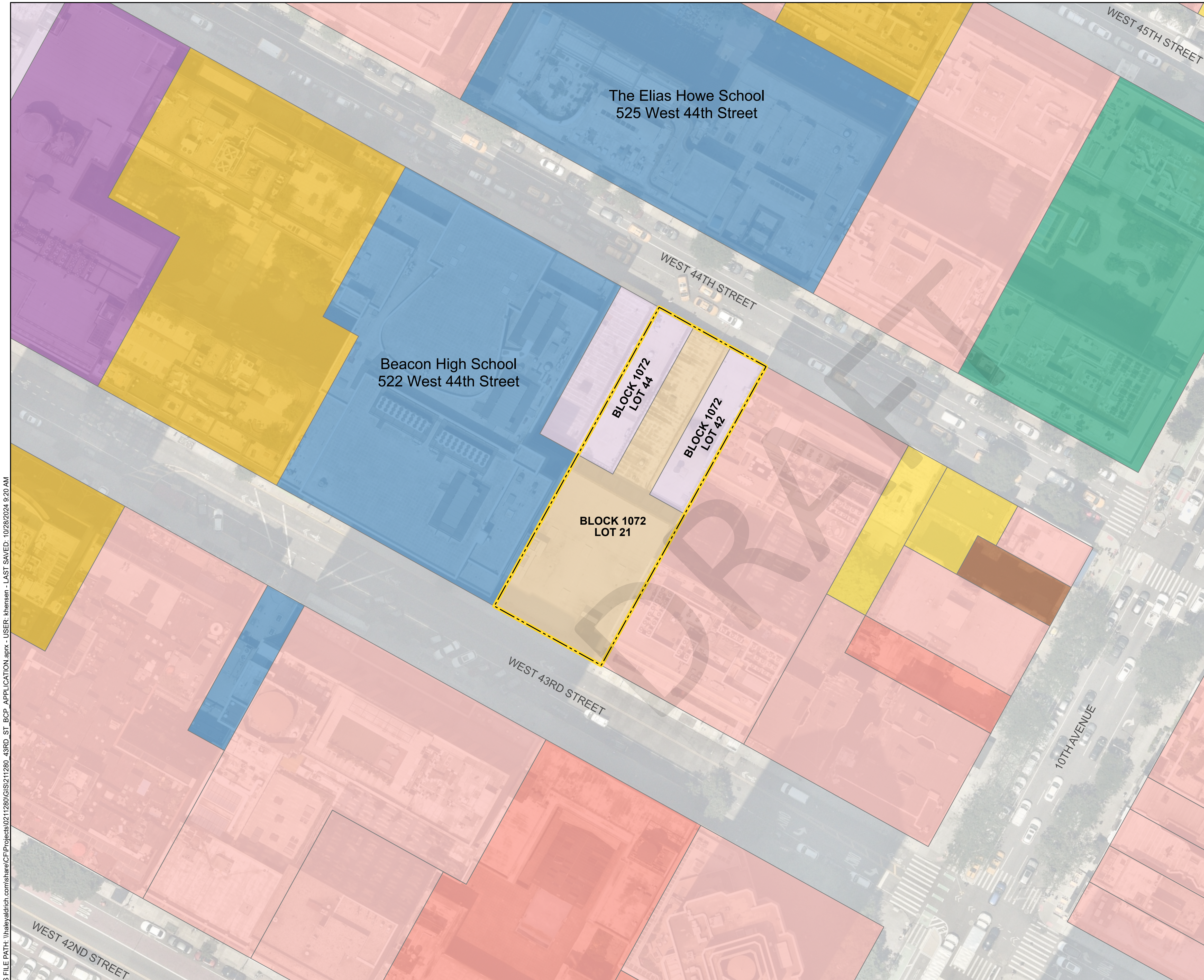

LEGEND

- MULTI-FAMILY WALK-UP BUILDINGS
- MULTI-FAMILY ELEVATOR BUILDINGS
- MIXED RESIDENTIAL AND COMMERCIAL BUILDINGS
- COMMERCIAL AND OFFICE BUILDINGS
- INDUSTRIAL AND MANUFACTURING BUILDINGS
- TRANSPORTATION AND UTILITY
- PUBLIC FACILITIES AND INSTITUTIONS
- PARKING FACILITIES
- VACANT LAND
- NOT CATEGORIZED
- SITE BOUNDARY
- PARCEL BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ASSESSOR PARCEL AND LAND USE DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 18 JUNE 2024

N

0 60 120
SCALE IN FEET

HALEY ALDRICH

515-519 WEST 43RD STREET AND 514-518 WEST 44TH STREET
MANHATTAN, NEW YORK

SURROUNDING LAND USE MAP

OCTOBER 2024

FIGURE 3

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SB-04	07/01/2024 L2437271-01 SB-04_0-2 0 - 2 (ft)	07/01/2024 L2437271-02 SB-04_8-10 8 - 10 (ft)
Total Metals		
Arsenic	13.4	1.49
Barium	356	17.6
Lead	***799***	4.46
Zinc	407	13.9
Semi-Volatile Organic Compounds		
Benzo(a)anthracene	***3.4***	0.22
Benzo(a)pyrene	3.6	0.24
Benzo(b)fluoranthene	***4.8***	0.32
Benzo(k)fluoranthene	1.6	0.093 J
Chrysene	***3.8***	0.23
Dibenz(a,h)anthracene	0.54	0.043 J
Indeno(1,2,3-cd)pyrene	2.5	0.2

SB-09	10/16/2024 L2460115-01 SB-09_0-2 0 - 2 (ft)	10/16/2024 L2460115-02 SB-09_3-5 3 - 5 (ft)
Total Metals		
Barium	54	487
Copper	10	76.2
Lead	4.7	***673***
Mercury	ND (0.078)	0.603
Zinc	19.6	398

SB-12	10/16/2024 L2460115-07 SB-12_0-2 0 - 2 (ft)	10/16/2024 L2460115-08 SB-12_8-10 8 - 10 (ft)
Total Metals		
Barium	464	22.2
Copper	17.7	4.51
Lead	***493***	4.41 J
Mercury	0.576	ND (0.087)
Zinc	261	28.4

SB-13	10/16/2024 L2460115-09 SB-13_0-2 0 - 2 (ft)	10/16/2024 L2460115-10 SB-13_5-7 5 - 7 (ft)
Total Metals		
Barium	81.6	118
Copper	15.2	21
Lead	285	***2720***
Mercury	0.137	0.597
Zinc	103	***3300***
Semi-Volatile Organic Compounds		
Benzo(a)anthracene	***47***	0.041 J
Benzo(a)pyrene	***43***	ND (0.19)
Benzo(b)fluoranthene	***54***	0.059 J
Benzo(k)fluoranthene	***19***	ND (0.14)
Chrysene	***48***	0.049 J
Dibenz(a,h)anthracene	6.5	ND (0.14)
Indeno(1,2,3-cd)pyrene	***28***	0.035 J

SB-01	07/01/2024 L2437271-03 SB-01_0-2 0 - 2 (ft)	07/01/2024 L2437271-04 SB-01_8-10 8 - 10 (ft)
Total Metals		
Lead	96.7	***486***
Zinc	122	324
Semi-Volatile Organic Compounds		
Benzo(a)anthracene	***2.2***	0.71
Benzo(a)pyrene	2.4	0.88
Benzo(b)fluoranthene	***3***	1.1
Benzo(k)fluoranthene	1.1	0.37
Chrysene	***2.1***	0.79
Dibenz(a,h)anthracene	0.36	0.17
Indeno(1,2,3-cd)pyrene	1.6	0.73

SB-14	10/16/2024 L2460115-11 SB-14_0-2 0 - 2 (ft)	10/16/2024 L2460115-12 SB-14_6-8 6 - 8 (ft)
Total Metals		
Barium	78.4	124
Copper	20.4	87.4
Lead	28.3	136
Mercury	ND (0.069)	0.665
Zinc	44.3	168

SB-10	10/16/2024 L2460115-03 SB-10_0-2 0.1 - 2 (ft)	10/16/2024 L2460115-04 SB-10_5-7 5 - 7 (ft)
Total Metals		
Barium	93.2	88.1
Copper	20.7	20.1
Lead	121	14.2
Mercury	0.16	0.049 J
Zinc	92.6	56.4

SB-06	07/01/2024 L2437271-05 SB-06_0-2 0 - 2 (ft)	07/01/2024 L2437271-06 SB-06_7-9 7 - 9 (ft)
Total Metals		
Lead	131	31.7
Mercury	0.215	0.118

SB-05	07/10/2024 L2438736-01 SB-05_0-2 0 - 2 (ft)	07/10/2024 L2438736-02 SB-05_2-4 2 - 4 (ft)
Total Metals		
Lead	39.5	65.9
Mercury	ND (0.072)	0.26
Zinc	34.5	110

SB-03	07/01/2024 L2437271-07 SB-03_0-2 0 - 2 (ft)	07/01/2024 L2437271-08 SB-03_2-4 2 - 4 (ft)
Total Metals		
Lead	184	54.6
Mercury	0.286	0.714
Nickel	9.48	33.7

SB-07	07/10/2024 L2438736-05 SB-07_2-4 2 - 4 (ft)
Total Metals	
Nickel	57.8
Zinc	191
Semi-Volatile Organic Compounds	
Naphthalene	6.5
Volatile Organic Compounds	
1,2,4-Trimethylbenzene	***230***
1,3,5-Trimethylbenzene	***75***
Ethylbenzene	***2.1***
Naphthalene	***34***
Xylene (Total)	***140***

SB-02	07/10/2024 L2438736-03 SB-02_0-2 0 - 2 (ft)	07/10/2024 L2438736-04 SB-02_2-4 2 - 4 (ft)
Total Metals		
Nickel	12.9	78
Volatile Organic Compounds		
1,2,4-Trimethylbenzene	ND (0.0023)	***11***
Xylene (Total)	ND (0.0011)	***1.9 J***

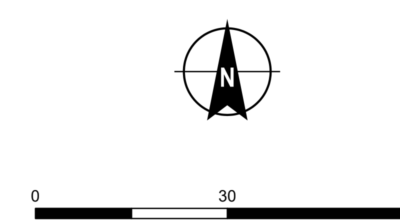
LEGEND

- SOIL BORING
- SOIL VAPOR PROBE
- SITE BOUNDARY

	NY-PGW	NY-RESR	NY-UNRES
Total Metals (mg/kg)			
Arsenic	16	16	13
Barium	820	400	350
Copper	1720	270	50
Lead	450	400	63
Mercury	0.73	0.81	0.18
Nickel	130	310	30
Zinc	2480	10000	109
Semi-Volatile Organic Compounds (mg/kg)			
Benzo(a)anthracene	1	1	1
Benzo(a)pyrene	22	1	1
Benzo(b)fluoranthene	1.7	1	1
Benzo(k)fluoranthene	1.7	3.9	0.8
Chrysene	1	3.9	1
Dibenz(a,h)anthracene	1000	0.33	0.33
Indeno(1,2,3-cd)pyrene	8.2	0.5	0.5
Volatile Organic Compounds (mg/kg)			
1,2,4-Trimethylbenzene	3.6	52	3.6
1,3,5-Trimethylbenzene	8.4	52	8.4
1,3-Dichlorobenzene	2.4	49	2.4
Ethylbenzene	1	41	1
Naphthalene	12	100	12
Xylene (Total)	1.6	100	0.26

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. SOIL SAMPLE ANALYTICAL RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TITLE 6 OF THE OFFICIAL COMPILATION OF NEW YORK CODES, RULES, AND REGULATIONS (NYCRR) PART 375 UNRESTRICTED USE SOIL CLEANUP OBJECTIVES (SCOS), RESTRICTED-RESIDENTIAL SCOS, AND 40 CFR 261 SUBPART C AND TABLE 1 OF 40 CFR 261.24.
3. DEFINITIONS:
NY-PGW = NYSDEC PART 375 PROTECTION OF GROUNDWATER CRITERIA
NY-RESR = NYSDEC PART 375 RESTRICTED-RESIDENTIAL USE SCO
NY-UNRES = NYDEC PART 375 UNRESTRICTED USE SCO
4. EXCEEDANCES OF THE NY-UNRES ARE SHADED GRAY. EXCEEDANCES OF THE NY-UNRES AND NY-RESR ARE SHADED YELLOW. EXCEEDANCES OF THE NY-PGW ARE SHOWN IN BLACK *ITALIC* TEXT.
5. RESULTS SHOWN IN MILLIGRAMS PER KILOGRAM (mg/kg)
6. AERIAL IMAGERY SOURCE: NEARMAP, 8 MARCH 2024



HALEY ALDRICH

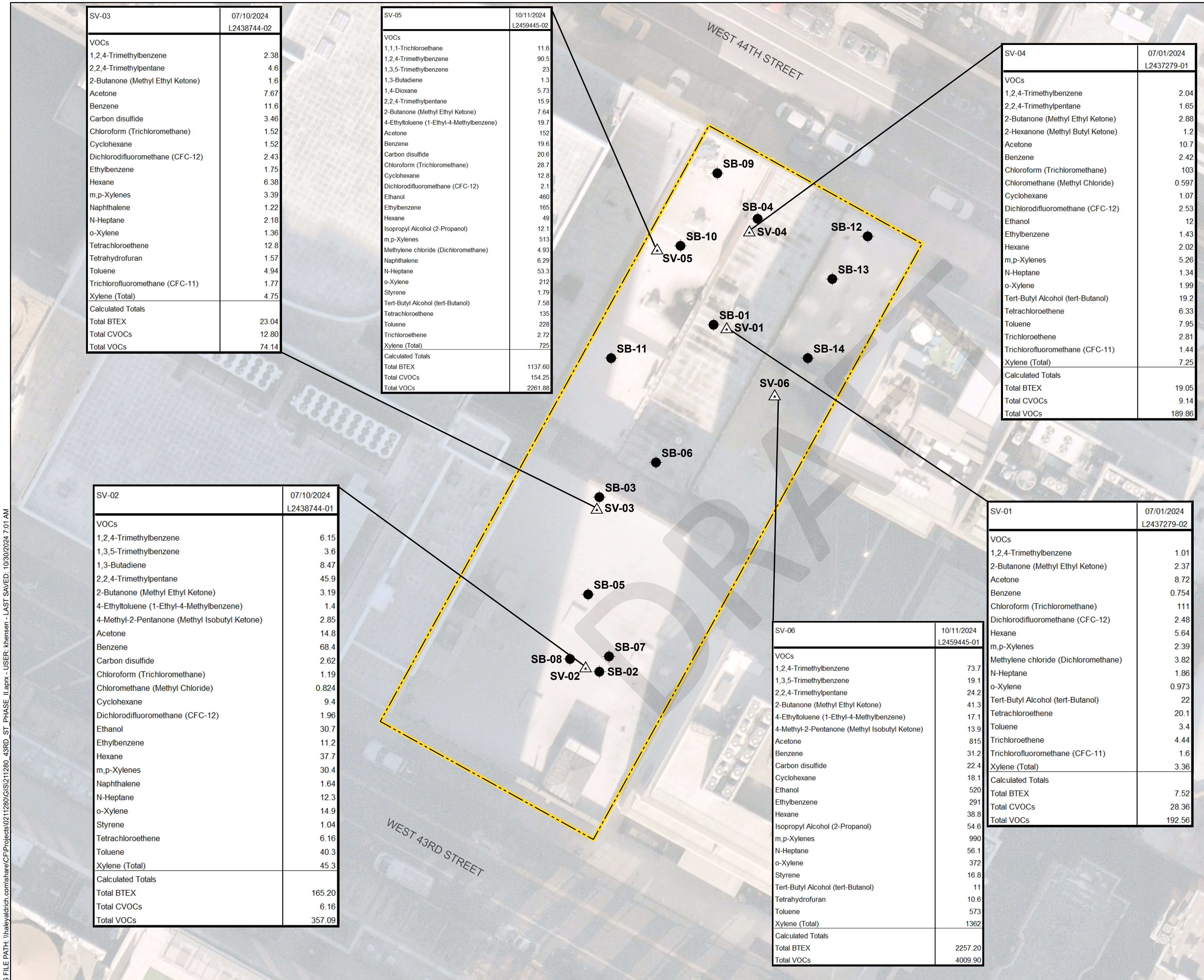
515-519 WEST 43RD STREET AND 514-518 WEST 44TH STREET
MANHATTAN, NEW YORK

SUMMARY OF HISTORICAL SOIL ANALYTICAL DATA

OCTOBER 2024

FIGURE 4

GIS FILE PATH: \\haleyaldrich.com\share\CF\Projects\0211280\GIS\211280_43RD_ST_PHASE_II.aprx - USER: khensen - LAST SAVED: 10/30/2024 7:01 AM



SV-03	07/10/2024 L2438744-02
VOCs	
1,2,4-Trimethylbenzene	2.38
2,2,4-Trimethylpentane	4.6
2-Butanone (Methyl Ethyl Ketone)	1.6
Acetone	7.67
Benzene	11.6
Carbon disulfide	3.46
Chloroform (Trichloromethane)	1.52
Cyclohexane	1.52
Dichlorodifluoromethane (CFC-12)	2.43
Ethylbenzene	1.75
Hexane	6.38
m,p-Xylenes	3.39
Naphthalene	1.22
N-Heptane	2.18
o-Xylene	1.36
Tetrachloroethene	12.8
Tetrahydrofuran	1.57
Toluene	4.94
Trichlorofluoromethane (CFC-11)	1.77
Xylene (Total)	4.75
Calculated Totals	
Total BTEX	23.04
Total CVOCs	12.80
Total VOCs	74.14

SV-05	10/11/2024 L2459445-02
VOCs	
1,1,1-Trichloroethane	11.6
1,2,4-Trimethylbenzene	90.5
1,3,5-Trimethylbenzene	23
1,3-Butadiene	1.3
1,4-Dioxane	5.73
2,2,4-Trimethylpentane	15.9
2-Butanone (Methyl Ethyl Ketone)	7.64
4-Ethyltoluene (1-Ethyl-4-Methylbenzene)	19.7
Acetone	152
Benzene	19.6
Carbon disulfide	20.6
Chloroform (Trichloromethane)	28.7
Cyclohexane	12.8
Dichlorodifluoromethane (CFC-12)	2.1
Ethanol	460
Ethylbenzene	165
Hexane	49
Isopropyl Alcohol (2-Propanol)	12.1
m,p-Xylenes	513
Methylene chloride (Dichloromethane)	4.93
Naphthalene	6.29
N-Heptane	53.3
o-Xylene	212
Styrene	1.79
Tert-Butyl Alcohol (tert-Butanol)	7.58
Tetrachloroethene	135
Toluene	228
Trichloroethene	2.72
Xylene (Total)	725
Calculated Totals	
Total BTEX	1137.60
Total CVOCs	154.25
Total VOCs	2261.88

SV-04	07/01/2024 L2437279-01
VOCs	
1,2,4-Trimethylbenzene	2.04
2,2,4-Trimethylpentane	1.65
2-Butanone (Methyl Ethyl Ketone)	2.88
2-Hexanone (Methyl Butyl Ketone)	1.2
Acetone	10.7
Benzene	2.42
Chloroform (Trichloromethane)	103
Chloromethane (Methyl Chloride)	0.597
Cyclohexane	1.07
Dichlorodifluoromethane (CFC-12)	2.53
Ethanol	12
Ethylbenzene	1.43
Hexane	2.02
m,p-Xylenes	5.26
N-Heptane	1.34
o-Xylene	1.99
Tert-Butyl Alcohol (tert-Butanol)	19.2
Tetrachloroethene	6.33
Toluene	7.95
Trichloroethene	2.81
Trichlorofluoromethane (CFC-11)	1.44
Xylene (Total)	7.25
Calculated Totals	
Total BTEX	19.05
Total CVOCs	9.14
Total VOCs	189.86

SV-02	07/10/2024 L2438744-01
VOCs	
1,2,4-Trimethylbenzene	6.15
1,3,5-Trimethylbenzene	3.6
1,3-Butadiene	8.47
2,2,4-Trimethylpentane	45.9
2-Butanone (Methyl Ethyl Ketone)	3.19
4-Ethyltoluene (1-Ethyl-4-Methylbenzene)	1.4
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	2.85
Acetone	14.8
Benzene	68.4
Carbon disulfide	2.62
Chloroform (Trichloromethane)	1.19
Chloromethane (Methyl Chloride)	0.824
Cyclohexane	9.4
Dichlorodifluoromethane (CFC-12)	1.96
Ethanol	30.7
Ethylbenzene	11.2
Hexane	37.7
m,p-Xylenes	30.4
Naphthalene	1.64
N-Heptane	12.3
o-Xylene	14.9
Styrene	1.04
Tetrachloroethene	6.16
Toluene	40.3
Xylene (Total)	45.3
Calculated Totals	
Total BTEX	165.20
Total CVOCs	6.16
Total VOCs	357.09

SV-06	10/11/2024 L2459445-01
VOCs	
1,2,4-Trimethylbenzene	73.7
1,3,5-Trimethylbenzene	19.1
2,2,4-Trimethylpentane	24.2
2-Butanone (Methyl Ethyl Ketone)	41.3
4-Ethyltoluene (1-Ethyl-4-Methylbenzene)	17.1
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	13.9
Acetone	815
Benzene	31.2
Carbon disulfide	22.4
Cyclohexane	18.1
Ethanol	520
Ethylbenzene	291
Hexane	38.8
Isopropyl Alcohol (2-Propanol)	54.6
m,p-Xylenes	990
N-Heptane	56.1
o-Xylene	372
Styrene	16.8
Tert-Butyl Alcohol (tert-Butanol)	11
Tetrahydrofuran	10.6
Toluene	573
Xylene (Total)	1362
Calculated Totals	
Total BTEX	2257.20
Total VOCs	4009.90

SV-01	07/01/2024 L2437279-02
VOCs	
1,2,4-Trimethylbenzene	1.01
2-Butanone (Methyl Ethyl Ketone)	2.37
Acetone	8.72
Benzene	0.754
Chloroform (Trichloromethane)	111
Dichlorodifluoromethane (CFC-12)	2.48
Hexane	5.64
m,p-Xylenes	2.39
Methylene chloride (Dichloromethane)	3.82
N-Heptane	1.86
o-Xylene	0.973
Tert-Butyl Alcohol (tert-Butanol)	22
Tetrachloroethene	20.1
Toluene	3.4
Trichloroethene	4.44
Trichlorofluoromethane (CFC-11)	1.6
Xylene (Total)	3.36
Calculated Totals	
Total BTEX	7.52
Total CVOCs	28.36
Total VOCs	192.56

LEGEND

- SOIL BORING
- SOIL VAPOR PROBE
- SITE BOUNDARY

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. RESULTS SHOWN IN MICROGRAMS PER CUBIC METER (ug/m^3).
3. AERIAL IMAGERY SOURCE: NEARMAP, 8 MARCH 2024
4. ALL DETECTED ANALYTES SHOWN ON FIGURE.
5. TOTAL VOCS IS THE SUM OF ALL DETECTED VOCS.
6. TOTAL CVOCS IS THE SUM OF 1,1-DICHLOROETHENE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE, CIS-1,2-DICHLOROETHENE, METHYLENE CHLORIDE, TRICHLOROETHENE, TETRACHLOROETHENE, AND VINYL CHLORIDE.
7. TOTAL BTEX IS THE SUM OF BENZENE, ETHYLBENZENE, AND XYLENES.

N

0 30 60
SCALE IN FEET

HALEY ALDRICH

515-519 WEST 43RD STREET AND 514-518 WEST 44TH STREET
MANHATTAN, NEW YORK

SUMMARY OF HISTORICAL SOIL VAPOR ANALYTICAL DATA

NOVEMBER 2024

FIGURE 5

APPENDIX A
Previous Reports

PHASE I AND LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT

515 WEST 43RD STREET NEW YORK, NEW YORK

DRAFT

Prepared for:

Cendant Car Rental Group, Inc.
6 Sylvan Way
Parsippany, New Jersey

Prepared by:

Langan Engineering & Environmental Services, Inc.
500 Hyde Park
Doylestown, Pennsylvania 18901-6619

515 W. 43rd St. NY

Post-it® Fax Note 7671	Date i-24 # of pages ▶ 40
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Co./Dept. 212 735 8708	Co.
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Fax # 212-681-4041	Fax #

Phase 1 and Limited Phase II

January 13, 2005
#3620801

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

PHASE I AND LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT

515 WEST 43^{RD} STREET
NEW YORK, NEW YORK

DRAFT

Prepared by:

Langan Engineering & Environmental Services, Inc.
500 Hyde Park
Doylestown, Pennsylvania 18901-6619

Dennis Webster, Senior Staff Geologist

Jason Hanna, Project Manager

January 13, 2005

#3620801

LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

500 Hyde Park • Doylestown, Pennsylvania 18901-6619 • (215) 348-7101 • FAX: (215) 348-7125

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EXECUTIVE SUMMARY

Langan Engineering and Environmental Services, Inc. (Langan) has completed this Phase I and Limited Phase II Environmental Site Assessment (Phase I and II ESA) for Cendant Car Rental Group, Inc. (Cendant) at the Subject Property located at 515 West 43rd Street in Manhattan Borough, New York County, New York (Site). The Site is identified by Manhattan Borough as Lot 21 of Block 1072. The subject property is wholly occupied by a three-story building with a basement and a single-story attached addition built on grade. The building is currently used as a parking garage. Cendant intends to lease the Site from the current owner.

The objective of the Phase I activities was to determine if Recognized Environmental Conditions (RECs) are present at the Site based on visual observations and review of available existing records and historical information. In addition, historical RECs and other environmental matters may also be identified. The Phase I ESA was completed following the ASTM Standard Practice E-1527-00. The findings, opinions and conclusions of this Phase I ESA are based on a site inspection, interviews, a review of State and Federal environmental databases, and correspondence with local and state agencies.

Based on a review of the ASTM required references, interviews, and the completion of the site inspection, two RECs were identified on the subject property. The REC's are described below.

- REC-1 - Potential asbestos-containing materials (PACMs) were observed coating the ceiling and structural columns in the basement of the main building, and

- REC-2 – Two 500-gallon gasoline underground storage tanks (USTs) are located beneath the concrete basement floor of the building. According to the current Site owner, these USTs were reportedly abandoned in place around 1975 in accordance with the local Fire Marshall's recommendations. Soil in the vicinity of these USTs may have been adversely impacted by petroleum products from the former use of these USTs.

The objective of the Phase II ESA was to determine the asbestos content of the PACMs in REC-1, and to determine if the historical operations of the USTs in REC-2 had adversely impacted soils beneath the concrete basement slab at this area. Phase II ESA activities included collection and laboratory analysis of bulk samples from REC-1 for asbestos content, and advancement of soil borings and laboratory analysis of select soil samples in the vicinity of REC-2.

The following findings, opinions and conclusions of the Phase II ESA are based on the field activities completed, sample analytical results, and a comparison of the soil results to applicable soil criteria:

REC-1

- The PACM sampling involved the collection of seven bulk samples from the friable spayed-on insulation observed coating the ceiling and structural columns in the basement of the main building. The results of the samples indicate that this material does not contain asbestos; therefore, no further action is recommended.

REC-2

- Three soil borings were advanced in the vicinity of the abandoned gasoline USTs located beneath the basement floor slab. Two soil samples were collected from the borings and submitted for laboratory analysis of New York Spill Tech and Remediation Series (STARS) compounds. The results were screened against the New York Department of Environmental Conservation (DEC) soil cleanup criteria and the STARS screening values for gasoline-contaminated soil. The screening results indicate that no compounds exceeded the New York DEC criteria or STARS screening values; therefore, no further action is recommended.

1.0 INTRODUCTION

1.1 General

Langan Engineering and Environmental Services, Inc. (Langan) has been retained by Cendant to complete a Phase I Environmental Site Assessment (Phase I ESA) in compliance with the American Society for Testing Materials (ASTM) Standard Practice E1527-00 for the subject property located at 515 West 43rd Street in Manhattan Borough, New York County, New York. The Site is identified by Manhattan Borough as Lot 21 of Block 1072. The subject property is wholly occupied by a three-story building with a basement and a one-story addition. The building is currently used as a parking garage. Cendant intends to lease the Site from the current owner.

1.2 Purpose and Scope

The purpose of this Phase I ESA is to identify Recognized Environmental Conditions (RECs) and suspected and historical RECs in connection with the property, using the methodology recommended by ASTM. Specifically, this methodology is referred to as "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, Designation E1527-00."

In general, the scope of this assessment consisted of reviewing readily available information and environmental data relating to the subject property; interviewing persons knowledgeable about the site; reviewing maps and records maintained by federal, state, and local regulatory agencies; and conducting a site reconnaissance.

Langan performed the site reconnaissance on November 2, 2004 in a systematic manner. During the Site reconnaissance, Langan was escorted by Mr. Nicholas Proscia, current owner of the property. Langan also interviewed Mr. Proscia during the visit; the results of the interview are mentioned throughout this report. Langan was provided access to the entire property during the reconnaissance.

1.3 Limitations of the Assessment

Langan prepared this Phase I ESA in accordance with the Scope of Work described in Section 1.2 above. Langan's scope of work is limited to the services agreed to with Cendant; no other services beyond those explicitly stated should be inferred or implied.

This Phase I and Phase II ESA Report is intended for the sole use of Cendant and its representatives The scope of services performed during this investigation may not be appropriate for other users, and any use of this document, or the findings, conclusions, or recommendations presented herein are at the sole risk of said user. This report is intended to be used in its entirety. Excerpts taken from this report are not necessarily representative of the assessment findings.

Our study was not intended to be a definitive investigation of possible environmental impacts at the subject property. The purpose and scope of this investigation was to determine if there is reason to suspect the possibility of environmental impacts at the subject property.

Langan's Phase I conclusions are professional opinions based solely upon visual observations of the subject property and the immediate vicinity, review of readily available historical information, correspondence with personnel knowledgeable about the site, and other readily available information. These conclusions are intended exclusively for the purpose stated herein, at the specified subject property as it existed at the time of our Site visit.

Please note that even the most comprehensive scope of services may fail to detect environmental liabilities at a particular site. Therefore, Langan cannot act as insurers and cannot "certify" that a site is free of environmental impacts. and no expressed or implied representation or warranty is included or intended in our reports, except that our services were performed, within the limits prescribed by our client, with the customary thoroughness and competence of our profession.

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2.0 SITE DESCRIPTION

2.1 Property Location

The subject property is located at 515 West 43rd Street in Manhattan Borough, New York County, New York (Figure 1). The Site is identified by Manhattan Borough as Lot 21 of Block 1072. The subject property occupies approximately 0.23 acres and is wholly occupied by a three-story building with a basement and a single-story attached addition built on grade. The three-story building is approximately 80 years old and constructed of cinder concrete slabs on a steel floor framing system. Exterior walls are constructed of brick masonry. This building has two block stairwells and a freight elevator capable of lifting automobiles. The one-story addition is slab-on-grade construction with block masonry walls and a concrete/gypsum plank roof on steel bar-joist framing. Neither the main building nor the addition have heating, ventilation and air conditioning (HVAC) systems. The main building may have been formerly served by natural gas and heated by a boiler located in the building's basement. This boiler no longer exists. The main building and the addition are currently used as a parking garage.

The Site fronts along West 43rd Street at its southern boundary; the northern boundary fronts along West 44th Street. The Site is located between the 10th Avenue (to the east) and 11th Avenue (to the west).

2.2 Surrounding Land Use

The surrounding land is used for commercial and residential purposes. Buildings used as a parking garage and an automotive repair facility adjoin the Site to the west. A railroad terrace operated by the Penn Central Railroad is adjacent east of the Site, beyond which are residential buildings. Parking garages and office buildings are located south of the Site, across West 43rd Street. Relevant photographs of the subject Site and the surrounding properties, taken during Langan's Site reconnaissance, are provided as Appendix A.

2.3 Geological Setting and Groundwater Use

According to the United States Department of Agriculture (USDA) and the New York City (NYC) Soil Surveys of Manhattan, New York, approximately 80 percent of Manhattan soils are classified as "pavement and/or buildings." The remaining 20 percent of the area is made up of a thin veneer of glacial till and historic fill. The general shape of the landscape is related to the erosion of river valleys before and between periods of glaciation. The subject property and its immediate surrounding are made up of urban land (man made fill) consisting of sand, gravel, clay deposits, and a fine mixture of fine sands and silts. These fill areas can range anywhere from 25 to 50 feet below ground surface.

The geology of the Manhattan area consist of surficial, unconsolidated deposits of the Holocene and Pleistocene Epochs that overlie Early to Middle Cambrian crystalline bedrock. Crystalline bedrock is typically found 50 to 100 feet below ground surface consisting of Manhattan Schist (Early to Middle Cambrian in age). The Manhattan Schist is a gray, medium to coarse-grained, layered and thin banded gneiss that has been severely crumbled and folded. Some foliation surfaces have lustrous white mica.

The bedrock beneath Washington Heights, the upland area on the eastern end of the George Washington Bridge, consists of a erosion-resistant Manhattan Formation. The Manhattan Formation consists of complex faulted and contorted bedrock. The surficial geology of Manhattan consists of glacial drift (Pleistocene epoch) and post-glacial deposits. Lower and Mid-Manhattan are mostly underlain by the Manhattan Schist formation (pre-Cambrian). Throughout Lower, Mid-, and Upper Manhattan are units of Undifferentiated Crystalline Rocks consisting of schist, gneiss, limestone, and granodiorite.

Groundwater within the Manhattan area is found in unconsolidated sediments and voids that may be present in the underlying bedrock. Typically groundwater is also found in fractured bedrock and in old stream channels and coastal deposits buried beneath artificial fill. The glacial till in this area is relatively impermeable. Groundwater can typically be found at 25 feet below ground surface. Manhattan's groundwater is not used for potable supply and non-potable use is very limited.

2.4 Topography

Based on a Langan's review of the USGS Central Park, New York and New Jersey

7.5 minute series topographic quadrangle map (1999) and our site visit, the existing grade is flat and has an approximate elevation of 25 feet above mean sea level (MSL). Topography for the subject property and the vicinity is provided on Figure 1.

2.5 Surface Water and Wetlands

Langan did not observe any surface water bodies or potential wetlands on-site during the site reconnaissance. In addition, review of the Central Park USGS topographic quadrangle map and Environmental Data Resources (EDR) report did not indicate the presence of surface water bodies or wetlands at or immediately adjacent to the subject property. The nearest surface water body is the Hudson River located approximately 0.5 miles east of the site.

2.6 Utilities

According to Mr. Nicholas Procia, owner of the subject Site since 1979, the Site is serviced by telephone, electricity, municipal water and sewer. It is likely that the building was formerly serviced by natural gas (as evidenced by the former boiler room and the existing radiators in the main building), however, no natural gas is currently being used at the Site. There are no septic systems and/or water wells on the subject property.

2.7 Environmental Permits

No active permits were identified for this subject property based upon interviews with the current Site owner. Permits likely exist for the business operation of the current parking garage.

3.0 HISTORICAL USE

3.1 Historical Sanborn/Fire Insurance Maps

Langan contacted EDR of Milford, Connecticut to search for Historical Sanborn Fire Insurance Maps pertaining to the subject property and vicinity. Sanborn/Fire Insurance maps from 1899, 1911, 1930, 1950, 1968, 1979, 1980, 1982, 1984, 1985, 1987, 1988, 1990, 1991 - 1996 were obtained from EDR and reviewed to identify former operations and storage areas that may be indicative of an REC. Copies of the historical Sanborn Maps are provided in Appendix B. A description of each is provided below.

1890

The Site appears to be occupied by four separate row-style structures, three of which front along West 43rd Street and one fronts along West 44th Street. Since no descriptions were provided for these structures, the structures were likely residential row-houses The surrounding properties appear to be residential row-houses with the exception of a school which is shown north of West 44th Street The railroad terrace currently located adjacent east of the Site is not shown.

1899

The portion of the property occupied by the existing Main building appears unchanged from the 1890 map. A new structure is shown in the portion of the Site currently occupied by the one-story addition. This structure is likely a residential row-house. No significant changes to the surrounding properties are shown.

1911

No significant changes to the subject Site or surrounding properties are shown.

1930

The existing main building is shown along West 43rd Street. An automobile repair shop is shown adjacent west of the existing one-story addition property. This repair shop is labeled as maintaining a 550-gallon buried gasoline tank. Properties adjacent east of the Site are labeled as belonging to the New York Central Railroad. No other significant changes to the surrounding properties are shown.

1950

No significant changes to the subject Site are shown. A large building is shown adjacent west of the subject site; this property is currently occupied by the New York Public Library. A vacant lot is shown adjacent east of the subject Site; this property is currently occupied by the Penn Central Railroad terrace. No other significant changes to the surrounding properties are shown.

1968

The subject Site is shown as it currently exists with the one-story addition fronting along West 44th Street. Properties adjoining the existing one-story addition are shown as being occupied by automobile repair shops Properties north of the Site across West 44th Street are occupied by a playground. No other significant changes to the surrounding properties are shown.

1979 - 1996

The subject property and surrounding area appear unchanged from the previous map.

3.2 Historical Aerial Photographs

Langan contacted EDR for Historical Aerial Photographs pertaining to the subject property and vicinity. Historical Aerial Photographs from 1943, 1953, 1966, 1976, 1984, and 1995 were obtained from EDR. The photographs were reviewed to identify past land use and any obvious potential environmental concerns related to the subject property and neighboring properties. Copies of the historical aerial photographs are provided in Appendix C. A brief summary of each photograph is provided below.

1943

The Main building is shown as it currently exists. A separate structure is shown at the location of the existing one-story addition. Based on review of the historic Sanborn maps, this building was likely a residential row-house.

1953

The subject Site and surrounding properties appear as they currently exist.

1966

The subject Site and surrounding properties appear as they currently exist.

1976

The resolution of this photograph is too low to make relevant observations.

1984

The subject Site and surrounding properties appear as they currently exist.

1995

The subject Site and surrounding properties appear as they currently exist.

3.3 Property Ownership

The subject Site is identified by Manhattan Borough as Lot 21 of Block 1072. The historical ownership information was obtained from a review of records at the New York County Assessor's and Recorder's Offices. A summary of the ownership history is provided in the table below.

Manhattan Borough Lot 21 of Block 1072

Grantor	Grantee	Date	Deed Book/Page
Nicolette Proscia	Nicholas Proscia, Katherine Proscia and Maryann Proscia	03-23-1979	Bk 475, Pg 1245
Nicolette Proscia, as Executrix of the Estate of Joseph Proscia, deceased	Nicolette Proscia	06-15-1977	Bk 402, Pg 1631
Beggs Garage, Inc.	Joseph Proscia	02-20-1974	Bk 305, Pg 1920
Emigrant Industrial Savings Bank	Beggs Garage, Inc.	05-09-1939	Bk 4013, Pg 82
Park & Tilford	Emigrant Industrial Savings Bank	02-19-1936	Bk 3919, Pg 200

No leases or environmental liens of record were identified as part of the ownership research. Based on a review of the ownership history, it appears that the subject Site has operated as a garage since at least 1939.

3.4 Previous Environmental Reports and Related Correspondence

Langan requested copies of any previous environmental reports or correspondence from the current Site owner for the subject property. No such reports were available for review.

4.0 REGULATORY REVIEW

Langan reviewed regulatory database information contained within a Computerized Environmental Report (CER) provided by EDR for environmental information regarding the subject property and surrounding properties that might adversely affect the subject property. The EDR database report is provided in Appendix D. The CER is a listing of sites identified on select federal and state standard source environmental databases within the search distance specified by ASTM *Standard Practice for Environmental Site Assessments E1527-00*. A brief description of the federal and state databases searched to generate this report is provided below:

Federal ASTM Standard Records

NPL:	Sites designated for Superfund Cleanup by the USEPA.
CERCLIS:	Known or suspected uncontrolled or abandoned hazardous waste sites.
CERC-NFRAP:	CERCLIS sites designated "No Further Remedial Action Planned" and which have been removed from the CERCLIS list.
CORRACTS:	List of hazardous waste handlers with RCRA Corrective Action activity.
ERNS:	Information on the sudden and/or accidental release of hazardous substances, including petroleum, into the environment
Proposed NPL:	Proposed National Priority List Sites.
RCRIS:	Resource Conservation and Recovery Information System
RCRIS-TSD:	Information pertaining to facilities that treat, store and/or dispose of hazardous waste or meet other applicable requirements of RCRA.
RCRIS-CESQG:	Conditionally exempt small quantity generators that generate less than 100 kg of hazardous waste, or less than 1 kg/month of acutely hazardous waste.
RCRIS-SQG:	Small quantity generators which generate 1,000 kg/month of non-acutely hazardous waste or 1 kg/month of acutely hazardous waste.
RCRIS-LQG:	Large quantity generators which generate less than 1,000 kg/month of non-acutely hazardous waste.

State ASTM-Required Records

UST:	Listing of all registered underground storage tanks.
LUST.	Listing of all reported leaking underground storage tanks.
SHWS:	State Hazardous Waste Sites.
SWF/LF:	Inventory of solid waste facilities/Landfill sites permitted by PADEP.
VPC:	Voluntary Cleanup Program Sites.
ARCHIVE UST:	Archived sites with removed or permanently closed underground storage tanks containing highly hazardous material.

Federal ASTM Supplemental Records

BRS:	Biennial Reporting System that collects data on the generation and management of hazardous waste.
ROD:	Records of Decision documents pertaining to remedies at NPL sites.
Delisted NPL:	NPL Deletions.
NPL LIENS:	A listing of all properties in which Federal Superfund liens have been issued.
FINDS:	Inventory of all facilities regulated or tracked by the USEPA
PADS:	A USEPA PCB Activity Database.
RAATS:	Inventory of all facilities that have been issued enforcement actions under RCRA.
TRIS:	Inventory of all facilities that release toxic chemicals to air, water and land under SARA Title III.
TSCA:	Toxic Substances Control Act which identifies manufacturers of chemicals.
HMIRS:	Hazardous Materials Incident Report System documenting all hazardous spill incidents reported to the DOT.
MLTS:	Listing of approximately 8,100 sites which possess or use radioactive materials and are subject to Nuclear Regulatory Commission licensing requirements.
CONSENT:	Superfund CERCLA Consent Decrees.
MINES:	Mines Master Index File.
FTTS:	FIFRA/TSCA Tracking System – FIFRA (Federal Insecticides, Fungicide and

	Rodenticide Act)/TSCA (Toxic Substances Control Act)
SSTS:	Section 7 Tracking System for FIFRA of producers, sellers, and distributors of Insecticides, Fungicides and Rodenticides.
DOD:	Listing of Department of Defense sites.
STORMWATER:	Listing of facilities with Storm Water General Permits.
INDIAN RESERVE:	Indian administered lands in the United States of 640 acres or greater.
US BROWNFIELDS:	Federal listing of Brownfields sites.
RMP:	Risk Management Plans.
FUDS:	Listing of Formerly Used Defense sites.

State ASTM Supplemental Records

AST:	Listing of registered aboveground storage tanks.
LAST:	List of confirmed releases.
ACT 2-DEED:	Listing of site with approved cleanup requiring a deed acknowledgement.
UNREG-LTANKS:	Unregulated leaking storage tank cases.
HIST-LF:	Abandoned Landfill Inventory
ARCHIVE AST:	Archived sites with current or former above ground storage tank of 21,000 gallons or more that were removed from PADEP's Storage Tank database.

Other Proprietary Databases

Coal Gas:	Former Manufactured Gas (Coal Gas) Sites.
Oil/Gas pipelines:	Reported oil and gas pipelines.
Sensitive Receptors:	Listing of buildings and facilities where individuals deemed to have special sensitivity to environmental discharges (generally elderly, the ill, and children) are likely to be located.
Flood Zone Data:	Depicts 100-year and 500-year flood zones as defined by the Federal Emergency Management Agency (FEMA).
NWI:	National Wetlands Inventory from the United States Fish and Wildlife Service.

EDR accessed state and federal environmental databases that were subsequently reviewed by Langan to determine the status of the historic and current environmental conditions at the subject property ad surrounding properties. The regulatory databases accessed were available through the United States Environmental Protection Agency (U.S. EPA), the New York Department of Environmental Conservation and New York City Department of Environmental Protection.

The target site was not identified on any databases searched by EDR. Relevant sites listed in the federal and state databases are summarized in the following sections.

4.1 Federal Databases

Resource Conservation and Recovery Information System Small Quantity Generators/Large Quantity Generators (RCRIS SQG/LQG)

Langan reviewed the list of sites which have filed notification with the U.S. EPA in accordance with Resource Conservation and Recovery Act (RCRA) requirements. These sites include generators of hazardous waste regulated under RCRA. Under RCRA, hazardous waste generators are classified by the mass of hazardous waste generated in a calendar month into the following categories: Large Quantity Generator (LQG), greater than 2,200 pounds; Small Quantity Generator (SQG), 220 to 2,200 pounds; and Conditionally-Exempt Small Quantity Generator, less than 100 kg. RCRIS Generators, which represent some form of hazardous waste activity, are most significant if they are determined to have Class I Violations or to be non-compliant. A total of 46 RCRIS SQG/LQG sites were identified in the prescribed federal database search within the prescribed search radius.

Several RCRIS SQG/LQG sites within 0.25 mile of the subject Site had known violations listed in the database report. However, based on the distance between these sites and the subject Site, and since the Site is served by municipal water, these sites are not considered to be RECs.

4.2 State Database

A total of 2 Solid Waste Facility/Landfill sites, 101 Leaking Storage Tank Incident Reports (LTANKS) sites, 39 Underground Storage Tank (UST) sites, two Chemical Bulk Storage UST (CBS-UST) sites, two Voluntary Cleanup Program (VCP) sites, four Chemical Bulk Storage Aboveground Storage Tank (CBS-AST) sites, 54 Spills sites, three dry cleaners sites, and three Coal Gas sites were identified in the state database searches within the prescribed search radii. The following is a summary of these sites.

State Solid Waste Facility/Landfill (SWF/LF)

The state SWF/LF database review identified two sites within a one mile radius from the subject property. These sites are solid waste disposal or landfill facilities. Below is a summary of the SWF/LF located within 0.5 mile of the subject property.

PROPERTY NAME	DISTANCE/ DIRECTION / ELEVATION VERSUS SITE
CON EDISON @ Service Center	0.25-0.5 mile/NW/Lower
CON EDISON	0.25-0.5 mile/NW/Lower

Based on the topographical elevations of these sites relative to the subject property, none of these sites are considered to be RECs.

Leaking Storage Tank Incident Reports (LTANKS)

This list is an inventory of sites where leaking underground storage tank incidents have been reported between April 1, 1986 and the most recent update. A review of the LTANKS database review identified 101 LTANKS sites within approximately 0.5 mile of the subject property. Below is a summary of the LTANK sites located within 0.125 mile of the subject Site.

PROPERTY NAME	DISTANCE/DIRECTION / ELEVATION VERSUS SITE
FDNY Rescue 1	0-0.125 mile/W/Higher
Service Station	0-0.125 mile/ENE/Higher
Not Reported	0-0.125 mile/NNE/Higher
Hess/502 W. 45th Street	0-0.125 mile/NE/Higher
Hess Station #32215	0-0.125 mile/NE/Higher
West 45th Street and 10th Avenue	0-0.125 mile/NE/Higher
Apartment Building	0-0.125 mile/N/Higher
Not Reported	0-0.125 mile/S/Higher
Apartment Complex	0-0.125 mile/WNW/Lower
Riverbank West Apartments	0-0.125 mile/WNW/Lower

Based on the distance between these sites and the subject Site, and since the Site is served by municipal water, these sites are not considered to be RECs.

Underground Storage Tanks (UST)

The UST database contains sites which maintain registered USTs. USTs are regulated under Subtitle I of the RCRA. This data comes from the Department of Environmental Protection and Energy UST database. The database review identified 39 UST sites within approximately 0.25 mile of the subject property. Below is a summary of the UST sites located within 0.125 mile of the subject Site.

PROPERTY NAME	DISTANCE/DIRECTION/ ELEVATION VERSUS SITE
F.D.N.Y.-Rescue Co. 1	0-0.125 mile/W/Higher
ANNEX BLDG	0-0.125 mile/ESE/Higher
43rd Parking Garage	0-0.125 mile/WNW/Higher
Marvin Mithell	0-0.125 mile/WNW/Higher
Merchandising Workshop, Inc.	0-0.125 mile/WNW/Higher
The Strand Condominium	0-0.125 mile/ESE/Higher
Travel Inn Hotel	0-0.125 mile/S/Higher
Manhattan Plaza	0-0.125 mile/ESE/Higher
Phil's West 44th Street Serv/Sta	0-0.125 mile/ENE/Higher
517-525 West 45th Street	0-0.125 mile/NE/Higher
Mercedes Benz/Manhattan, Inc.	0-0.125 mile/SW/Higher
American Red Cross	0-0.125 mile/SSW/Higher
Hess Station #32215	0-0.125 mile/NE/Higher
AVIS Rent-a-Car	0-0.125 mile/SSE/Higher
AVIS Rent-a-Car System, Inc.	0-0.125 mile/SSE/Higher
Riverbank West	0-0.125 mile/SSE/Lower

Based on the distance between these sites and the subject Site, and since the Site is served by municipal water, these sites are not considered to be RECs.

State Chemical Bulk Storage Underground Storage Tanks (CBS-UST)

The CBS UST database includes facilities storing hazardous substances listed in 6 NYCRR Part 597, in aboveground tanks with capacities of 185 gallons or greater, and/or in underground tanks of any size. It also includes facilities registered (and closed) since effective date of CBS regulations (July 15, 1988) through the date request is processed. The database review identified two CBS-UST sites within approximately 0.25 mile of the subject property. These sites are listed below.

PROPERTY NAME	DISTANCE/DIRECTION / ELEVATION VERSUS SITE
Manhattan Plaza Health Club	0-0.125 mile/ESE/Higher
M.J. Quill Depot	0.125-0.25 mile/WSW/Lower

Since no records of spills are referenced for these properties, they do not appear to be RECs.

Voluntary Cleanup Program (VCP)

The voluntary remedial program uses private monies to get contaminated sites remediated to levels allowing for the sites' productive use. The program covers virtually any kind of site and contamination. The database review identified two VCP sites within approximately 0.5 mile of the subject property. These sites are listed below.

PROPERTY NAME	DISTANCE/DIRECTION / ELEVATION VERSUS SITE
CON EDISON – W. 42nd Street Gas	0.125-0.25 mile/WNW/Higher
Clinton Greene Development Project	0.25-0.5 mile/NE/Higher

Based on the distance between these sites and the subject Site, and since the Site is served by municipal water, these sites are not considered to be RECs.

State or Local Supplemental

A review of the State and Local Supplemental database indicated that there are four CBS-AST sites and three drycleaners located within 0.25 mile of the subject property. Since no records of spills or USTs are referenced for these properties, they do not appear to be RECs.

A review of the State and Local Supplemental database indicated that there are 54 SPILLS incidents within 0.125 mile of the subject Site. Data collected on spills is reported to NYSDEC. This list includes spills active as of April 1, 1986, as well as spills occurring since this date. Since the subject Site is not listed in this database and since the Site is served by municipal water, these Spill incidents are not considered to be RECs.

4.3 Proprietary Databases

A review of the Proprietary Database indicated that there are three Former Manufactured Gas (Coal Gas) site located within 0.25 mile of the subject property. Based on the distance between these sites and the subject Site, and since the Site is served by municipal water, these sites are not considered to be RECs.

4.4 Local and County Agencies Review

Langan contacted multiple government agencies in New York City and New York County to access public files in order to obtain information on the subject property, including the New York City of Environmental Protection, the New York County Recorder of Deeds and Tax Assessor, and the New York City Department of Health. Available files were requested to determine whether there is documentation pertaining to any incident, which could have resulted in an environmental impact to the subject Site. No files were identified in response to these requests.

5.0 SITE RECONNAISSANCE

The following sections summarize the results of our Site reconnaissance and the findings are described consistent with ASTM Standard Practice E1527-00 Sections 8.42, 8.43, and 8.44.

The Site reconnaissance was conducted on November 2, 2004 in a systematic manner focusing on the subject property. Langan was escorted during the Site reconnaissance by Mr. Nicholas Proscia, current owner of the subject Site.

5.1 Site Observations

The following observations pertain to Langan's inspection of the subject property.

Interior

The three-story building, its basement, and the attached one-story addition occupy approximately 32,500 square feet. All of this space is open and is currently used as an automotive parking garage. A cable-driven freight elevator is used to transport cars between levels. The ground floor of the main building contains an office, a parking attendant kiosk, and two bathrooms. During the Site reconnaissance, no obvious oil staining was observed on the surfaces of the concrete floors throughout the building.

Exterior

The three-story building and the one-story addition occupy the entire property. The exterior of the structures are constructed of brick masonry. On the ground floor, access to the main buildings is along West 43rd Street and access to the one-story addition is along West 44th Street. No evidence of adverse environmental conditions (i.e., staining) was observed around the exterior of the property.

5.2 Summary of Observations

The following sections summarize visual observations made during the Site reconnaissance.

5.2.1 *Hazardous Substances and Petroleum Products*

Langan did not observe any hazardous substances or petroleum products on-site during the Site inspection.

5.2.2 *Storage Tanks*

Two 550-gallon steel underground storage tanks (USTs) are located beneath the basement concrete floor of the main building. Mr. Proscia reported that these USTs are situated in a concrete vault and formerly stored gasoline. Two pump motors are located along the basement walls in the vicinity of the USTs. These pumps supplied a dispenser which was formerly located on the ground floor of the main building, in the center of the garage door opening (West 43rd Street side). Reportedly, the USTs were installed prior to his taking ownership of the property.

Mr. Proscia reportedly hired a contractor to pressure test the tanks approximately 35 years ago. Since one or both the tanks failed the pressure tests, the USTs were abandoned in-place in accordance with the local Fire Marshall's recommendations. He was unaware of any former release incidents involving the USTs. No documentation regarding the USTs was available for review.

An elevated concrete slab and a UST pipe manhole were observed in the basement of the main building, in the reported location of the USTs.

One empty 275-gallon aboveground storage tank (AST) was observed in the basement of the main building. Mr. Proscia reported that this AST previously stored kerosene but is no longer in use. No staining was observed at the base of the AST.

5.2.3. *Potential Asbestos Containing Materials*

During the Site reconnaissance, one potential asbestos-containing material (ACMs) was visually identified inside the buildings. This material is summarized below:

- Gray, sprayed-on fire-retardant insulation covering the ceiling and several structural columns in the basement of the main building. This material is friable and was observed to be in fair condition.

Based on the unknown age and friable nature of this material, this material is considered an REC.

Based on the ages of the materials described below, these materials are not likely to be ACMs and are not considered RECs:

- Black, 12-inch by 12-inch vinyl floor tile and mastic covering the floors of the bathrooms on the ground floor of the main building. These floor tiles are non-friable and were observed to be in good condition.
- White 2-foot by 2-foot acoustic ceiling tile comprising the dropped ceilings in the bathrooms on the ground floor. These ceiling tiles are friable and were observed to be in good condition.

5.2.4 Odors

Aside from automotive exhaust fumes, no petroleum or chemical odors were observed during the Site reconnaissance.

5.2.5 Pools of Liquid

Langan did not observe standing surface water or pools/sumps containing liquids likely to constitute hazardous substances or petroleum products during the Site reconnaissance.

5.2.6 Drums

Langan did not observe any drums present on-site during the Site reconnaissance.

5.2.7 Unidentified Substance Containers

No open or damaged containers containing unidentified substances suspected of being hazardous substances or petroleum products were observed during the Site reconnaissance.

5.2.8 *PCBs*

Several fluorescent light fixtures were observed throughout the buildings. The ballasts of these fixtures may contain PCBs. These ballasts should be properly characterized prior to their disposal.

5.2.9 *Stains or Corrosion*

No significant staining or corroded environments were observed during the Site reconnaissance.

5.2.10 *Exterior Pits, Ponds or Lagoons*

Langan did not observe any pits or lagoons, including those which have been used in connection with waste disposal or waste treatment activities and suspected of containing hazardous substances or petroleum products, on the subject property.

5.2.11 *Stressed Vegetation*

No vegetation is located on the property.

5.2.12 *Solid Waste*

There were no piles of solid waste observed being stored on the subject property.

5.2.13 *Wastewater*

No wastewater is discharged to the ground surface from the subject property.

5.2.14 *Wells*

Langan did not observe evidence of dry wells, injection wells, observation wells, monitoring wells, recovery wells or abandoned wells on the subject property.

5.2.15 *Septic Systems*

Septic systems or cesspools were not observed on the subject property.

6.0 LIMITED PHASE II ESA

Based on the results of the Phase I activities, two RECs were identified on the subject property. These REC's are discussed below:

- REC-1 – A potential asbestos-containing material was identified in the basement of the main building. This material is friable and was observed to be in fair condition.

- REC-2 – Two 550-gallon gasoline USTs are located beneath the basement concrete floor in the main building. These USTs were reportedly abandoned in-place approximately 35 years ago and are situated in a concrete vault.

The Phase II ESA activities included asbestos sampling for REC-1 and performance of a soil boring investigation and soil sampling in the vicinity of REC-2. The findings, opinions and conclusions of the Phase II ESA are provided in the sections below.

6.1 REC-1: Asbestos Sampling

An asbestos inspection was performed on December 16, 2004 by Mr. Leonid Shereshevsky, a Langan asbestos inspector accredited under the United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA). Seven bulk samples of the sprayed on fire-retardant insulation in the basement were collected and submitted for analysis by Polarized Light Microscopy (PLM) by EPA Method 600 for the presence/absence of asbestos. The sample locations were spread out to be spatially representative of the material. Samples were analyzed by AmeriSci New York (AmeriSci) of New York, New York. AmeriSci participates in the National Voluntary Laboratory Approval Program (NVLAP) and American Industrial Hygiene Association (AIHA).

A material with an asbestos content greater than one percent by weight is considered to be an ACM. Asbestos was not detected or detected in concentrations less than one percent by weight in all seven samples. Based on these results, no further action is required for this REC. The results of laboratory analyses are located in Appendix F.

6.2 REC-2: Soil Borings and Soil Sampling

On December 18, 2004, three soil borings (SB-3 through SB-5) were advanced in the vicinity of REC-2 to identify if soils have been adversely impacted by former operation of the USTs. Note that two soil borings (SB-1 and SB-2) were performed on the ground floor of the one-story addition; these borings were performed for geotechnical purposes and are outside the scope of this report.

The borings were advanced using a Dingo TX-425 track-mounted Geoprope® device. The Geoprope® uses direct-push sampling techniques to collect continuous four foot soil cores in acetate macro core liners. Geoprope® activities were conducted by Summit Drilling Company, Inc. of Bound Brook, New Jersey under the full-time supervision of a Langan geologist. The Langan geologist recorded soil lithology, field measurements and observations on field soil boring logs. Field measurements included photoionization detector (PID) readings and observations of any staining and odors. Following their completion, the soil borings were backfilled with the removed soil and capped with a concrete patch. The completed environmental soil boring locations are shown on Figure 2B and the soil boring logs are presented in Appendix E.

The following presents the lithology, field measurements, and sampling procedures performed during environmental soil boring activities:

Soil Boring SB-3

SB-3 was advanced approximately two feet east of the suspected UST location (Figure 2b).

Approximately two feet of red, brown and black sand and gravel was encountered beneath the concrete slab. The boring met refusal at two feet below the ground surface at white sandstone/quartzite rock (bedrock). PID readings from the soil ranged from 12 to 157 parts per million (ppm). Despite the elevated PID readings, no odors or staining was observed in soil.

Soil Boring SB-4

SB-4 was advanced approximately five feet northeast of the suspected UST location (Figure 2b). Approximately 1.5 feet of red, brown and black sand and gravel was encountered beneath the concrete slab. The boring met refusal at 1.5 feet below the ground surface at white sandstone/quartzite rock (bedrock). PID readings from the soil ranged from zero to 182 ppm. Despite the elevated PID readings, no odors or staining was observed in the soil Langan collected soil sample SB4-121804 from 1.0-1.5 feet below the ground surface.

Soil Boring SB-5

SB-5 was advanced approximately six feet north of the suspected UST location (Figure 2b). Approximately one foot of reddish-brown sand was encountered beneath the concrete slab. The boring met refusal at one foot below the ground surface at white sandstone/quartzite rock (bedrock). PID readings from the soil ranged from zero to 152 ppm. Despite the elevated PID readings, no odors or staining was observed in the soil. Langan collected soil sample SB5-121804 from 0.5-1.0 feet below the ground surface.

The soil samples were placed in a cooler, the internal temperature of which was maintained below 4°C. The samples were accompanied by a chain of custody. The soil samples were submitted to Great Lakes Analytical (GLA) Laboratories of King of Prussia, Pennsylvania and were analyzed for New York Spill Tech and Remediation Series (STARS) gasoline compounds by U.S. EPA Method 8260B.

The soil sample results were screened against the New York Department of Environmental Conservation (DEC) soil cleanup criteria and the STARS screening values for gasoline-contaminated soil in Table 2. The results indicate that no compounds exceeded the New

York DEC criteria or STARS screening values; therefore, no further action is recommended. The complete soil analytical data package is included in Appendix G.

7.0 CONCLUSIONS AND RECOMMENDATIONS

This Phase I and Limited Phase II ESA has been performed in general conformance with ASTM Practice E 1527-00 and accepted industry standards. Summaries of the RECs identified and as part of the Phase I assessment and investigated as part of Phase II activities are presented below:

<u>REC-1</u>

- The PACM sampling involved the collection of seven bulk samples from the friable spayed-on insulation observed coating the ceiling and structural columns in the basement of the main building. The results of the samples indicate that this material does not contain asbestos; therefore, no further action is recommended

<u>REC-2</u>

- Three soil borings were advanced in the vicinity of the abandoned gasoline USTs located beneath the basement floor slab. Two soil samples were collected from the borings and submitted for laboratory analysis of New York STARS compounds. The results were screened against the New York DEC soil cleanup criteria and STARS screening values for gasoline-contaminated soil. The results indicate that no compounds exceeded the DEC criteria or the STARS screening values; therefore, no further action is recommended.

8.0 ADDITIONAL LIMITATIONS

The scope of services performed for this study did not address the following non-ASTM required Phase I ESA items: lead-based paint, radon, lead in drinking water, wetlands, regulatory compliance, cultural and historic resources, industrial hygiene, health and safety, ecological resources, endangered species, indoor air quality, and high voltage power lines.

APPENDIX B
October 2024 GPR Survey Report

GEOPHYSICAL ENGINEERING SURVEY REPORT

514-518 WEST 44TH STREET
NEW YORK, NEW YORK 10036

NOVA PROJECT NUMBER:
24-4389

DATED:
OCTOBER 16, 2024

PREPARED FOR:

HALEY ALDRICH

237 West 35th Street, 16th Floor
New York, NY 10123
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PREPARED BY:

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October 16, 2024

Nicole Mooney
Project Geologist
H & A of New York Engineering and Geology, LLP
213 West 35th Street,
New York, New York 10001
M: 646.984.5064 E: nmooney@haleyaldrich.com

Re: Geophysical Engineering Survey (GES) Report
514-518 West 44th Street
New York, New York 10036

Dear Ms. Mooney;

Nova Geophysical Services (NOVA) is pleased to provide the findings of the geophysical engineering survey (GES) at the above referenced project site: 514-518 West 44th Street, New York, New York (the "Site").

INTRODUCTION TO GEOPHYSICAL ENGINEERING SURVEY (GES)

NOVA performed a geophysical engineering survey (GES) consisting of a Ground Penetrating Radar (GPR) and Electromagnetic (EM) survey at the site. The purpose of this survey is to locate and identify utilities, underground storage tanks (USTs) and other substructures in the vicinity of proposed boring locations on October 11th, 2024.

The equipment selected for this investigation was a Sensors and Software Noggin 250 MHz ground penetrating radar (GPR) with a shielded antenna and a RadioDetection RD7100 Electromagnetic utility locator. A GPR system consists of a radar control unit, control cable, and transducer (antenna). The control unit transmits a trigger pulse at a normal repetition rate of 250 MHz. The trigger pulse is sent to the transmitter electronics in the transducer via the control cable. The transmitter electronics amplify the trigger pulse into bipolar pulses that are radiated to the surface. The transformed pulses vary in shape and frequency according to the transducer used. In the subsurface, variations of the signal occur at boundaries where there is a dielectric contrast (void, steel, soil type, etc.). Signal reflections travel back to the control unit and are represented as color graphic images for interpolation.

A typical electromagnetic (EM) utility locating system consists of a transmitter unit and a receiver unit. The receiver unit can be used independently of the transmitter unit in order to detect utility lines with an inherent EM signature (electric utility lines, water lines, etc.). If needed a current at a specific frequency can also be placed on a utility that is being located. This can be done via the transmitter unit by either direct connection or induction via an EM field varying at specific frequency. The receiver unit is then set to the selected frequency and the electromagnetic field created by the current running through the utility can be located allowing the utility to be marked.

GEOPHYSICAL METHODS

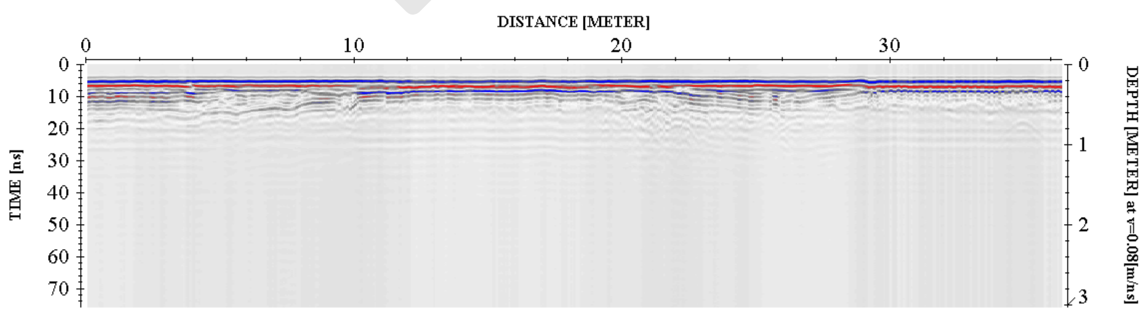
The project site was screened using GPR to search the specified area and inspected for reflections, which could be indicative of substructures and utilities within the subsurface. An EM utility locator was used to help determine the locations of utilities within the survey area.

EM data was collected and interpreted on site and suspected utilities marked as needed. GPR data profiles were collected for the areas of the Site specified by the client and processed as specified below.

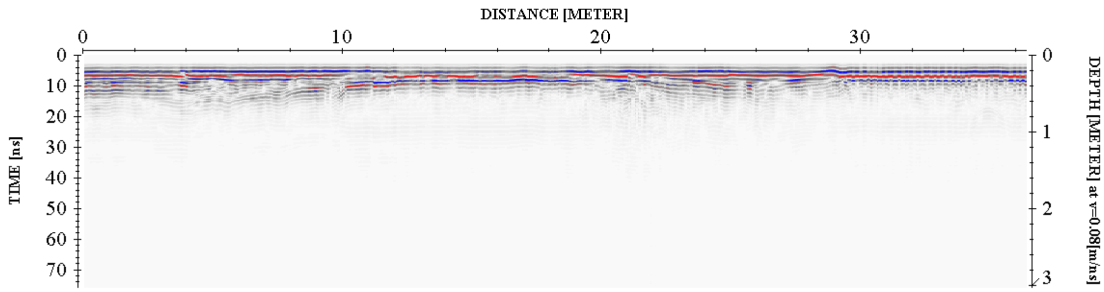
DATA PROCESSING

To improve the quality of the results and to better identify anomalies NOVA processed the collected data. The processing workflow is briefly described in this section.

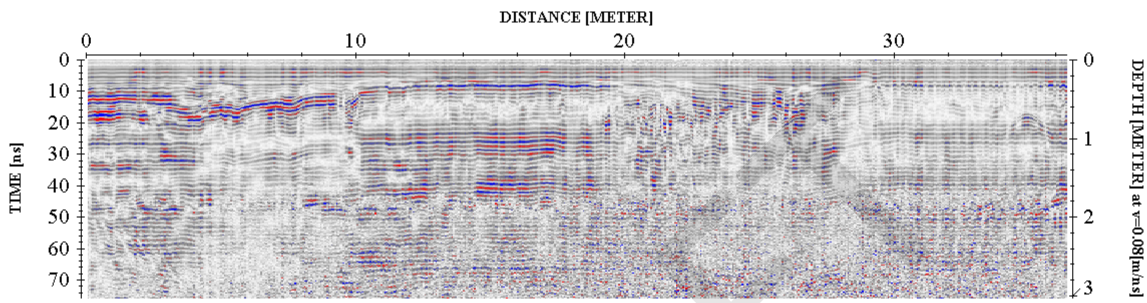
Step 1. Import Raw RAMAC data to standard processing format



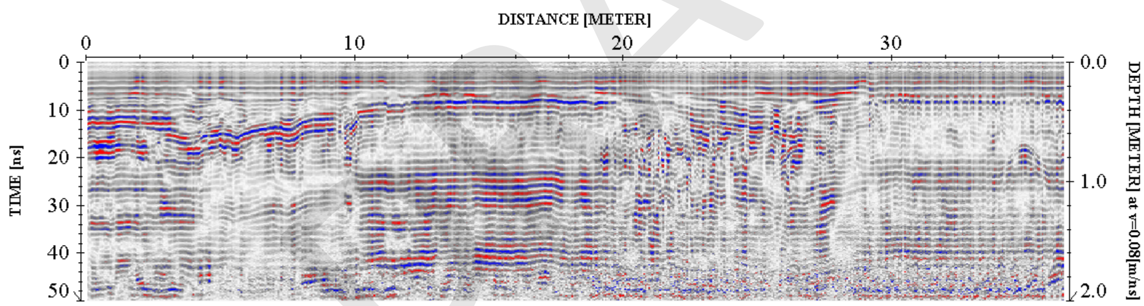
Step 2. Remove instrument noise *(dewow)*



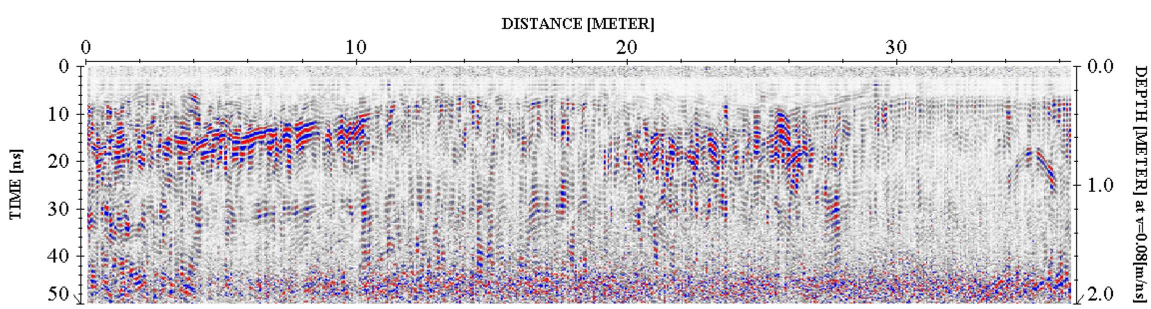
Step 3. Correct for attenuation losses *(energy decay function)*



Step 4. Remove static from bottom of profile *(time cut)*



Step 5. Mute horizontal ringing/noise *(subtracting average)*



The above example shows the significance of data processing. The last image (step 5) has higher resolution than the starting image (raw data – step 1) and represents the subsurface anomalies much more accurately.

PHYSICAL SETTINGS

NOVA observed the following physical conditions at the time of the survey.

Weather: Sunny

Temperature: 65° F

Surface: Concrete

Survey Parameters: A GPR grid scan was conducted within the survey areas as shown on the survey plan. The approximate line spacing of the grid survey was approximately 2’. Additional GPR data was collected over features of interest.

Limitations: The geophysical noise level (GNL) at the site was high due to being in an urban environment and other unknown anthropogenic noise sources.

RESULTS

The results of the geophysical engineering survey (GES) identified the following at the project site:

- Anomalies resembling potential subsurface utilities (such as electric, water, telecom, gas, and sewer) were identified within the survey area. The approximate locations are shown in the survey plan.
- The GEs identified a floor drain where its connected to the public sewer system located along the West 44th Street.
- The GES did not identify any major anomalies consistent with any underground storage tanks (USTs) at the project area.
- NOVA cleared and marked all proposed boring locations.

If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

NOVA Geophysical Services

Levent Eskicakit, P.G., E.P.

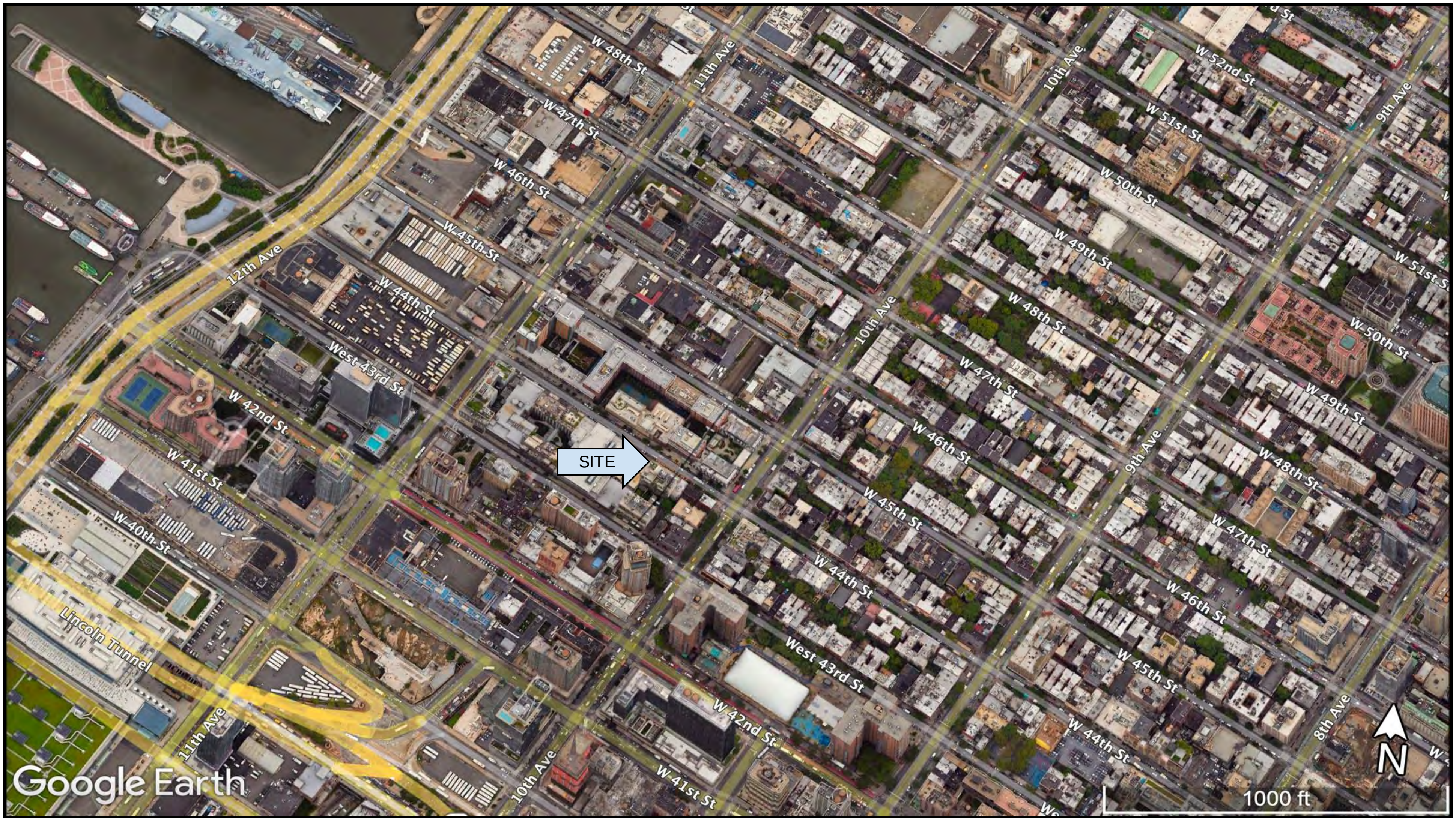
Project Manager

Attachments:

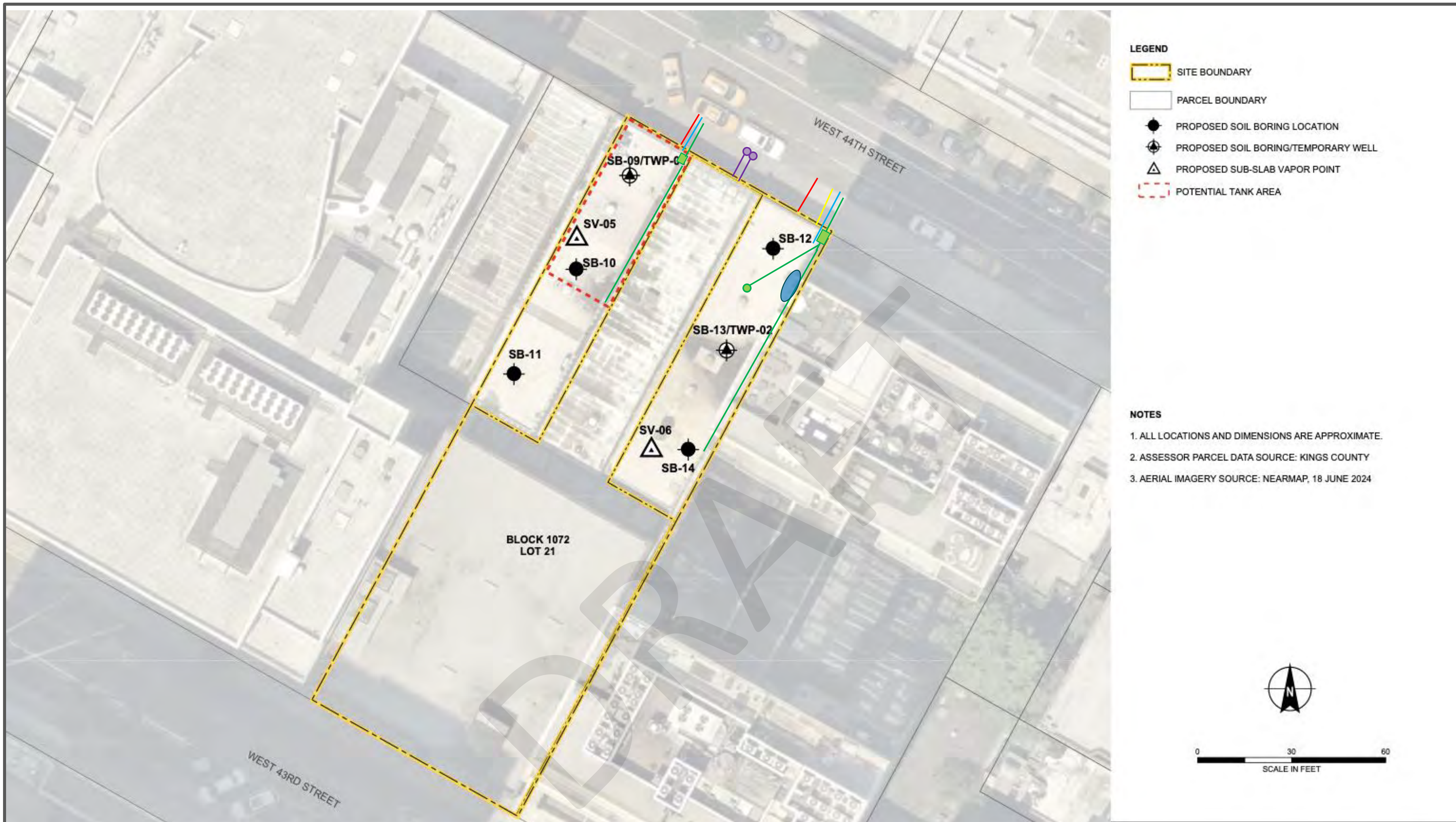
Location Map

Survey Plan

Geophysical Images



	Location Map	LEGEND
NOVA Geophysical Services Subsurface Mapping Solutions 56-01 Marathon Parkway, # 765 Douglaston, New York 11362 Phone (347) 556-7787 * Fax (718) 261-1527 www.novagsi.com	SITE: **Commercial Property** 514-518 Werst 44th Street, New York, New York 10036 DATE: October 11th, 2024 AUTH: Jason Staunton/Tolga Ybas	



NOVA
Geophysical Services
Subsurface Mapping Solutions
56-01 Marathon Parkway, # 765
Douglaston, New York 11362
Phone (347) 556-7787 * Fax (718) 261-1527
www.novagsi.com

SURVEY PLAN

SITE: **Commercial Property**
514-518 West 44th Street,
October, New York 10036

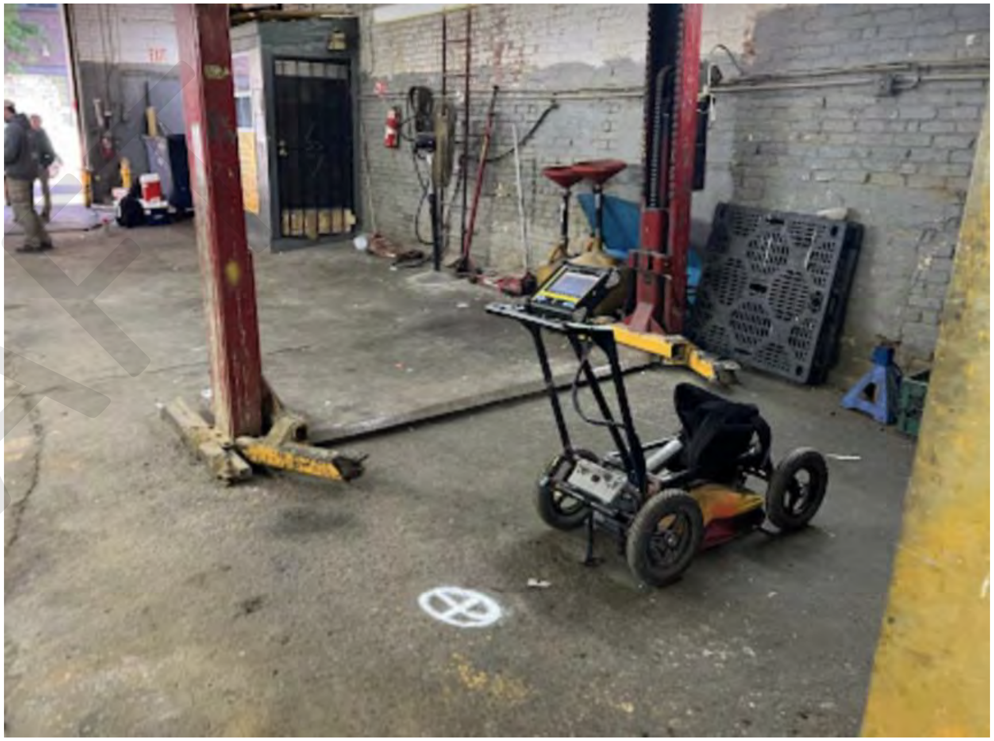
DATE: October 11, 2024

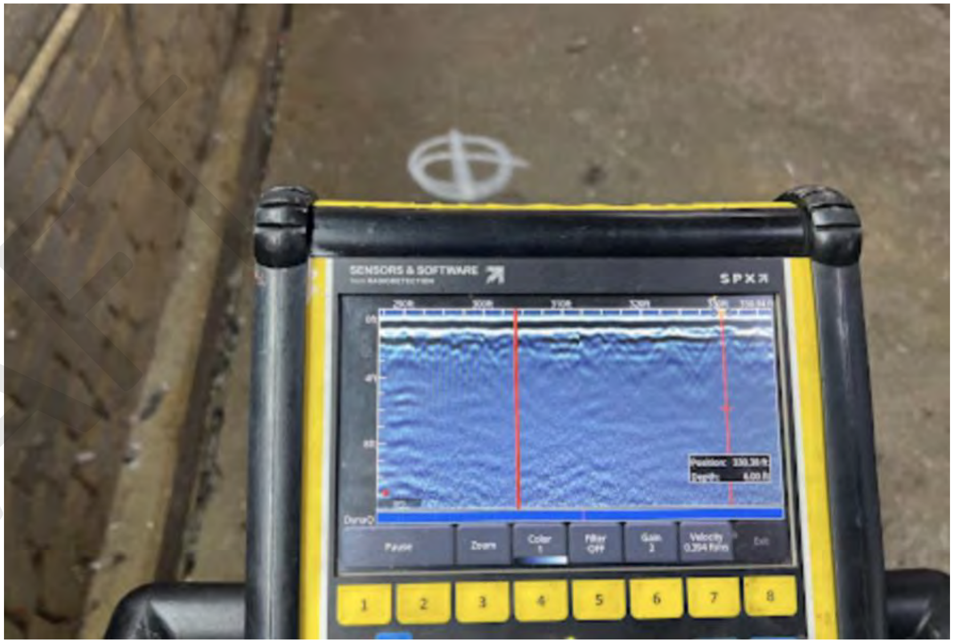
AUTH: Jason Staunton /Tolga Ybas

LEGEND

- SITE BOUNDARY
- PARCEL BOUNDARY
- PROPOSED SOIL BORING LOCATION
- PROPOSED SOIL BORING/TEMPORARY WELL
- PROPOSED SUB-SLAB VAPOR POINT
- POTENTIAL TANK AREA
- ABOVEGROUND STORAGE TANK (AST)
- FILL PORT
- FLOOR DRAIN
- ELECTRIC
- GAS
- SEWER/DRAIN
- WATER


SENSORS & SOFTWARE
SPX
Pause
Zoom
Color
Filter
OFF
Gain
2
Velocity
Exit
1
2
3
4
5
6
7
8




SENSORS & SOFTWARE
1
2
3
4
5
6
7
8

GEOPHYSICAL IMAGES

Commercial Property

514-518 WEST44TH STREET, NEW YORK NY 10036

OCTOBER 11,, 2024


DRIVE

APPENDIX C
Field Sampling Plan

www.haleyaldrich.com

FIELD SAMPLING PLAN
515-519 WEST 43RD STREET REDEVELOPMENT SITE
NYSDEC BCP SITE NO. PENDING
515-519 WEST 43RD STREET AND 514-518 WEST 44TH STREET
NEW YORK, NEW YORK

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

for
BH Group 43 LLC
Brooklyn, New York

File No. 0211280
December 2024

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1. Introduction

This Field Sampling Plan (FSP) has been prepared as a component of the Remedial Investigation Work Plan (RIWP) for the subject Site located at 515-519 West 43rd Street and 514-518 West 44th Street, New York, New York (Site). This document was prepared to establish field procedures for field data collection to be performed in support of the RIWP for the Site.

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

The standard operating procedures (SOPs) included as components of this plan will provide the procedures necessary to meet the project objectives. The SOPs will be used as a reference for the methods to be employed for field sample collection and handling and the management of field data collected in the execution of the approved RIWP. The SOPs include numerous methods to execute the tasks of the RIWP. The Project Manager will select the appropriate method as required by field conditions and/or the objective of the respective project task at the time of sample collection. Field procedures will be conducted in general accordance with the New York State Department of Conservation (NYSDEC) Technical Guidance for Site Investigation and Remediation (Division of Environmental Remediation [DER]-10) and the Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) under NYSDEC Part 375 Remedial Program when applicable.

2. Field Program

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

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

- Soil sampling;
- Groundwater sampling;
- Soil vapor sampling;
- Indoor and ambient air sampling; and,
- Sampling of investigation-derived waste (IDW) as needed for disposal.

A Limited Phase II conducted at the Site by H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York) on 01 July 2024, 10 July 2024, 11 October 2024, and 16 October 2024 identified the presence of petroleum-related volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs; specifically polyaromatic hydrocarbons [PAHs]), and metals (specifically lead) in soil, and petroleum-related VOCs and chlorinated volatile organic compounds (CVOCs) in soil vapor.

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

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

3. Utility Clearance

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

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

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

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

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

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

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

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

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

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

Obtaining the utility clearance generally involves the designated “one-call” underground facilities protection organization for the area and the landowner and one or both following entities:

- A third-party utility locator company will be utilized to locate underground utilities outside of the public right-of-way; and/or
- “Soft dig” excavation techniques to confirm or deny the presence of underground utilities in the area.

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

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

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

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

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

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

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

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

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

Equipment/Materials:

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

4. Field Data Recording

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

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

- general field observations;
- numeric field measurements and instrument readings;
- quantity estimates;
- sample locations and corresponding sample numbers;
- relevant comments and details pertaining to the samples collected;
- documentation of activities, procedures, and progress achieved;
- contractor pay item quantities;
- weather conditions;
- a listing of personnel involved in Site-related activities;
- a log of conversations, Site meetings, and other communications; and,
- field decisions and pertinent information associated with the decisions.

4.1 WRITTEN FIELD DATA

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

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

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

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

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

4.2 ELECTRONIC DATA

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

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

potential for loss of data, access and downloading of data should be performed frequently enough to ensure the data storage capacity of the remote equipment is not exceeded.

Equipment/Materials:

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

5. Aquifer Characterization

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

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

5.1 PROCEDURE

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

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

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

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

Equipment/Materials:

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

6. Sample Collection for Laboratory Analysis

6.1 SOIL SAMPLE COLLECTION FOR LABORATORY ANALYSIS

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

6.1.1 Preparatory Requirements

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

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

6.1.2 Soil Classification

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

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

6.1.2.1 Data Recording

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

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

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

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

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

Soil characteristics like plasticity, strength and dilatancy should be determined using the Haley & Aldrich of New York Soil Identification Field Form.

6.1.2.2 Field Sample Screening

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

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

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

Equipment/Materials:

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

6.1.3 Soil Sampling

Soil samples will be collected from acetate liners installed by a track-mounted direct-push drill rig (Geoprobe®) operated by a licensed operator. Soil samples will be collected using a stainless-steel trowel or sampling spoon into laboratory-provided sample containers. If it is necessary to relocate any proposed sampling location due to terrain, utilities, access, etc., the Project Manager must be notified, and an alternate location will be selected.

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

6.1.4 Sampling Techniques

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

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

6.1.4.1 Grab Versus Composite Samples

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

6.2 GROUNDWATER SAMPLE COLLECTION FOR LABORATORY ANALYSIS

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

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

The "Typical Sampling Methods" will be employed where the collection of parameters less sensitive to turbidity/sediment issues are being collected (general chemistry, pesticides, and other SVOCs).

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

6.2.1 Preparatory Requirements

- Verify well identification and location using borehole log details and location layout figures. Note the condition of the well and record any necessary repair work required.
- Prior to opening the well cap, measure the breathing space above the well casing with a handheld organic vapor analyzer to establish baseline breathing space VOC levels. Repeat this

measurement once the well cap is opened. If either of these measurements exceeds the air quality criteria in the HASP, field personnel should adjust their personal protective equipment (PPE) accordingly.

- Prior to commencing the groundwater purging/sampling, a water level must be obtained to determine the well volume for hydraulic purposes. In some settings, it may be necessary to allow the water level time to equilibrate. This condition exists if a water-tight seal exists at the well cap and the water level has fluctuated above the top of screen; creating a vacuum or pressurized area in this air space. Three water level checks will verify static water level conditions have been achieved.
- Calculate the volume of water in the well. Typically, overburden well volumes consider only the quantity of water standing in the well screen and riser; bedrock well volumes are calculated on the quantity of water within the open core hole and within the overburden casing.

6.2.2 Well Development

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

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

Equipment:

- Appropriate health and safety equipment
- Knife
- Power source (generator)
- Field book
- Well Development Form (Form 3006)
- Well keys
- Graduated pails
- Pump and tubing

- Cleaning supplies (including non-phosphate soap, buckets, brushes, laboratory-supplied distilled/deionized water, tap water, cleaning solvent, aluminum foil, plastic sheeting, etc.)Water level meter

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

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

- Slowly lower the pump, safety cable, tubing, and electrical lines into the well to the depth specified by the project requirements. The pump intake must be at the midpoint of the well screen to prevent disturbance and resuspension of any sediment in the screen base.
- Before starting the pump, measure the water level again with the pump in the well leaving the water level measuring device in the well when completed.
- Purge the well at 100 to a maximum of 500 milliliters per minute (mL/min). During purging, the water level should be monitored approximately every five minutes, or as appropriate. A steady flow rate should be maintained that results in a drawdown of 0.3 ft or less. The rate of pumping should not exceed the natural flow rate conditions of the well. Care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record adjustments made to the pumping rates and water levels immediately after each adjustment.
- During the purging of the well, monitor and record the field indicator parameters (pH, temperature, conductivity, oxidation-reduction (redox) reaction potential [ORP], DO, and turbidity) approximately every five minutes. Stabilization is considered to be achieved when the final groundwater flow rate is achieved, and three consecutive readings for each parameter are within the following limits:
  - pH: 0.1 pH units of the average value of the three readings;
  - Temperature: 3 percent of the average value of the three readings;
  - Conductivity: 0.005 milliSiemen per centimeter (mS/cm) of the average value of the three readings for conductivity less than 1 mS/cm and 0.01 mS/cm of the average value of the three readings for conductivity greater than 1 mS/cm;
  - ORP: 10 millivolts (mV) of the average value of the three readings;
  - DO: 10 percent of the average value of the three readings; and
  - Turbidity: 0 percent of the average value of the three readings, or a final value of less than 50 NTU.
- The pump must not be removed from the well between purging and sampling.

6.2.4 Sampling Techniques

- If an alternate pump is utilized, the first pump discharge volumes should be discarded to allow the equipment a period of acclimation to the groundwater.
- Samples are collected directly from the pump with the groundwater being discharged directly into the appropriate sample container. Avoid handling the interior of the bottle or bottle cap and don new gloves for each well sampled to avoid contamination of the sample.
- Order of sample collection:
  - PFAS

  - VOCs
  - 1,4-dioxane
  - SVOCs
  - Total Analyte List (TAL) metals
- No sampling equipment components or sample containers should come in contact with aluminum foil, low-density polyethylene, glass, or polytetrafluoroethylene (PTFE, Teflon™) materials including plumbers' tape and sample bottle cap liners with a PTFE layer.
- For low-stress/low-flow sampling, samples should be collected at a flow rate between 100 and 500 mL/min and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 ft.
- The pumping rate used to collect a sample for VOCs should not exceed 100 mL/min. Samples should be transferred directly to the final container of 40-mL glass vials completely full and topped with a Teflon™ cap. Once capped, the vial must be inverted and tapped to check for headspace/air presence (bubbles). If air is present, the sample will be discarded, and recollected until free of air.
- All samples must be labeled with:
  - A unique sample number
  - Date and time
  - Parameters to be analyzed
  - Project Reference ID
  - Sampler's initials
- Labels should be written in indelible ink and secured to the bottle with clear tape.

Equipment/Materials:

- pH meter, conductivity meter, DO meter, ORP meter, nephelometer, temperature gauge
- Field filtration units (if required)
- Purging/sampling equipment
  - Peristaltic Pump
- Water level probe
- Sampling materials (containers, log book/forms, coolers, chain of custody)
- Work Plan
- HASP
- When sampling for PFAS, acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene.

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

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

Field Notes:

- Field notes must document all the events, equipment used, and measurements collected during the sampling activities. Section 2.0 describes the data/recording procedure for field activities.
- The log book should document the following for each well sampled:
  - Identification of well
  - Well depth
  - Static water level depth and measurement technique
  - Sounded well depth
  - Presence of immiscible layers and detection/collection method
  - Well yield – high or low
  - Purge volume and pumping rate
  - Time well purged
  - Measured field parameters
  - Purge/sampling device used
  - Well sampling sequence
  - Sampling appearance
  - Sample odors
  - Sample volume
  - Types of sample containers and sample identification
  - Preservative(s) used
  - Parameters requested for analysis
  - Field analysis data and method(s)
  - Sample distribution and transporter
  - Laboratory shipped to
  - Chain of custody number for shipment to laboratory
  - Field observations on sampling event
  - Name collector(s)
  - Climatic conditions including air temperature
  - Problems encountered and any deviations made from the established sampling protocol.

A standard log form for documentation and reporting groundwater purging and sampling events is presented on the Groundwater Field Sampling Form. Refer to Appendix A for example field forms.

Groundwater/Decon Fluid Disposal:

- Groundwater disposal methods will vary on a case-by-case basis but may range from:

  - Off-site treatment at private treatment/disposal facilities or public-owned treatment facilities;
  - On-site treatment at facility-operated treatment facilities; or
  - Direct discharge to the surrounding ground surface, allowing groundwater infiltration to the underlying subsurface regime.
- Decontamination fluids should be segregated and collected separately from wash waters/groundwater containers.

6.3 SUB-SLAB/SOIL VAPOR SAMPLING

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

6.3.1 Preparatory Requirements

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

6.3.2 Sampling Techniques

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

6.4 INDOOR AIR AND AMBIENT AIR SAMPLING

The following procedure is an introduction to indoor air and ambient air sampling techniques and an outline of field staff responsibilities.

6.4.1 Preparatory Requirements

Confirmatory PID readings will be recorded prior to sampling.

6.4.2 Sampling Techniques

Indoor and ambient air sampling will be conducted, as necessary, in general accordance with the applicable procedures described in the NYSDOH Vapor Intrusion Guidance Document. Samples will be collected in appropriately sized Summa canisters that have been certified clean by the laboratory and samples will be analyzed by using EPA Method TO-15. One eight-hour duration sample will be collected of indoor air and one of ambient air, as necessary. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, identity of samplers, sampling methods and devices, vacuum of canisters before and after the samples are collected, and chain of custody protocols.

6.5 SAMPLE HANDLING AND SHIPPING

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

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

The following sections provide the minimum standards for sample management.

6.5.1 Sample Handling

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

6.5.2 Sample Labeling

Samples must be properly labeled immediately upon collection.

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

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

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

All sample names will be as follows:

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

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

Examples of this naming convention are as follows:

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

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

6.5.3 Field Code

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

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

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

6.5.4 Packaging

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

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

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

6.5.5 Chain of Custody Records

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

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

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

- Chains of custody used should be a Haley & Aldrich of New York standard form or supplied by the analytical laboratory.
- Chains of custody must be completed in black ballpoint ink only.
- Chains of custody must be completed neatly using printed text.
- If a simple mistake is made, cross out the error with a single line and initial and date the correction.

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

6.5.6 Shipment

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

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

7. Field Instruments – Use and Calibration

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

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

7.1 GENERAL PROCEDURE DISCUSSION

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

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

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

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

7.2 DECONTAMINATION OF MONITORING EQUIPMENT

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

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

7.3 DISPOSAL OF WASH SOLUTIONS AND CONTAMINATED EQUIPMENT

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

Equipment/Materials:

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

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

8. Investigation Derived Waste Disposal

8.1 RATIONALE/ASSUMPTIONS

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

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

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

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

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

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

8.2 PROCEDURE

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

A.) Soil Cuttings - Soils removed from boring activities will be contained within an approved container, suitable for transportation and disposal.

  - Once placed into the approved container, any free liquids (i.e., groundwater) will be removed for disposal as waste fluids or solidified within the approved container using a solidification agent such as Speedy Dri (or equivalent).
  - Contained soils will be screened for the presence of VOCs, using a PID; this data will be logged for future reference.

- Once screened, full, and closed, the container will be labeled and placed into the container storage area. At a minimum, the following information will be shown on each container label: date of filling/generation, Site name, source of soils (i.e., borehole or well), and contact.
- Prior to container closure, representative samples from the containers will be collected for waste characterization purposes and submitted to the project laboratory.
- Typically, at a location where an undetermined Site-specific parameter group exists, sampling and analysis may consist of the full RCRA Waste Characterization (ignitability, corrosivity, reactivity, toxicity), or a subset of the above based upon data collected, historical information, and generator knowledge.

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

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

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

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

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

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

Equipment/Materials:

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

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APPENDIX A
Field Forms

HALEY ALDRICH

EQUIPMENT CALIBRATION LOG

Project: ______________________________

Location: ______________________________

Model Name: ______________________________

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

Cal. Standards: ______________________________

____

____

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

Date	Time	Calibration Satandard Solution	Calibration Result	Calibrated by

Other Comments: ______________________________

Groundwater Field Sampling Form

Location:

Job Number: ______________________

Well ID: ______________________

Field Sampling Crew: ____________

Date: ______________________

Start Time: ______________________

Finished Time: ______________________

Initial Depth to Water: ______________________

Well Depth: ______________________

Depth to top of screen: ______________________

Depth to bottom of screen: ______________________

Depth of Pump Intake: ______________________

Purging Device:________________

Tubing present in well? __________

Tubing type: __________________

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

Comments:

SAMPLE IDENTIFICATION KEY

PROJECT

LOCATION

CLIENT

CONTRACTOR

H&A FILE NO.

PROJECT MGR.

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

Notes:

Common Sample Type Codes:

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

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

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DAILY FIELD REPORT

Page of

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

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

Distribution:

Haley & Aldrich, Inc.

HALEY ALDRICH

SOIL BORING LOG

BORING NO.
Page 1 of

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

Elevation ft.	Datum		Boring Location				
Item	Casing	Sampler	Rig Make & Model			Surface Conditions	Drilling Notes
Type			Completion Depth (ft.)		Drilling Method		
Inside Diameter (in.)							
Hammer Weight (lb.)			Number of Samples				
Hammer Fall (in.)							

Depth (ft.)	Recovery (in/tot)	PID (ppm)	Description Depth (ft.)	Visual-Manual Identification & Description (Color, primary component NAME, secondary component, optional descriptions, odor, moisture [SYMBOL])	**Remarks** (Sample Information, Depth of Casing, Other Tests, Fill Interval, etc.)
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

Water Level Data				Well Construction Information			Summary
Date	Time	Elapsed Time (hr.)	Depth in feet to: Water	Type	Depth	Notes	Overburden (Linear ft.) Rock Cored (Linear ft.) Number of Samples
							BORING NO.

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

NOTE: Soil descriptions based on a modified Burmister method of visual-manual identification as practiced by Haley & Aldrich, Inc.

Form #3000

APPENDIX D
Quality Assurance Project Plan

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QUALITY ASSURANCE PROJECT PLAN
515-519 WEST 43RD STREET REDEVELOPMENT SITE
515-519 WEST 43RD STREET AND 514-518 WEST 44TH STREET
NEW YORK, NEW YORK

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

for
BH Group 43 LLC
Brooklyn, New York

File No. 0211280
December 2024

Executive Summary

This Quality Assurance Project Plan outlines the scope of the quality assurance and quality control activities associated with the site monitoring activities associated with the Remedial Investigation Work Plan for 515-519 West 43rd Street and 514-518 West 44th Street in New York, New York (Site).

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

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1. Project Description

This Quality Assurance Project Plan (QAPP) has been prepared as a component of the Remedial Investigation Work Plan (RIWP) for the property located at 515-519 W 43rd Street and 514-518 West 44th Street in New York, New York (Site).

1.1 PROJECT OBJECTIVES

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

1.2 SITE DESCRIPTION AND HISTORY

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

1.3 LABORATORY PARAMETERS

The laboratory parameters for soil include:

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

The laboratory parameters for groundwater include:

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

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

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

The analytical laboratory parameters for soil vapor samples include:

- VOCs using EPA Method TO-15

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

1.4 SAMPLING LOCATIONS

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

2. Project Organization and Responsibilities

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

2.1 PROJECT TEAM

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

NYSDEC Case Manager	To be Determined
NYSDOH Case Manager	To be Determined
Project Manager/Qualified Environmental Professional (QEP)	James Bellew
Haley & Aldrich of New York* Health & Safety Director	Brian Fitzpatrick, CHMM
Health and Safety Officer (HSO)	Brian Ferguson
Quality Assurance Officer	Nicole Mooney
Third-Party Validator	Katherine Miller

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

2.2 MANAGEMENT RESPONSIBILITIES

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

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

2.3 QUALITY ASSURANCE RESPONSIBILITIES

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

2.3.1 Quality Assurance Officer

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

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

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

2.3.2 Data Validation Staff

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

2.4 LABORATORY RESPONSIBILITIES

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

2.4.1 Laboratory Project Manager

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

2.4.2 Laboratory Operations Manager

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

2.4.3 Laboratory QA Officer

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

2.4.4 Laboratory Sample Custodian

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

- Receiving and inspecting the incoming sample containers;
- Recording the condition of the incoming sample containers;
- Signing appropriate documents;
- Verifying chain-of-custody and its correctness;
- Notifying the Project Manager and Operations Manager of sample receipt and inspection;
- Assigning a unique identification number and entering each into the sample receiving log;
- Initiating transfer of samples to laboratory analytical sections; and,
- Controlling and monitoring access/storage of samples and extracts.

2.4.5 Laboratory Technical Personnel

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

2.5 FIELD RESPONSIBILITIES

2.5.1 Field Coordinator

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

Other responsibilities include the following:

- Developing and implementing field-related work plans, ensuring schedule compliance, and adhering to management-developed project requirements;
- Coordinating and managing field staff;
- Performing field system audits;
- Overseeing QC for technical data provided by the field staff;
- Preparing and approving text and graphics required for field team efforts;
- Coordinating and overseeing technical efforts of subcontractors assisting the field team;
- Identifying problems in the field, resolving difficulties in consultation with the Project QA Officer and Project Manager, implementing and documenting corrective action procedures; and,
- Participating in the preparation of the final reports.

2.5.2 Field Team Personnel

Field Team Personnel will be responsible for the following:

- Performing field activities as detailed in the RIWP and in compliance with the Field Sampling Plan (FSP) and QAPP.
- Immediately reporting any accidents and/or unsafe conditions to the Site HSO and taking reasonable precautions to prevent injury.

3. Sampling Procedures

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

3.1 SAMPLE CONTAINERS

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

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

3.2 SAMPLE LABELING

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

Refer to the FSP for the sample labeling procedures.

3.3 FIELD QC SAMPLE COLLECTION

3.3.1 Field Duplicate Sample Collection

3.3.1.1 Water Samples

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

1. The samples are properly labeled as specified in Section 3.2.
2. Steps 1 through 4 are repeated for the bottles for each analysis. The samples are collected in order of decreasing analyte volatility as detailed in Section 3.3.1.
3. Chain-of-custody documents are executed.
4. The samples will be handled as specified in Table I.

3.3.1.2 Soil Samples

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

1. Soils will be sampled directly from acetate liners.

2. Soil for VOC analysis will be removed from the sampling device as specified in the FSP.
3. Soil for non-VOC analysis will be removed from the sampling device and collected into clean laboratory-provided containers.

3.4 GENERAL DECONTAMINATION PROCEDURES

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

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

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

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

4. Custody Procedures

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

A sample is under custody if:

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

4.1 FIELD CUSTODY PROCEDURES

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

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

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

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

- Detailed description of sample location;
- Equipment used to collect the sample or make the measurement and the date equipment was calibrated;
- Time sample was collected;
- Description of the sample conditions;
- Depth sample was collected (if applicable);
- Volume and number of containers filled with the sample; and,
- Sampler’s identification.

4.1.1 Field Procedures

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

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

4.1.2 Transfer of Custody and Shipment Procedures

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

4.2 LABORATORY CHAIN-OF-CUSTODY PROCEDURES

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

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

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

4.3 STORAGE OF SAMPLES

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

4.4 FINAL PROJECT FILES CUSTODY PROCEDURES

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

The final project file will include the following:

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

- A final report.

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

5. Calibration Procedures and Frequency

5.1 FIELD INSTRUMENT CALIBRATION PROCEDURES

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

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

5.2 LABORATORY INSTRUMENT CALIBRATION PROCEDURES

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

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

6. Analytical Procedures

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

6.1 FIELD ANALYTICAL PROCEDURES

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

6.2 LABORATORY ANALYTICAL PROCEDURES

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

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

6.2.1 List of Project Target Compounds and Laboratory Detection Limits

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

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

6.2.2 List of Method-Specific Quality Control Criteria

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

7. Internal Quality Control Checks

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

7.1 FIELD QUALITY CONTROL

7.1.1 Field Blanks

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

7.1.2 Trip Blanks

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

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

7.2 LABORATORY PROCEDURES

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

7.2.1 Field Duplicate Samples

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

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

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

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

7.2.2 Matrix Spike Samples

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

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

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

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

7.2.3 Laboratory Control Sample Analyses

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

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

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

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

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

7.2.4 Surrogate Compound/Internal Standard Recoveries

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

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

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

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

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

7.2.5 Calibration Verification Standards

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

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

7.2.6 Laboratory Method Blank Analyses

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

8. Data Quality Objectives

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

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

8.1 PRECISION

8.1.1 Definition

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

8.1.2 Field Precision Sample Objectives

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

8.1.3 Laboratory Precision Sample Objectives

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

8.2 ACCURACY

8.2.1 Definition

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

8.2.2 Field Accuracy Objectives

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

If non-dedicated sampling equipment is used, equipment rinse blanks will be collected by passing ASTM Type II water over and/or through the respective sampling equipment utilized during each sampling effort. One equipment rinse blank will be collected for each type of non-dedicated sampling equipment used for the sampling effort. Equipment rinse blanks will be analyzed for each target parameter for the respective sampling effort for which environmental media have been collected. (Note: If dedicated or disposable sampling equipment is used, equipment rinse samples will not be collected as part of that field effort.)

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

8.3 LABORATORY ACCURACY OBJECTIVES

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

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

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

8.4 REPRESENTATIVENESS

8.4.1 Definition

Representativeness expresses the degree to which sample data represent a characteristic of a population, a parameter variation at a sampling point, or an environmental condition.

Representativeness is a qualitative parameter that is dependent upon the design of the sampling program. The representativeness criterion is satisfied through the proper selection of sampling locations, the quantity of samples, and the use of appropriate procedures to collect and analyze the samples.

8.4.2 Measures to Ensure Representativeness of Field Data

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

8.5 COMPLETENESS

8.5.1 Definition

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

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

8.5.2 Field Completeness Objectives

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

8.5.3 Laboratory Completeness Objectives

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

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

8.6 COMPARABILITY

8.6.1 Definition

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

8.6.2 Measures to Ensure Comparability of Laboratory Data

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

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

8.7 LEVEL OF QUALITY CONTROL EFFORT

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

If necessary, a separate equipment rinse blank sample will be collected for PFAS. (Note: If dedicated or disposable sampling equipment is used, equipment rinse samples will not be collected as part of that field effort.)

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

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

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

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

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

9. Data Reduction, Validation and Reporting

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

9.1 DATA REDUCTION

9.1.1 Field Data Reduction Procedures

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

9.1.2 Laboratory Data Reduction Procedures

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

9.1.3 Quality Control Data

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

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

9.2 DATA VALIDATION

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

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

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

9.3 DATA REPORTING

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

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

10. Performance and System Audits

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

10.1 FIELD PERFORMANCE AND SYSTEM AUDITS

10.1.1 Internal Field Audit Responsibilities

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

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

10.1.2 External Field Audit Responsibilities

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

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

10.2 LABORATORY PERFORMANCE AND SYSTEM AUDITS

10.2.1 Internal Laboratory Audit Responsibilities

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

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

10.2.2 External Laboratory Audit Responsibilities

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

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

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

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

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

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

11. Preventive Maintenance

11.1 FIELD INSTRUMENT PREVENTIVE MAINTENANCE

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

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

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

11.2 LABORATORY INSTRUMENT PREVENTIVE MAINTENANCE

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

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

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

12.1 FIELD MEASUREMENTS

Field-generated information will be reviewed by the Field Coordinator and typically includes evaluation of bound logbooks/forms, data entry, and calculation checks. Field data will be assessed by the Project Coordinator who will review the field results for compliance with the established QC criteria that are specified in Sections 7.0 and 8.0 of this QAPP. The accuracy of pH and specific conductance will be assessed using daily instrument calibration, calibration checks, and blank data. Accuracy will be measured by determining the percent recovery (% R) of calibration check standards. The precision of the pH and specific conductance measurements will be assessed on the basis of the reproducibility of duplicate readings of a field sample and will be measured by determining the RPD. The accuracy and precision of the soil VOC screening will be determined using duplicate readings of calibration checks. Field data completeness will be calculated using the following equation:

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

12.2 LABORATORY DATA

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

13. Quality Assurance Reports

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

QA reports to management can include:

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

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

References

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

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

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

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

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

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

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

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

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

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

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TABLE

TABLE I
SUMMARY OF ANALYSIS METHOD, PRESERVATION METHOD, HOLDING TIME, SAMPLE SIZE REQUIREMENTS AND SAMPLE CONTAINERS
515-519 WEST 43RD STREET AND 514-518 WEST 44TH STREET
NEW YORK, NEW YORK

Analysis/Method[3]	Sample Type	Preservation	Holding Time	Volume/Weight	Container[4]
Volatile Organic Compounds/8260D	Soil	1 - 1 Vial MeOH/2 Vial Water, Cool, 4 ± 2 °C	14 days[1]	120 mL	3 - 40ml glass vials
Semivolatile Organic Compounds/8270E	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 8 oz Glass
TAL Metals/6010D	Soil	Cool, 4 ± 2 °C	180 days	60 mL	1 - 4 oz Glass
Pesticides/8081B	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 4 oz Glass
Polychlorinated Biphenyls/8082A	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 4 oz Glass
PFAS/1633	Soil	Cool, 4 ± 2 °C	28 days extraction / 40 days analysis	To be determined by laboratory	1 - HDPE container
1,4-Dioxane/8270E	Soil	Cool, 4 ± 2 °C	14 days extraction / 40 days analysis	250 mL	1 - 8 oz Glass
Volatile Organic Compounds/8260C	Groundwater	HCl, Cool, 4 ± 2 °C	14 days	120 mL	3 - 40 mL glass vials
Semivolatile Organic Compounds/8270E	Groundwater	Cool, 4 ± 2 °C	7 days extraction / 40 days analysis	500 mL	2 - 250 mL amber glass
Total Metals/6020	Groundwater	HNO_3Cool, 4 ± 2 °C	180 days	500 mL	1 - 500 mL plastic bottle
Dissolved Metals/6020	Groundwater	HNO_3Cool, 4 ± 2 °C	180 days	500 mL	1 - 500 mL plastic bottle
Pesticides/8081B	Groundwater	Cool, 4 ± 2 °C	7 days extraction / 40 days analysis	1000 mL	2 - 500 mL amber glass
Polychlorinated Biphenyls/8082A	Groundwater	Cool, 4 ± 2 °C	7 days extraction / 40 days analysis	2000 mL	2 - 1000 mL amber glass
PFAS/1633	Groundwater	H2O Cool, 4 ± 2 °C	28 days extraction / 28 days analysis	To be determined by laboratory	2 - HDPE container
1,4-Dioxane/8270E-SIM	Groundwater	Cool, 4 ± 2 °C	7 days extraction / 40 days analysis	500 mL	1 - 500 mL plastic bottle
Volatile Organic Compounds/TO-15	Soil Vapor	N/A	30 days	2.7 - 6 L	1 - 2.7 L Summa Canister

Notes:
1. Terracores and encores must be frozen within 48 hours of collection
2. Refer to text for additional information.
3. Equivalent method can be used.
4. Volume may vary by laboratory and/or equivalent method.
5. The anticipated number of samples to be collected per media is provided in RIWP Table 1.

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

ATTACHMENT A
Project Team Resumes

JAMES BELLEW

Principal

EDUCATION

M.S., Environmental Geology, Queens College
B.S., Geology, Pre-Law, Environmental Science, Binghamton University

PROFESSIONAL SOCIETIES

American Council of Engineering Companies, Member, 2017
Urban Land Institute, Member, 2016
Business Council of New York, Member, 2018

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120)
30-Hour OSHA Construction Safety and Heath
8-hour OSHA Site Supervisor Certification
OSHA Confined Space Entry Training Certification
Erosion and Sediment Control, New York, No. 006925
USDOT/IATA Training on the Shipping and/or Transportation of Hazardous Materials

James has a hands-on approach to every project. He believes that being present and putting himself into his clients' shoes is the best way to understand their needs. As a Principal, James's expertise includes due diligence, environmental risk development, building surveys, remedial investigations, remedial design, and technical oversight. Mr. Bellew has completed over 50 NYCOER E-Designation Sites and NYSDEC Brownfield Cleanup Program Sites which include preparation of all reports through to the certificate of completion and a certificate of occupancy.

Clients appreciate James' strategies from the inception of a project through closure under various regulatory programs nationwide. That comprehensive approach is what James loves the most about his job. He enjoys taking on complex projects and finding rational, cost-effective, remedial solutions. His biggest reward? When he can bring a client cost relief through value engineering.

RELEVANT PROJECT EXPERIENCE

Development, NYCDDC Shirley Chisholm Recreational Center, Brooklyn, New York. Principal for the project released by the New York City Department of Design and Construction, on behalf of the NYC Parks Department, for the design and construction of a new recreational center located at 3002 Foster Avenue in Brooklyn New York. Scope of services included execution of a Phase II Environmental Site Assessment, soil characterization, remedial oversight, geotechnical percolation testing and closure with the NYC Department of Environmental Protection.

Development's, New York State Superfund Site, Former NuHart Plastics Site, New York State Superfund Site (NuHart West) and Brownfield Cleanup Program Site (NuHart East), Brooklyn, New York. Principal for the preparation of the feasibility study, offsite investigation reports, RCRA (Resource Conservation and Recovery Act) Closure Work Plan, execution of the RCRA Closure, preparation of the Brownfield Cleanup Application (NuHart East), 100% Remedial Design, preparation of all BCP related work plans (NuHart East), coordination to vest the Site for 421-a and all community outreach programs for a former plasticizer facility with on- and off-site pollutant concerns. Responsible for all remedial cost and alternative analysis with the client to bring the Site to a certificate of completion. NuHart is a high-profile Site that requires coordination with the New York State Department of Environmental Conservation (NYSDEC), the New York City Office of Environmental Remediation (NYCOER), local regulatory agencies, community stakeholders and local elected officials. The NuHart East Site has completed the remediation and received the Certificate of Completion with the NYSDEC and the NuHart West Site is close to completion with an anticipated 2024 transition from a Class 2 to a Class 4 Inactive Hazardous waste Site.

Development's, 101 Fleet Place, Brooklyn, New York. Principal responsible for the due diligence during acquisition, preparation of the Brownfield Cleanup Program Application, Change of Use Documents, BCA Amendments, remedial investigation, and remedial action design (BCP and OER) for a former bus depot Site under the New York State Brownfield Cleanup program and NYCOER E-Designation Programs (Air/Noise). The Site has a footprint of 20,000 SF with a planned development of a 21-story mixed use building with approximately 292 units which include affordable housing.

Development's, Speedway Portfolio, Multiple Boroughs, New York. Principal responsible for the expedited due diligence during acquisition of 5 former Speedway Sites of Phase I ESA's and Limited Phase II ESI's, preparation of the Brownfield Cleanup Program Applications, Remedial Investigation Work Plans, Interim Remedial Measure Work Plans and Air/Noise Remedial Action Work Plans (NYCOER). Five of the Sites were accepted into the NYSDEC Brownfield Cleanup program. Remedial Investigations for compliance with the Brownfield Cleanup Program have been completed and the remedial design on the Sites include a variety of remedial approaches which include in situ chemical treatment for groundwater, soil vapor extraction, excavation and dewatering removal and treatment.

Development, 138 Bruckner Boulevard, Bronx, New York. Principal responsible for the due diligence during acquisition, preparation of the Brownfield Cleanup Program Application, Change of Use Documents, coordination to vest the Site for 421-a, BCA Amendments, remedial investigation, and remedial action design (BCP and OER) for the former Zaro's Bakery Site under the New York State Brownfield Cleanup program and NYCOER E-Designation Programs (Air/Noise). The Site has a footprint of 50,000 SF with a planned development of a 12-story mixed use building with approximately 447 units which include affordable housing.

Development, 310 Grand Concourse, Bronx, New York. Principal responsible for environmental and construction management services required to successfully navigate this two-building redevelopment project through the NYSDEC Brownfield Cleanup Program (BCP) and NYCOER E-Designation Program (Air/Noise). Project included site investigation, design, and remediation for development of two buildings within a 30,000 square-foot lot in the Bronx, New York. Remediation included excavation of approximately 20,000 cubic yards of soil, groundwater extraction and treatment, underground storage tank (UST) removal, design, and installation an ex-situ chemical in situ soil stabilization process for elevated levels of metals.

Development, 40 Bruckner Boulevard, Bronx, New York. Principal responsible for the due diligence during acquisition, preparation of the Brownfield Cleanup Program Application, Change of Use Documents, BCA Amendments, remedial investigation, and remedial action design (BCP and OER) for the former Mill Sanitary Wiping Cloth Site under the New York State Brownfield Cleanup program and NYCOER E-Designation Programs (Air/Noise). The Site has a footprint of 45,000 SF with a planned development of a 12-story mixed use building with approximately 480 units which include affordable housing.

Development, 297 Wallabout Street, Brooklyn New York. Principal responsible for the due diligence during acquisition, preparation of the Brownfield Cleanup Program Application, Change of Use Documents, BCA Amendments, remedial investigation, and remedial action design (BCP and OER) for the 297 Wallabout Street Site under the New York State Brownfield Cleanup program and NYCOER E-Designation Programs (Air). Successfully delineated the onsite tetrachloroethene (PCE) plume in soil and groundwater. The Site is currently in the remedial implementation phase.

Developments, 89-91 Gerry & 93 Gerry Street, Brooklyn New York. Principal responsible for the due diligence during acquisition, preparation of the Brownfield Cleanup Program Application, Change of Use Documents, BCA Amendments, remedial investigation, and remedial action design (BCP and OER) for two Sites (adjacent to each other) located at 89-91 Gerry Street and 93 Gerry Street under the New York State Brownfield Cleanup program and NYCOER E-Designation Programs (Air). The Sites are currently preparing to execute the remedial action.

Development, Former Techtronics Site (8 Walworth Street), Brooklyn, New York. Principal for the remedial investigation, remedial action design and remedial action implementation for the former Techtronics Site under the New York State Brownfield Cleanup program as a Participant where trichloroethene (TCE) and tetrachloroethene (PCE) were encountered in soil and groundwater. James successfully delineated the vertical and lateral extents of the plumes which were identified as an upgradient, on-site. For this Site we have designed source removal to 20'bgs, Zero Valent Iron (ZVI) Reactive Barrier Wall, in situ ZVI injections sitewide and a vertical vapor mitigation system. The Site is currently in the remedial implementation phase.

Development, 346 Grand Concourse, Bronx, New York. Principal for the proposed 9-story, 60 key commercial building with one-level deep cellar. Design phase environmental services consist of guiding the Site through the New York City Office of Environmental of Remediation Voluntary Cleanup and E-Designation Programs, including Hazmat, Air Quality and Noise requirements. This program included submission of a Remedial Investigation Work Plan, implementation of a Remedial Investigation, submittal of a Remedial Investigation Report, Remedial Action Work Plans (Hazmat Air and Noise) and the Final Installation Report for the Certificate of Occupancy.

Development, 3294 Atlantic Avenue, Brooklyn, New York. Principal for the proposed 12-story, 80 key commercial building with one-level deep cellar. Design phase environmental services consist of guiding the Site through the New York City Office of Environmental of Remediation Voluntary Cleanup and E-Designation Programs, including Hazmat, Air Quality and Noise requirements. This program included submission of a Remedial Investigation Work Plan, implementation of a Remedial Investigation, submittal of a Remedial Investigation Report, Remedial Action Work Plans (Hazmat Air and Noise) and the Final Installation Report for the Certificate of Occupancy.

590-594 Myrtle Avenue, Brooklyn, New York. Principal for the proposed 6-story, 12-unit residential building with one-level deep cellar. Design phase environmental services consist of guiding the Site through the New York City Office of Environmental of Remediation Voluntary Cleanup and E-Designation Programs, including Hazmat, Air Quality and Noise requirements. This program included submission of a Remedial Investigation Work Plan, implementation of a Remedial Investigation, submittal of a Remedial Investigation Report, Remedial Action Work Plans (Hazmat Air and Noise) and the Final Installation Report for the Certificate of Occupancy.

Development, 3530 Webster Avenue, Bronx, New York. Principal for the proposed 8-story, 75 key commercial building with one-level deep cellar. Design phase environmental services consist of guiding the Site through the New York City Office of Environmental of Remediation Voluntary Cleanup and E-Designation Programs, including Hazmat, Air Quality and Noise requirements. This program included submission of a Remedial Investigation Work Plan, implementation of a Remedial Investigation, submittal of a Remedial Investigation Report, Remedial Action Work Plans (Hazmat Air and Noise). The project is currently in the construction phase of the NYCOER program.

Development, Former BP Station, Elmhurst Queens, New York. Principal for the preparation of a full environmental impact statement with respect to a mixed-use development proposed in Elmhurst Queens for submission to the NYC Department of City Planning to rezone the project. The work included a full impact assessment of the proposed construction with respect to the neighborhood, evaluation of green/open spaces for the community and environmental site investigation and remediation services.

New York State Brownfield Site, Former Delta Metals Site, Brooklyn, New York. Senior Project manager for the remedial investigation and remedial action design for the former Delta Metal Products Company. Project is under the New York State Brownfield Cleanup program as a Participant where TCE and tetrachloroethene (PCE) were encountered in soil and groundwater. James successfully delineated the vertical and lateral extents of the plumes which were identified as an upgradient, on-site and downgradient plume. Investigation results triggered the NYSDEC to utilize its call-out contract to perform a plume track down for the immediate area and identify additional Potentially Responsible Parties. The design for an Air Sparge Soil Vapor Extraction system has been accepted and the project is currently under construction.

Manufacturing-Industrial, Hess Amerada, Bogota and Edgewater, New Jersey. Senior Project Manager and technical Lead for the construction management services for the demolition of two waterfront terminals on the Hackensack and Hudson rivers. Services included demolition design, submittal review, site execution and coordination of activities related to asbestos abatement, demolition of buildings, thirty holding tanks, piping structures, containment structures and storm water structures.

Manufacturing-Industrial, PQ Corporation, Northeastern United States. Senior Project Manager responsible for the design and implementation of a three phased program for handling polychlorinated biphenyl (PCB) containing materials on approximately 100 tank structures at large, active industrial sites, which included coating removal, encapsulation, demolition, and Toxic Substances Control Act (TSCA) remediation. He was responsible for development of the overall program, specifications, drawings, bid packages, construction oversight and project administration until closure. The program also included design and oversight of a new façade and roof upgrades completed concurrently to client operations.

Development, New York State Brownfield Site, Former Cascade Laundry, Brooklyn, New York. Senior Project Manager responsible for environmental and construction management services required to successfully navigate a seven-building redevelopment project through the NYSDEC Brownfield Cleanup Program (BCP) and NYCOER E-Designation Program (Air/Noise). Project included site investigation, design, and remediation for development of seven buildings within a 2-acre site in Brooklyn, New York. Remediation included excavation of approximately 40,000 cubic yards of soil, groundwater extraction and treatment, underground storage tank (UST) removal, design, and installation of a sub slab depressurization system (SSDS) and ex situ chemical oxidation of groundwater impacted by petroleum.

Development, New York City Brownfield Site - 520-534 West 29th Street, New York, New York. James was responsible for environmental site investigation and remediation activities required to successfully navigate the project through the NYCOER's E-Designation and Voluntary Cleanup Programs. This program included submission of a Remedial Investigation Work Plan, implementation of a Remedial Investigation, submittal of a Remedial Investigation Report, Remedial Action Work Plans (Hazmat Air and Noise). The project is currently in the construction phase of the NYCOER program.

Development, New York State Brownfield Site, BJ's Wholesale, Brooklyn, New York. Senior Project Manager for the remedial execution within the NYSDEC BCP and NYCOER E-Designation programs at an 8-acre peninsula in Gravesend Bay being redeveloped by BJ's Wholesale Club (BJ's) into a "big-box" warehouse and parking garage, and a publicly accessible, waterfront open space. He implemented a comprehensive community air monitoring plan (CAMP), managed the design and installation of a passive sub slab depressurization system, and oversaw handling and off-site disposal of impacted material generated by BJ's (the Lessee for the subject site) during their foundation construction activities.

Development, New York State Brownfield Site, Coney Island, Brooklyn, New York. Senior Project Manager responsible for the environmental design during the rehabilitation and expansion of a 1970s-era mixed-use complex, which covers an area equivalent to three city blocks. He facilitated the BCP applications for two adjacent parcels within the complex impacted by historic dry-cleaning uses. Site investigations performed had documented the presence of PCE in soil gas and was delineated over three separate structural slabs in commercial and residential space utilizing a mobile laboratory. He designed and installed two sub-slab depressurization systems and prepared Remedial Investigation Work Plan which outlined work required to delineate the vertical and horizontal extent of the impacted soils, soil vapor and groundwater at both BCP sites. The system was designed with below slab suction pits, remote sensing vacuum monitoring points, and a variable frequency drive blower tied into the monitoring points for optimization and power savings.

Development, New York City Brownfield Site, Hospitals, Memorial Sloan Kettering Cancer Center (MSKCC), New York, New York. Project Manager for environmental remediation for this MSKCC development project. James was solely responsible for subsurface investigation and remediation activities, large, manufactured gas plant (MGP) gas holder removal (from former Con Edison Operations), UST removal, daily status updates to the NYCOER, implementation of the CAMP and the management, handling, characterization, and off-site disposal of MGP impacted soil and dewatering fluids.

New York State Spill Remediation, Metropolitan Transportation Agency Bridges and Tunnels, New York, New York. Project Manager responsible for execution of a remedial action scope which included UST removal, excavation of 600 cubic yards of petroleum impacted soil, design and installation of a groundwater extraction and treatment system and post remediation samples. He implemented the In Situ Chemical Oxidation program for the injection of 54,000 gallons of 8 percent solution Fenton's Reagent and the O&M (Operation & Maintenance) of the petroleum spill with respect to Fenton's performance and the plume migration.

Various Public Schools, New York City School Construction Authority, New York, New York. Project Manager responsible for environmental remediation proposed several school developments sites, including PS 312, P.S. 281, and PS 27K. Assisted in the design and implementation of the remediation programs for the sites for petroleum spills, PCB TSCA contamination and hazardous lead hot spots.

Development, i.Park Edgewater, Edgewater, New Jersey. Project Manager responsible for the design and environmental remediation on-site. Implemented the construction plan for remediation of arsenic, pitch- and PCB-impacted soil for excavation and off-site disposal of 20,000 tons. He managed the air monitoring system on-site which consisted of four permanent stations set upwind and downwind on-site for volatile organic compounds (VOCs) and particulate migration off-site. Also, James performed redesigns throughout the project to keep within the current schedule and budget.

Development, New York State Brownfield, Queens West, Long Island City, New York. Project Manager responsible for oversight of the Environmental Remediation on-site. James implemented the construction plan for remediation of 20,000 cubic yards of LNAPL on the Site; he assisted in design and oversight of the In Situ Chemical Oxidation mixing on-site. The project was eventually developed into three large towers and a new school.

Manufactured Gas Plant, National Grid, Rockaway, New York. James aided in the design and implementation of the soil characterization plan for MGP impacted sands. After delineation of the contamination plume, drafted work plans and site layout of the negative pressure tent. He performed and trained the on-site staff on the use of personal air monitoring equipment and aided with design considerations on the installation of a waterloo barrier to be advanced to minus 80 feet below grade surface. James also helped with the design and permitting for the groundwater treatment system installed on-site.

Manufactured Gas Plant, Con Edison, New York, New York. Environmental engineer for responsible party for all environmental issues associated with this job, including transportation and disposal of 8,000 tons of MGP contaminated soil from former Con Edison operations. James scheduled weekly work for all civil and environmental tasks on the job. He was responsible for the design and installation of the dewatering treatment system with a daily discharge of 25,000 gallons per day of MGP -impacted water.

New York State Superfund Project, NYSDEC, Hicksville, New York. James performed O&M and reporting on the Site's Potassium Permanganate Injection system, which was on a timed system; maintained the system, troubleshooting problems and ensuring that the proper ratios were being injected. He performed the fieldwork for analysis and drafted interim reports for the project manager.

Retail Petroleum, New York State Spills Program, Hess Amerada, Various Locations, New York. Environmental Engineer responsible for the design and installation of groundwater and soil vapor remedial systems at over 30 retail petroleum stations for Hess. Responsible for ensuring that the remedial systems were operating properly and performing repairs as necessary during operation. He performed groundwater and soil vapor monitoring and drafted O&M reports for the NYSDEC. Plume size ranged from within the retail station property with monitoring off-site impacts in local neighborhoods greater than a 3-mile radius.

Retail Petroleum, New York State Spills Program, British Petroleum (BP), Various Locations, New York. Environmental Engineer responsible for the design and installation of groundwater and soil vapor remedial systems at over 10 retail petroleum stations for BP. He was responsible for ensuring that the remedial systems were operating properly and performing repairs necessary during operation. He performed groundwater and soil vapor monitoring and drafted O&M reports for the NYSDEC. Plume size ranged from within the retail station property with monitoring off-site impacts in local neighborhoods greater than a 2-mile radius.

Development, 524 West 19th Street, New York, NY (Metal Shutter Homes). Project Engineer responsible party for all environmental and civil issues associated with this job, including transportation and disposal of 5,000 tons of MGP contaminated soil from former Con Edison operations. James scheduled weekly work for all civil and environmental tasks on the job. He successfully redesigned the grout cutoff wall connections to the installed steel sheeting with a secant wall installed off-site. He provided technical guidance for drilling 4-foot diameter exploratory casings for subsurface anomalies. Additionally, James was responsible for the design and installation of the dewatering treatment system with a daily discharge of 25,000 gallons per day of MGP impacted water.

EPA Superfund Site, Newtown Creek Superfund, Brooklyn, New York. Environmental Engineer who aided in the design of the pump and treat system installed at Peerless Importers. He also aided in the design and installation of the harbor boom set up. Operated and Maintained groundwater/LNAPL extraction systems on-site and performed monthly site gauging as part of the O&M plan.

BRIAN FITZPATRICK, CHMM

Corporate Director, Health and Safety

EDUCATION

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

CERTIFICATIONS

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

PROFESSIONAL SOCIETIES

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

SPECIAL STUDIES AND COURSES

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

AWARDS

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

Brian ensures the work we do for our clients is done safely – knowing this reduces costs, improves service quality and site conditions, and ultimately protects our clients' reputations. In addition to building the Haley & Aldrich Health & Safety (H&S) culture, Brian is hands-on with clients to help improve their and their partners' safety cultures.

He has extensive expertise in the Occupational Safety and Health Administration (OSHA) general industry, process safety management, and construction safety programs. He is an active member of the Alliance of Hazardous Materials Professionals and the New England chapter of the Academy of Certified Hazardous Materials Managers.

Brian knows an organization's success is predicated on empowering its people to safely work within the complex, living processes in which they operate. He is a student of human factors in the workplace, of the phenomena of human error and drift into failure, and of the safety applications of Lean techniques.

RELEVANT PROJECT EXPERIENCE

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

- Developing a safety culture through incident reporting, root cause analysis, behavior-based safety, hazard recognition and risk assessment, communication, and developing leaders;

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

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

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

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

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

BRIAN A. FERGUSON

Senior Engineer | Health & Safety Manager

EDUCATION

MS, Geotechnical Engineering, Tufts University, Medford, Massachusetts
BS, Civil Engineering, State University of New York - Environmental, Science, and Forestry, Syracuse, New York
AS, Applied Science and Technology (Nuclear Engineering), Thomas A. Edison State College, Trenton, New Jersey

CERTIFICATIONS

BCSP Certified Safety Professional (#CSP-45145)
BCSP Associate Safety Professional (#ASP-31270)

PROFESSIONAL SOCIETIES

Associate Safety Professional – 2019
Order of the Engineer – 2000
Boston Society of Civil Engineers (BSCE)
American Society of Civil Engineers (ASCE)

SPECIAL STUDIES AND COURSES

American Concrete Institute – Certified Field Technician Certified Grade 1
Radiation Safety and Operations of Nuclear Testing Equipment – Troxler
40-Hour OSHA Hazardous Waste Operations Training (+ 8-Hour annual refresher)
10-Hour OSHA Construction training
Confined Space Entry Training
16-Hour Asbestos Operations and Maintenance
24-Hour Asbestos Inspector
Asbestos Inspector License (June 2018 and renewed Annually)

ENGINEERING EXPERIENCE

Brian has over 23 years of experience serving as a project engineer on a variety of real estate development projects. His project experience has included monitoring field investigations, performing construction oversight, performing due diligence, engineering analyses, performing geotechnical analyses, developing geotechnical recommendations, and preparing geotechnical reports, and project specifications.

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

RELEVANT PROJECT EXPERIENCE

Fenway Center. Project engineer for the construction of laboratory space constructed over the Massachusetts Turnpike, two residential towers, and the Fenway Area consisting of 8 to 14 stories and multiple levels below grade. Construction responsibilities included coordination of construction monitoring, observing Support of Excavation (SOE) and footing installation, coordination of installation of Slurry Walls, assisting with project management, reviewing weekly field construction reports, reviewing, and responding to geotechnical design submittals, and attending project meetings.

Massachusetts Institute of Technology, The Schwarzman College of Computing Project. Project Engineer for a new approximately eight stories above ground and one story below ground building and contains approximately 189,000 gross square feet (gsf) of mixed-use space for: offices, research laboratory, academic, event, collaboration, meetings, café, convening, and associated services. Responsibilities included coordination of construction monitoring, observing SOE, micropile, and Caisson Installation, assisting with project management, reviewing weekly field construction reports, reviewing, and responding to geotechnical design submittals, and attending project meetings. Brian also was the main point of contact for construction-related issues with the project owner and contractors.

Massachusetts Institute of Technology, Graduate Housing Project. Project Engineer for construction of two new five- to eight- story residential buildings with a total gross floor space of approximately 261,000 square feet (sq ft). Responsibilities included coordination of construction monitoring, observing SOE, micropile, and Caisson Installation, assisting with project management, reviewing weekly field construction reports, reviewing and responding to geotechnical design submittals, and attending project meetings. Brian was the main point of contact for construction-related issues with the project owner and contractors and conducted Health & Safety Audits of Haley & Aldrich personnel during construction.

Edwards Vacuum Project. Project Engineer for a new single-level 101,000-sq ft building with a mezzanine located in the south portion of the proposed building. Responsibilities included developing subsurface exploration program coordination, writing the Geotech Report, and coordinating field staff to observe construction activities, including mass excavation of approximately 100,000 cubic yards of soil, installation of spread footing, and construction dewatering. Brian assisted with project management, reviewing weekly field construction reports, reviewing, and responding to geotechnical design submittals, and attending project meetings. Brian was the main point of contact for construction-related issues with the project owner and contractors and conducted Health & Safety Audits of Haley & Aldrich personnel during construction.

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

HALEY ALDRICH

NICOLE MOONEY

Project Geologist

EDUCATION

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

SPECIAL STUDIES AND COURSES

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

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

RELEVANT PROJECT EXPERIENCE

Environmental Investigation, Site Characterization, and Remediation

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

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

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

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

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

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

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

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

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

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

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

HALEY ALDRICH

KATHERINE R. MILLER

Senior Project Manager

EDUCATION

BS, Chemistry, University of Arizona

SPECIAL STUDIES AND COURSES

40-Hour OSHA Hazardous Waste Operations and Emergency Response Training (29 CFR 1910.120 and 40 CFR 265.16)

8-Hour OSHA Refresher Training (29 CFR 1910.120)

Level IV Data Validation Training

AWARDS

Pinnacle Award, 2009

Pathfinder Award, 2014

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

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

RELEVANT PROJECT EXPERIENCE

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

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

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

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

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

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

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

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

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

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

APPENDIX E
NYSDEC Emerging Contaminant Field Sampling Guidance

New York State of Opportunity. Department of Environmental Conservation

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

Under NYSDEC's Part 375 Remedial Programs

April 2023

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NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

ERRATA SHEET for

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

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

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

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

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

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

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

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

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

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

Objective

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

Applicability

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

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

Field Sampling Procedures

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

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

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

Analysis and Reporting

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

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

Routine Analysis

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

Additional Analysis

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

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

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

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

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

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

Data Assessment and Application to Site Cleanup

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

Water Sample Results

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

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

Soil Sample Results

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

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

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

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

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

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

Testing for Imported Soil

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

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

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

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

General Guidelines in Accordance with DER-10

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

Specific Guidelines for PFAS

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

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

General

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

Laboratory Analysis and Containers

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

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix C - Sampling Protocols for PFAS in Monitoring Wells

General

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

Laboratory Analysis and Container

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

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

Equipment

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

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

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

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

Equipment Decontamination

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

Sampling Techniques

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

Appendix D - Sampling Protocols for PFAS in Surface Water

General

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

Laboratory Analysis and Container

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

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

Equipment

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

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

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

- stainless steel cup

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

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

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

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

General

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

Laboratory Analysis and Container

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

Equipment

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

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

Equipment Decontamination

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

Sampling Techniques

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

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

Sample Identification and Logging

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

Quality Assurance/Quality Control

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

Documentation

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

Personal Protection Equipment (PPE)

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

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

Appendix F - Sampling Protocols for PFAS in Fish

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

Procedure Name: General Fish Handling Procedures for Contaminant Analysis

Number: FW-005

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

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

Version: 8

Previous Version Date: 21 March 2018

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

Originator or Revised by: Wayne Richter, Jesse Becker

Date: 26 April 2019

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

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

GENERAL FISH HANDLING PROCEDURES FOR CONTAMINANT ANALYSES

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

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

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

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

B. The following data are required on <u>each</u> **Fish Collection Record** form:

1. Project and Site Name.

2. DEC Region.

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

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

5. Preservation Method.

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

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

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

3. Date collected.

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

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

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

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

D. General data collection recommendations:

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

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

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

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

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

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

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

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

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

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

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

General

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

Preservation and Holding Time

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

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

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

Initial Calibration

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

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

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

Continuing Calibration Verification

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

CCV recovery <70 or >130%	J flag results

Blanks

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

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

Field Duplicates

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

RPD >30%	Apply J qualifier to parent sample

Lab Control Spike

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

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

Matrix Spike/Matrix Spike Duplicate

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

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

Extracted Internal Standards (Isotope Dilution Analytes)

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

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

Signal to Noise Ratio

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

Reporting Limits

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

Peak Integrations

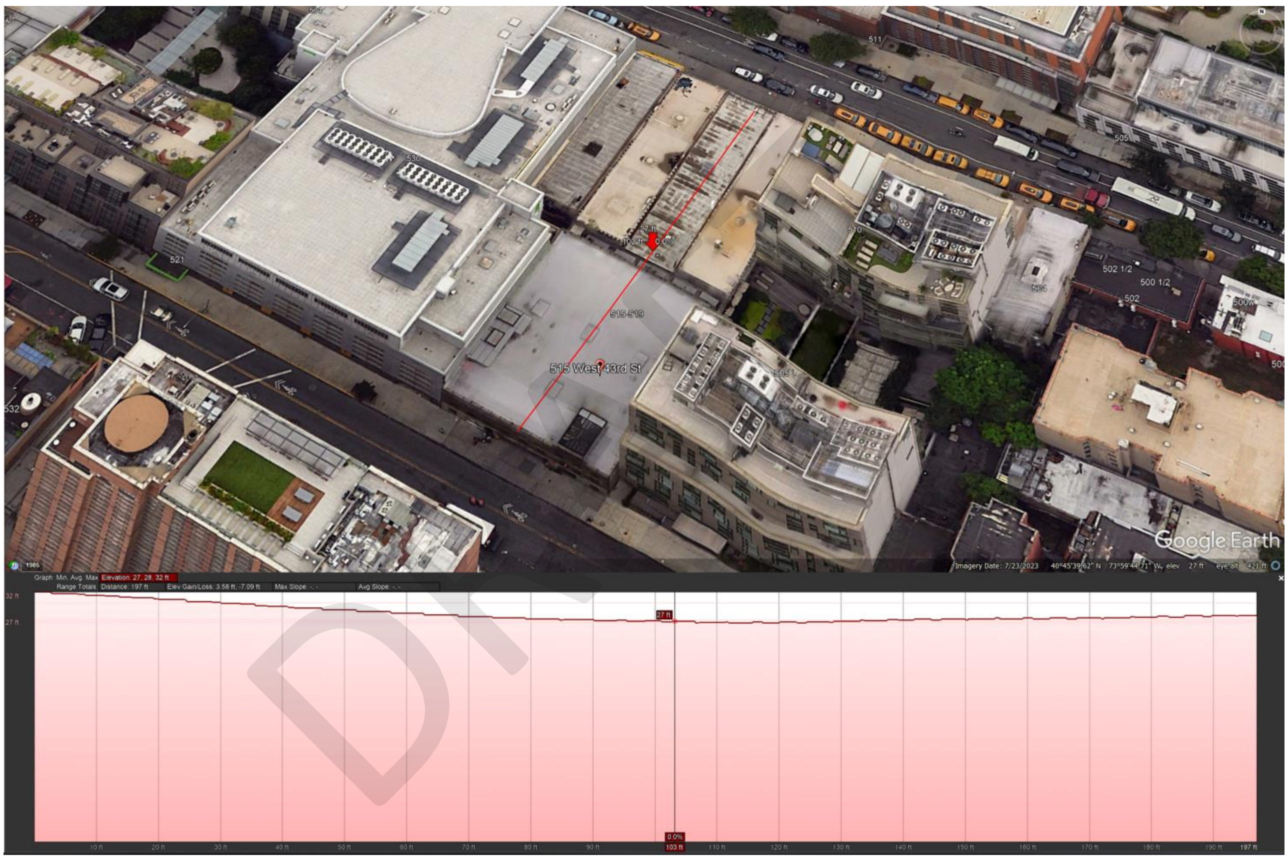
Target analyte peaks should be integrated properly and consistently when compared to standards. Ensure branched isomer peaks are included for PFAS where standards are available. Inconsistencies should be brought to the attention of the laboratory or identified in the data review summary report.

APPENDIX F
Climate Screening Checklist

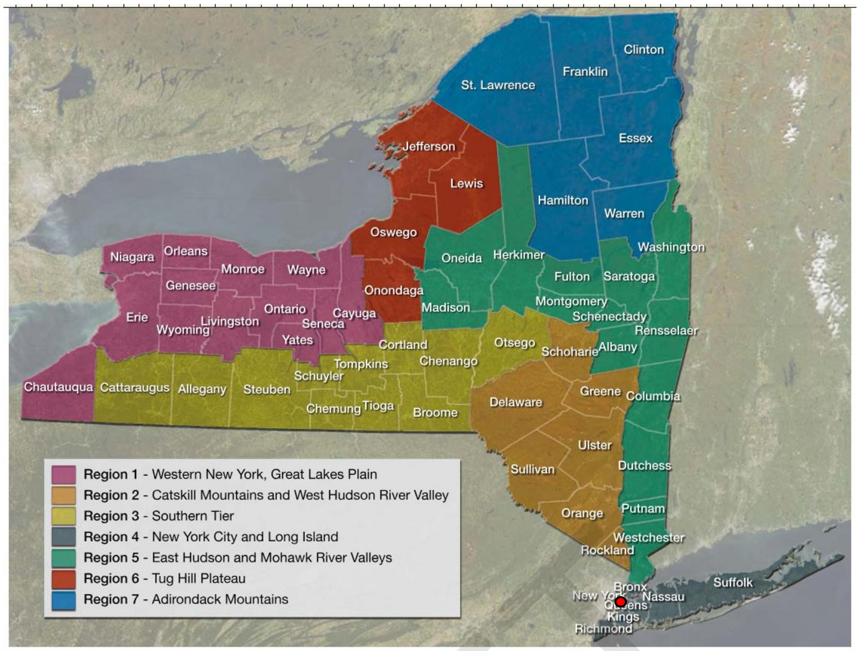
Climate Screening Checklist

Background Information

- Project Manager: Luke J. McCartney
- Site Name: 515-519 West 43rd Street Redevelopment Site (the "Site")
- Site Number: PENDING
- Site Location: 515-519 West 43rd Street and 514-518 West 44th Street, New York, New York
- Site Elevation (average above sea level): Approximately 27 feet above sea level (Google Earth)



- ClimAID Region ([Responding Climate Change in New York State (ClimAID) - NYSERDA](#)): Region 4 – New York City and Long Island



- Remedial Stage/Site Classification: Pending Brownfield Cleanup Program (BCP) acceptance
- Contamination - Media Impacted/ Contaminants of Concern: Soil, Groundwater, Soil Vapor
- Proposed/Current Remedy: Investigation/Design Phase
- What is the predicted timeframe of the remedy? Will components of the remedy still be in place in 10+ years?

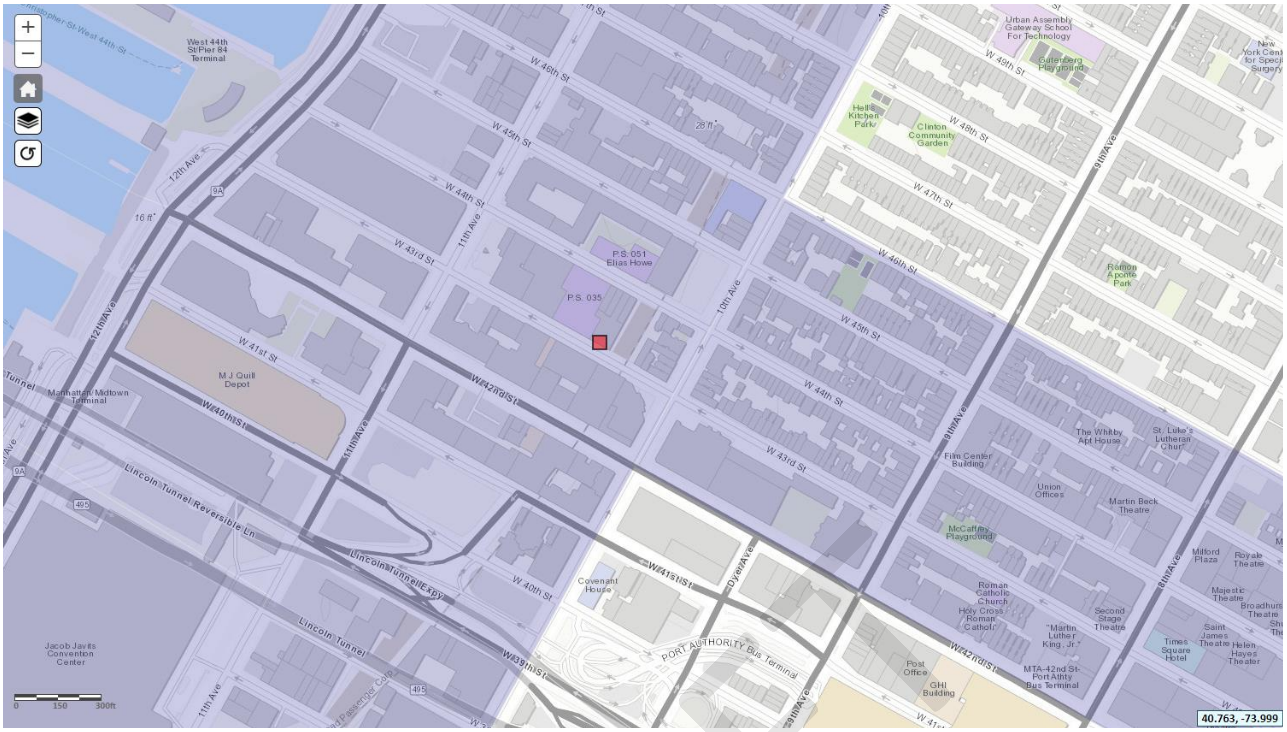
  Remedy anticipated for completion in approximately two years. If required, engineering controls will remain in place, be maintained, or replaced as needed during the duration of requirement under future Site management.

- Is the site in proximity to any sensitive receptors? (e.g., wetlands, waterbodies, residential properties, hospitals, schools, drinking water supplies, etc.)

  Yes, Beacon High School (located at 522 West 44th Street, New York, New York, 10036, listed as a public school) and P.S. 051 Elias Howe (located at 525 West 44th Street, New York, New York, 10036, listed as a public school).

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

X Yes ☐ No



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

☐ **Yes** X **No**

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

☐ **Yes** X **No**

Climate Screening Table*

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

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

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

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

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

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

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

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

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

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

FEMA- National Flood Hazard Layer | FEMA.gov

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

Department of Agriculture Forest Service Wildfire Risk to Communities

EPA Climate Change Indicators in the United States

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

EPA National Stormwater Calculator

National Integrated Drought Information System U.S. Drought Portal

National Interagency Coordination Center National Interagency Fire Center

National Oceanic and Atmospheric Administration Coastal Services Digital Coast

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

National Oceanic and Atmospheric Administration National Centers for Environmental Information website

National Oceanic and Atmospheric Administration Sea Level Trends

National Weather Service Climate Prediction Center

National Weather Service National Hurricane Center

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

National Weather Service Storm Surge Hazard Maps

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

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

U.S. Geological Survey Coastal Change Hazards Portal

U.S. Geological Survey Landslide Hazards Program

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

U.S. Geological Survey National Climate Change Viewer

U.S. Geological Survey National Water Dashboard

U.S. Geological Survey StreamStats

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

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

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

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

APPENDIX G
Green Sustainable Remediation Documentation

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

3 December 2024
File No. 0211280

New York State Department of Environmental Conservation
Region 2 – Division of Environmental Remediation
47-40 21st Street
Long Island City, New York 11101-5401

Attention: Ms. Jane O'Connell

Subject: Remedial Investigation Work Plan
515-519 West 43rd Street Redevelopment Site
515-519 West 43rd Street and 514-518 West 44th Street
BCP Site PENDING
New York, New York 10036

H & A of New York Engineering and Geology, LLP (Haley & Aldrich of New York) presents the following environmental footprint analysis in accordance with U.S. Environmental Protection Agency (EPA) 542-R-12-002 for the Investigation and Remedy of the above-referenced site at 515-519 West 43rd Street and 514-518 West 44th Street, New York, New York (Site).

FORMER NEW CITY LINK AUTO REPAIR SITE – INVESTIGATION AND POTENTIAL REMEDY

The investigation is anticipated to result in estimated totals of:

- 72.6 MMBtus of energy used
- 5.0 tons of total greenhouse gas emissions (CO2e)
- 299.3 lbs of NOx + SOx +PM emissions
- 19.0 lbs of HAP emissions

Energy

- 11.3 MMbtus used for on-site activities
- 0.0042 MMbtus used for Grid Electricity Generation
- 21.6 MMbtus used for transportation of personnel and materials
- 39.8 MMbtus used for off-site activities

Greenhouse Gas Emissions (CO2e)

- 0.8 tons of CO2e produced from on-site activities
- 0.0003 tons of CO2e produced from Grid Electricity Generation
- 1.6 tons of CO2e produced from transportation of personnel and materials
- 2.2 tons of CO2e produced from off-site activities

Overall, the footprint of the investigation is anticipated not to be dominated by off-site activities, which are anticipated to include off-site laboratory analysis and diesel fuel production. Off-site energy use is anticipated to comprise 54.76 percent of all energy use and off-site greenhouse gas emissions to comprise 47.32 percent of all emissions for the investigation.

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

Luke J. McCartney, P.G.
Project Manager

\\haleyaldrich.com\share\CF\Projects\0211280\Deliverables\5. BCP RIWP\Appendices\Appendix G - Green Sustainable Remediation Documentation\Working Folder\1. GSR_Overview_Letter_DF.docx

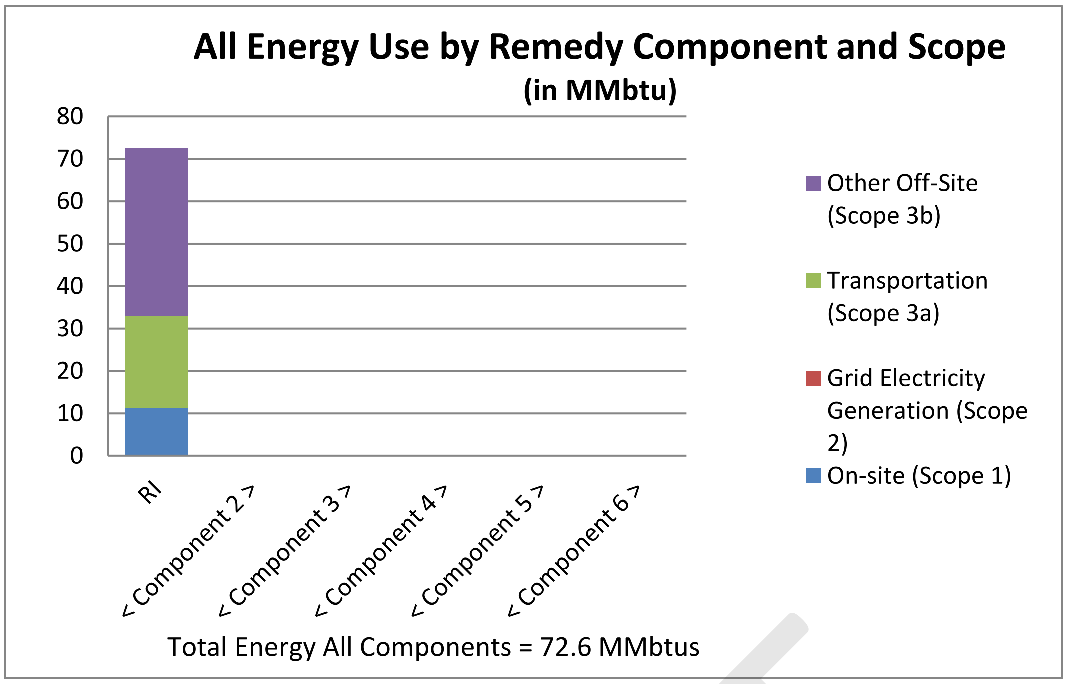
Environmental Footprint Summary

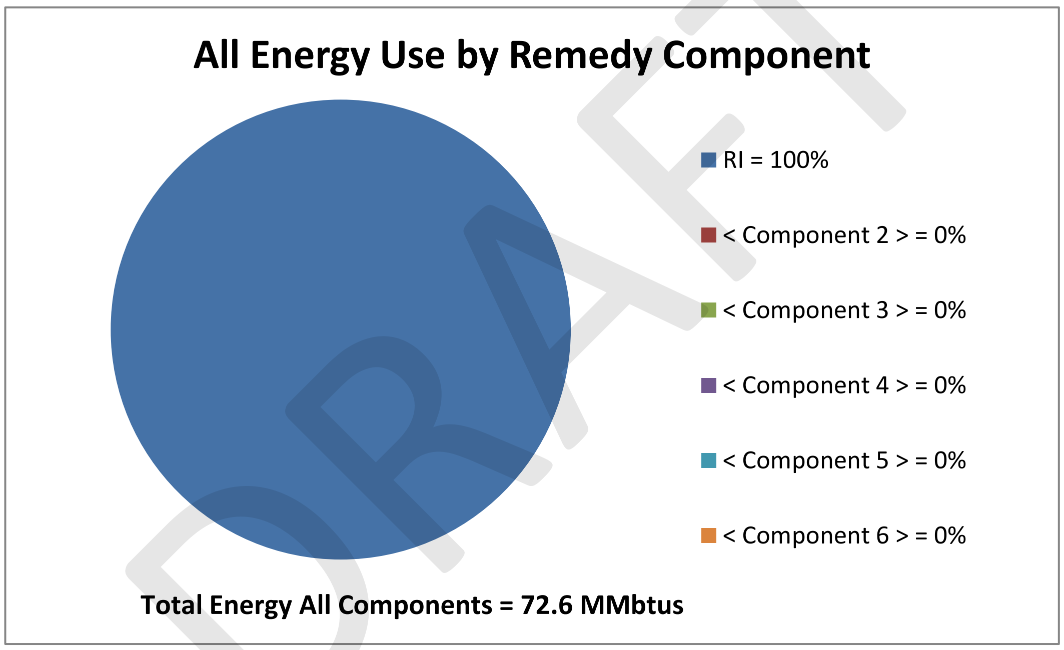
Core Element	Metric		Unit of Measure	Footprint: RI	Footprint: < Component 2 >	Footprint: < Component 3 >	Footprint: < Component 4 >	Footprint: < Component 5 >	Footprint: < Component 6 >	Footprint: Total
Materials & Waste	M&W-1	Refined materials used on-site	Tons	1.6	0.0	0.0	0.0	0.0	0.0	1.6
	M&W-2	% of refined materials from recycled or reused material	%	0.0%						0.0%
	M&W-3	Unrefined materials used on-site	Tons	0.000	0.000	0.000	0.000	0.000	0.000	0.0
	M&W-4	% of unrefined materials from recycled or reused material	%							
	M&W-5	On-site hazardous waste disposed of off-site	Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M&W-6	On-site non-hazardous waste disposed of off-site	Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M&W-7	Recycled or reused waste	Tons	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	M&W-8	% of total potential waste recycled or reused	%							
Water (used on-site)	W-1	Public water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-2	Groundwater use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-3	Surface water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-4	Reclaimed water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-5	Storm water use	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-6	User-defined water resource #1	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-7	User-defined water resource #2	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	W-8	Wastewater generated	MG	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy	E-1	Total energy used (on-site and off-site)	MMBtu	72.6	0.0	0.0	0.0	0.0	0.0	72.6
	E-2	Energy voluntarily derived from renewable resources								
	E-2A	On-site renewable energy generation or use + on-site biodiesel use + biodiesel and other renewable resource use for transportation	MMBtu	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-2B	Voluntary purchase of renewable electricity	MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-3	Voluntary purchase of RECs	MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	E-4	On-site grid electricity use	MWh	0.001	0.000	0.000	0.000	0.000	0.000	0.0
Air	A-1	On-site NOx, SOx, and PM emissions	Pounds	14.5	0.0	0.0	0.0	0.0	0.0	14.5
	A-2	On-site HAP emissions	Pounds	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	A-3	Total NOx, SOx, and PM emissions	Pounds	299.3	0.0	0.0	0.0	0.0	0.0	299.3
	A-3A	Total NOx emissions	Pounds	102.4	0.0	0.0	0.0	0.0	0.0	102.4
	A-3B	Total SOx emissions	Pounds	170.3	0.0	0.0	0.0	0.0	0.0	170.3
	A-3C	Total PM emissions	Pounds	26.6	0.0	0.0	0.0	0.0	0.0	26.6
	A-4	Total HAP emissions	Pounds	19.0	0.0	0.0	0.0	0.0	0.0	19.0
	A-5	Total greenhouse gas emissions	Tons CO2e*	5.0	0.0	0.0	0.0	0.0	0.0	5.0
Land & Ecosystems		Qualitative Description								

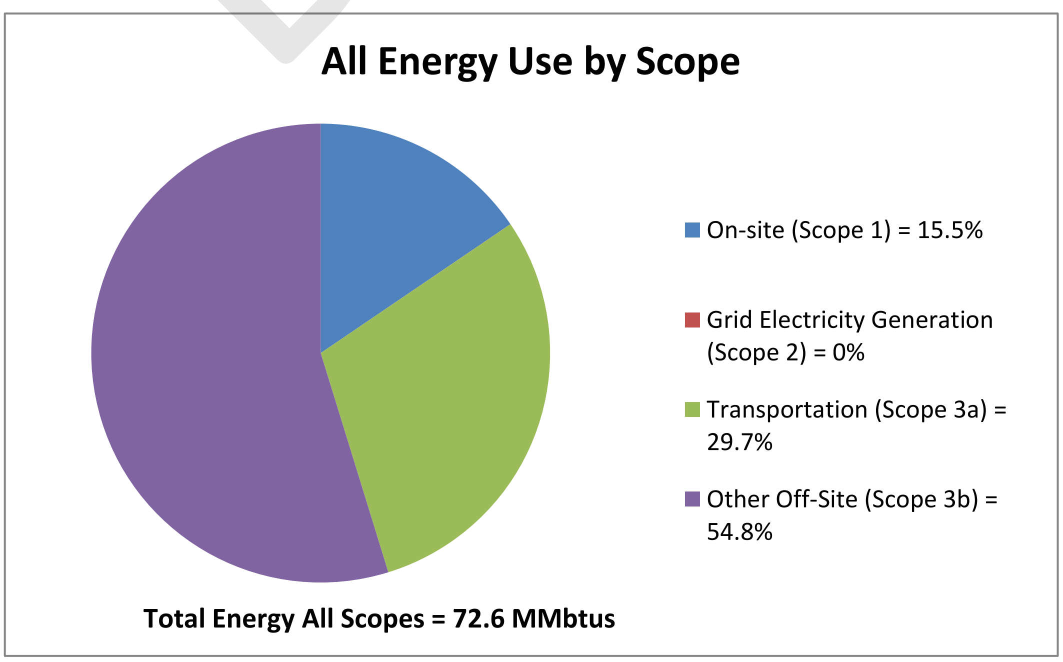
** Total greenhouse gases emissions (in CO2e) include consideration of CO2, CH4, and N2O (Nitrous oxide) emissions.*
"MMBtu" = millions of Btus
"MG" = millions of gallons
"CO2e" = carbon dioxide equivalents of global warming potential
"MWh" = megawatt hours (i.e., thousands of kilowatt-hours or millions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

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

Notes:


All Energy Use by Remedy Component and Scope
(in MMbtu)
80
70
60
50
40
30
20
10
0
RI
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
Total Energy All Components = 72.6 MMbtus


All Energy Use by Remedy Component
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
Total Energy All Components = 72.6 MMbtus

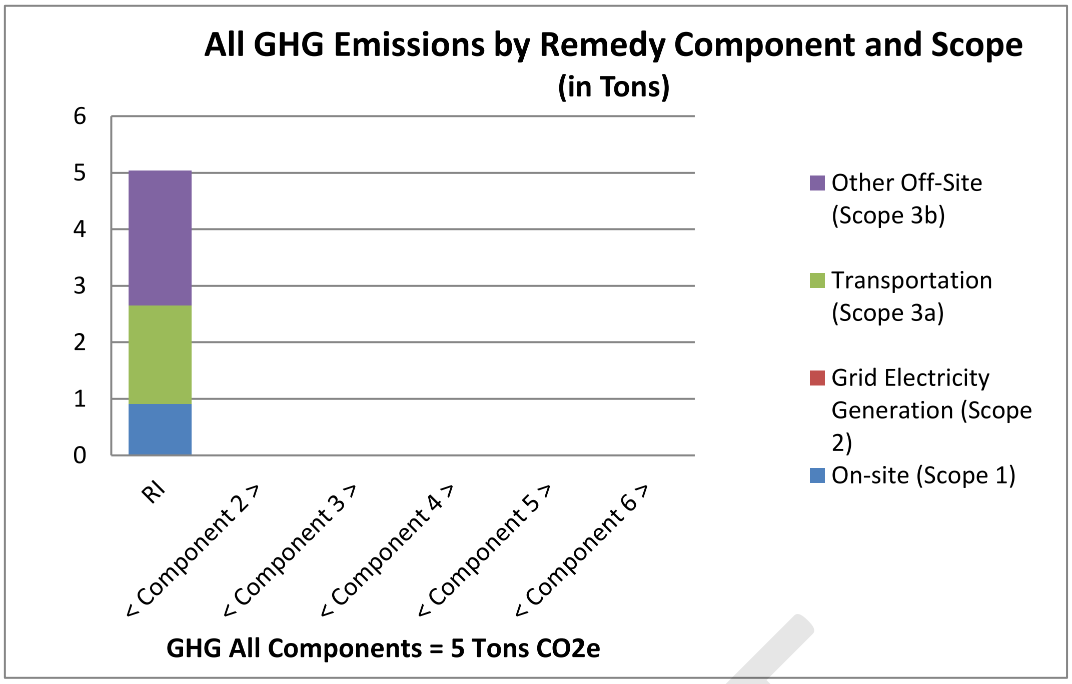

All Energy Use by Scope
On-site (Scope 1) = 15.5%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 29.7%
Other Off-Site (Scope 3b) = 54.8%
Total Energy All Scopes = 72.6 MMbtus

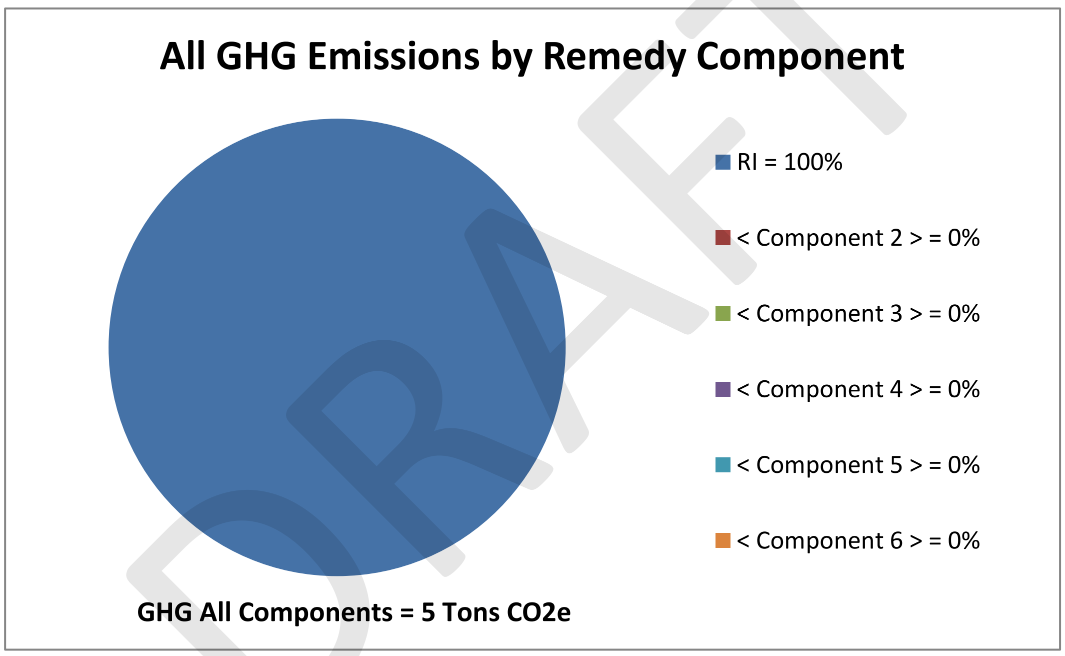
Total Energy MMbtus	RI	< Compon	< Compon	< Compon	< Compon	< Compon	Total	
On-site (Scope 1)	11.3	0.0	0.0	0.0	0.0	0.0	11.3	
Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	d Electricity
nsportation (Scope 3a)	21.6	0.0	0.0	0.0	0.0	0.0	21.6	Trar
ner Off-Site (Scope 3b)	39.8	0.0	0.0	0.0	0.0	0.0	39.8	Oth
Total	72.6	0.0	0.0	0.0	0.0	0.0	72.6	

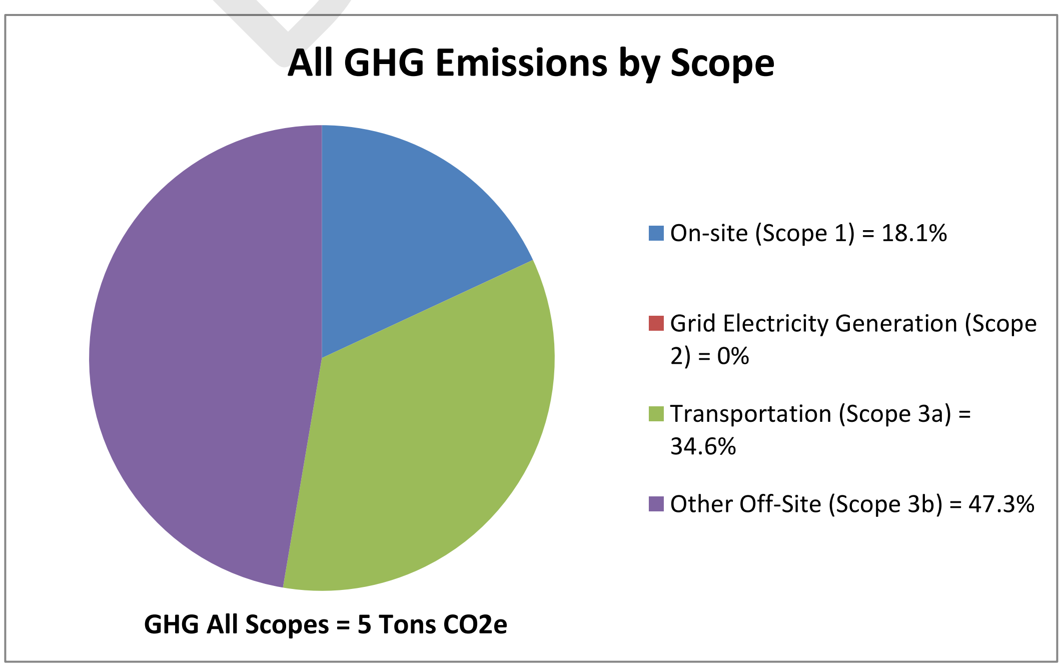
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 15.5%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 29.7%
Other Off-Site (Scope 3b) = 54.8%

Total Energy All Components = 72.6 MMbtus
Total Energy All Scopes = 72.6 MMbtus


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


All GHG Emissions by Remedy Component
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
GHG All Components = 5 Tons CO2e

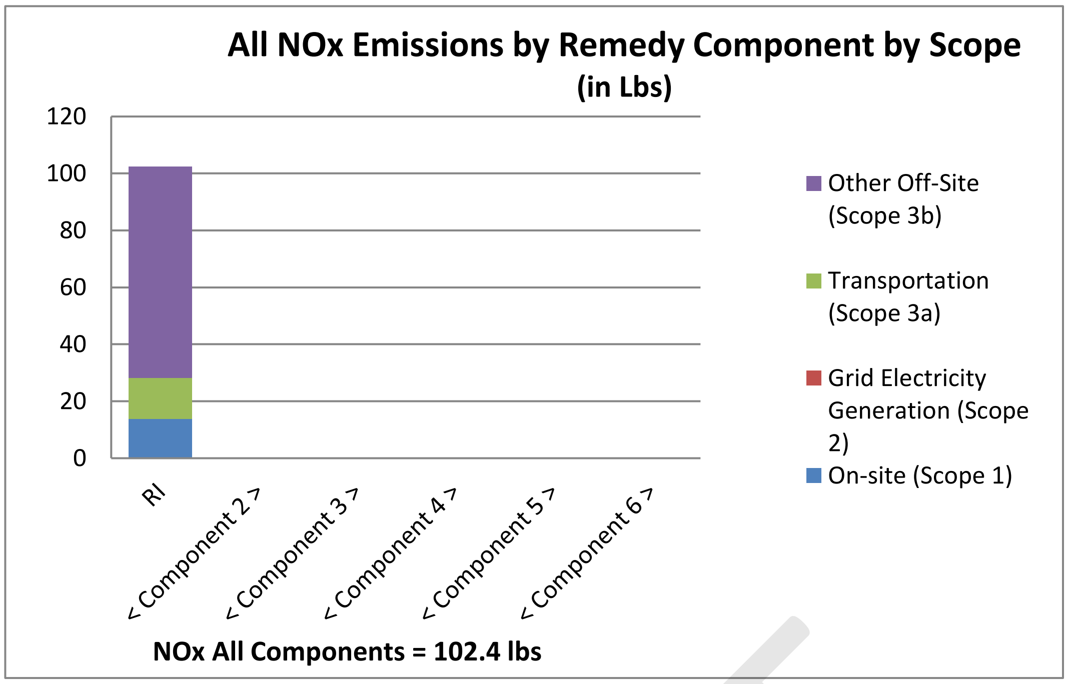

All GHG Emissions by Scope
On-site (Scope 1) = 18.1%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 34.6%
Other Off-Site (Scope 3b) = 47.3%
GHG All Scopes = 5 Tons CO2e

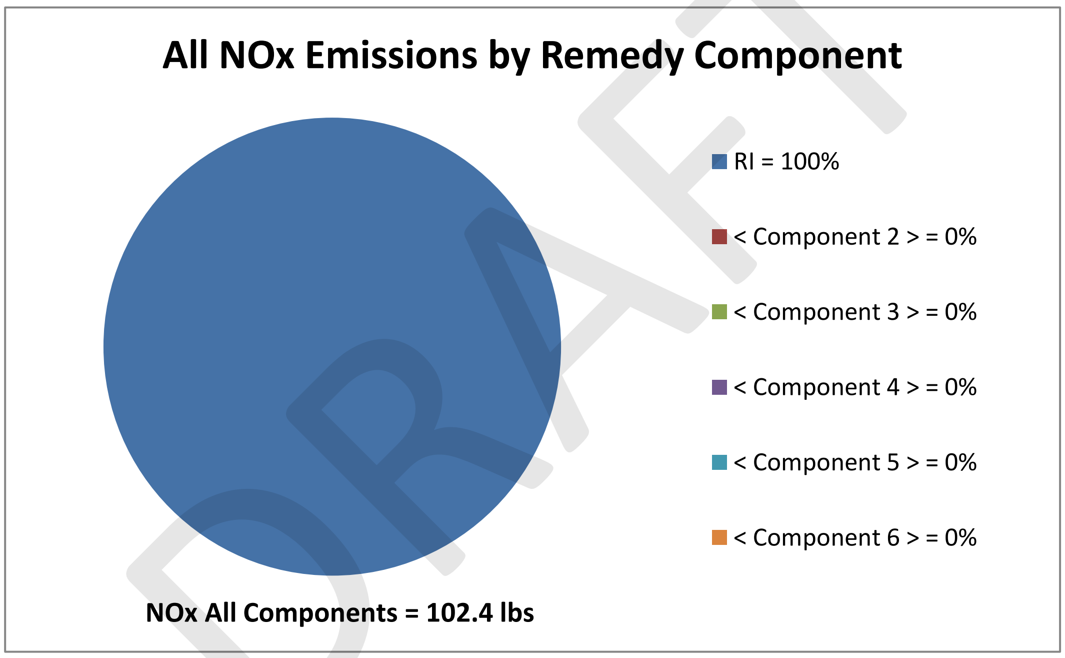
GHG Tons CO2e	RI	< Compon	< Compon	< Compon	< Compon	< Compon	Total	
On-site (Scope 1)	0.9	0.0	0.0	0.0	0.0	0.0	0.9	
Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	d Electricity
sportation (Scope 3a)	1.7	0.0	0.0	0.0	0.0	0.0	1.7	Trar
er Off-Site (Scope 3b)	2.4	0.0	0.0	0.0	0.0	0.0	2.4	Oth
Total	5.0	0.0	0.0	0.0	0.0	0.0	5.0	

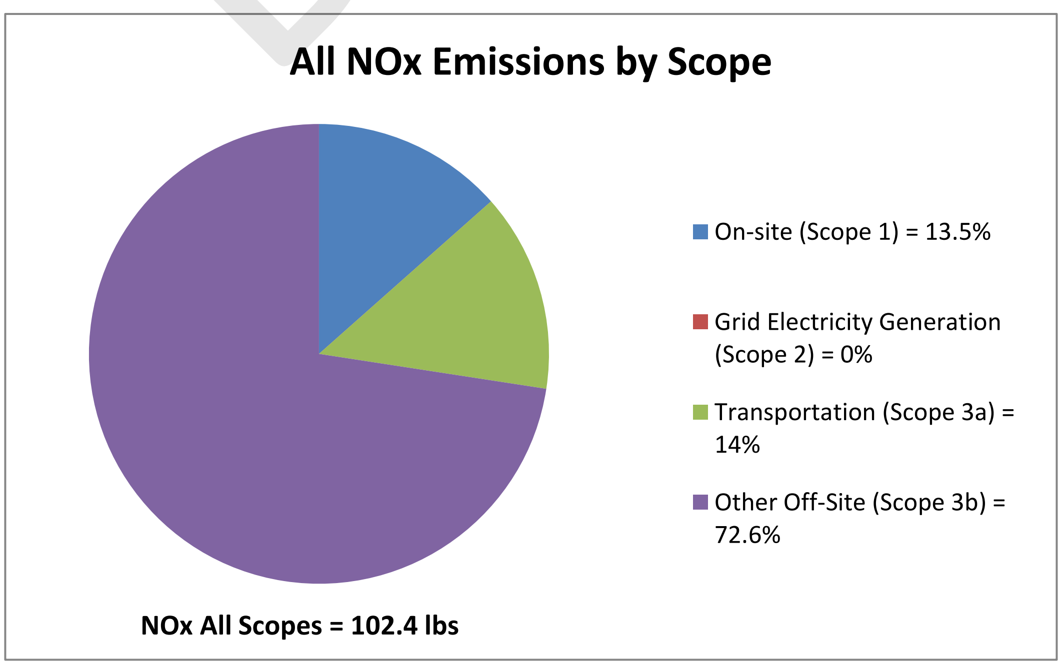
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 18.1%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 34.6%
Other Off-Site (Scope 3b) = 47.3%

GHG All Components = 5 Tons CO2e
GHG All Scopes = 5 Tons CO2e


All NOx Emissions by Remedy Component by Scope
(in Lbs)
120
100
80
60
40
20
0
RI
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
NOx All Components = 102.4 lbs


All NOx Emissions by Remedy Component
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
NOx All Components = 102.4 lbs

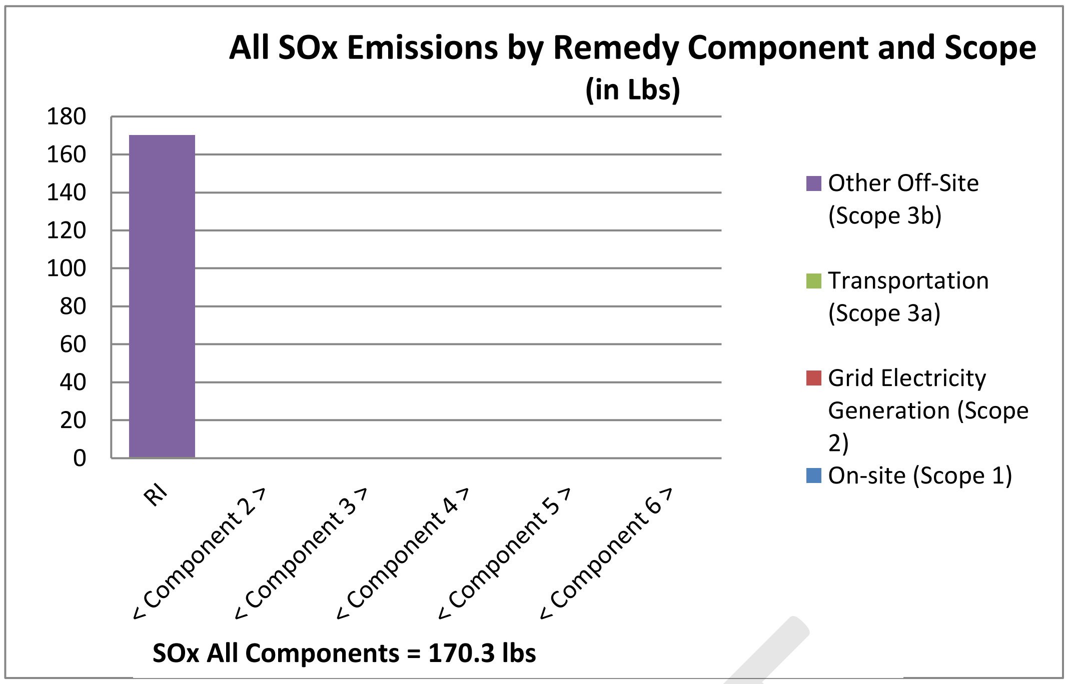

All NOx Emissions by Scope
On-site (Scope 1) = 13.5%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 14%
Other Off-Site (Scope 3b) = 72.6%
NOx All Scopes = 102.4 lbs

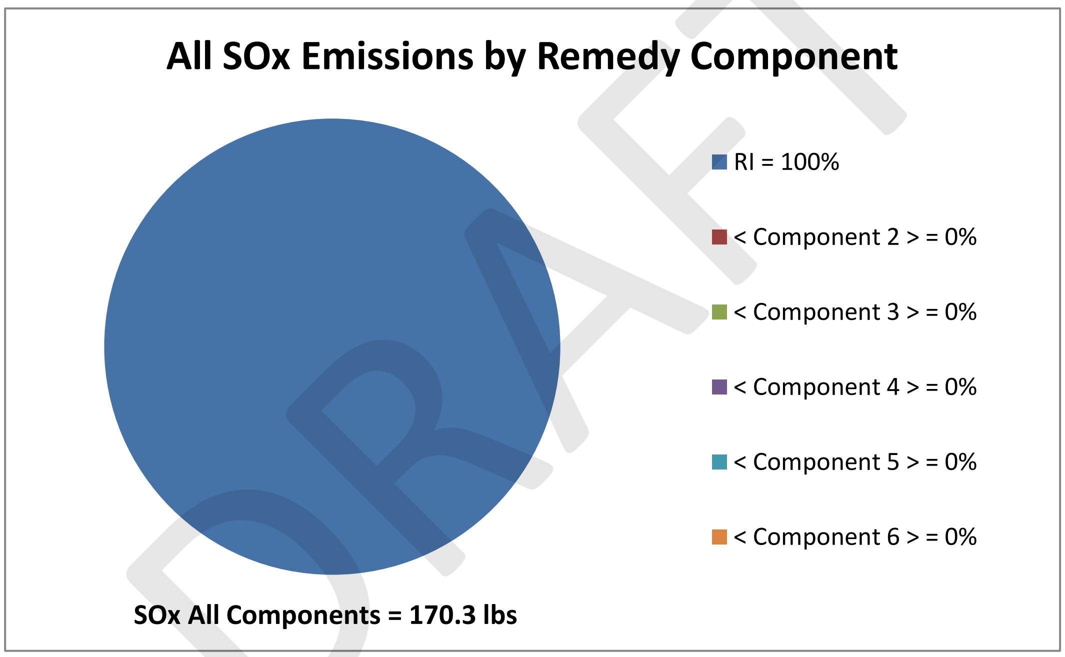
NOx lbs	RI	< Compon‹	< Compon‹	< Compon‹	< Compon‹	< Compon‹	Total	
On-site (Scope 1)	13.8	0.0	0.0	0.0	0.0	0.0	13.8	
Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	d Electricity
ısportation (Scope 3a)	14.3	0.0	0.0	0.0	0.0	0.0	14.3	Trar
ıer Off-Site (Scope 3b)	74.3	0.0	0.0	0.0	0.0	0.0	74.3	Oth
Total	102.4	0.0	0.0	0.0	0.0	0.0	102.4	

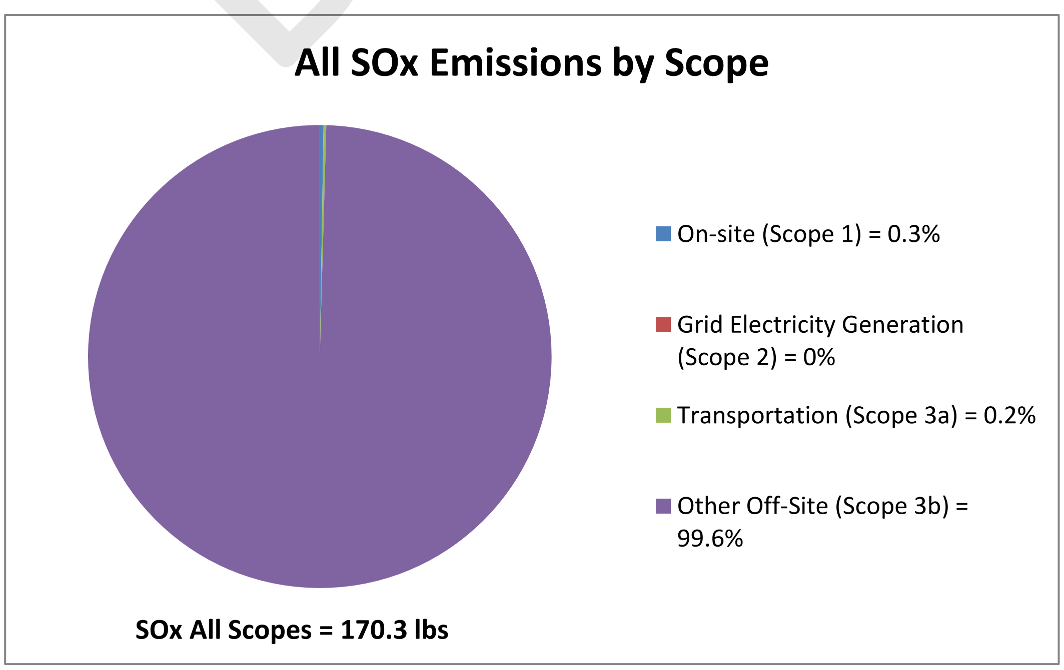
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 13.5%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 14%
Other Off-Site (Scope 3b) = 72.6%

NOx All Components = 102.4 lbs
NOx All Scopes = 102.4 lbs


All SOx Emissions by Remedy Component and Scope
(in Lbs)
180
160
140
120
100
80
60
40
20
0
RI
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
SOx All Components = 170.3 lbs


All SOx Emissions by Remedy Component
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
SOx All Components = 170.3 lbs

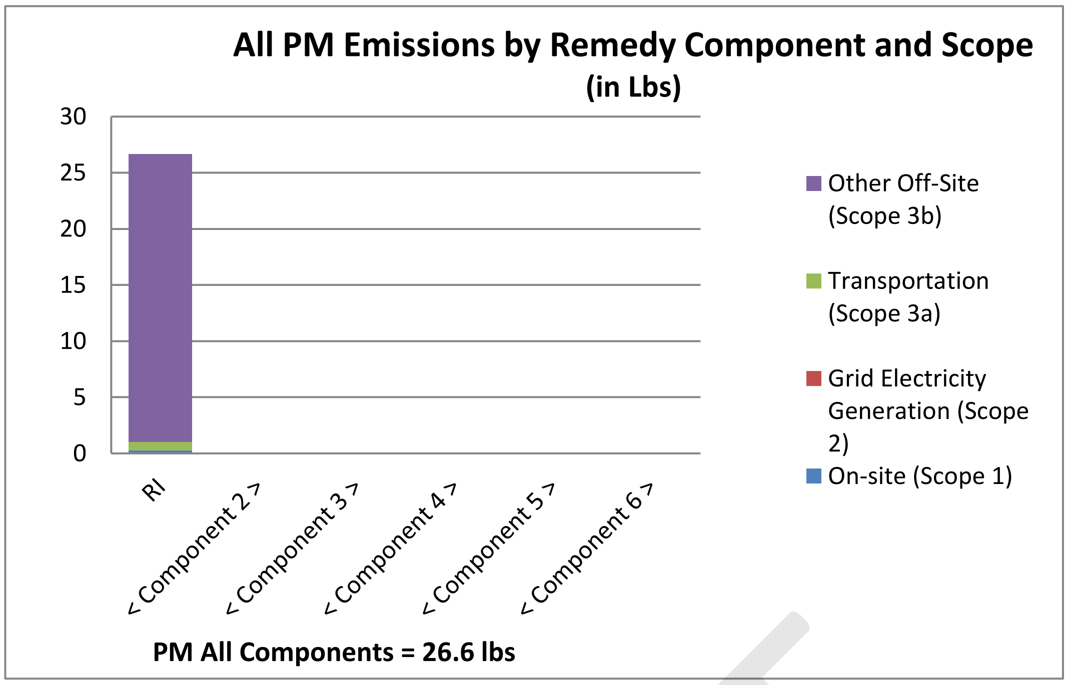

All SOx Emissions by Scope
On-site (Scope 1) = 0.3%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 0.2%
Other Off-Site (Scope 3b) = 99.6%
SOx All Scopes = 170.3 lbs

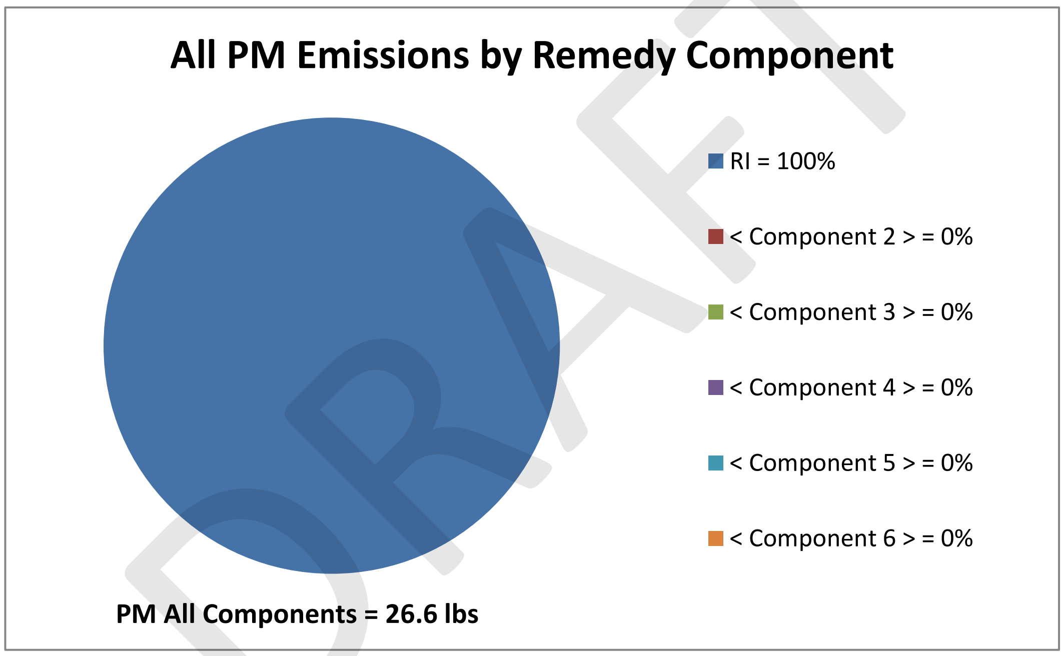
SOx lbs	RI	< Compon	< Compon	< Compon	< Compon	< Compon	Total	
On-site (Scope 1)	0.4	0.0	0.0	0.0	0.0	0.0	0.4	
Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	d Electricity
nsportation (Scope 3a)	0.3	0.0	0.0	0.0	0.0	0.0	0.3	Trar
ner Off-Site (Scope 3b)	169.5	0.0	0.0	0.0	0.0	0.0	169.5	Oth
Total	170.3	0.0	0.0	0.0	0.0	0.0	170.3	

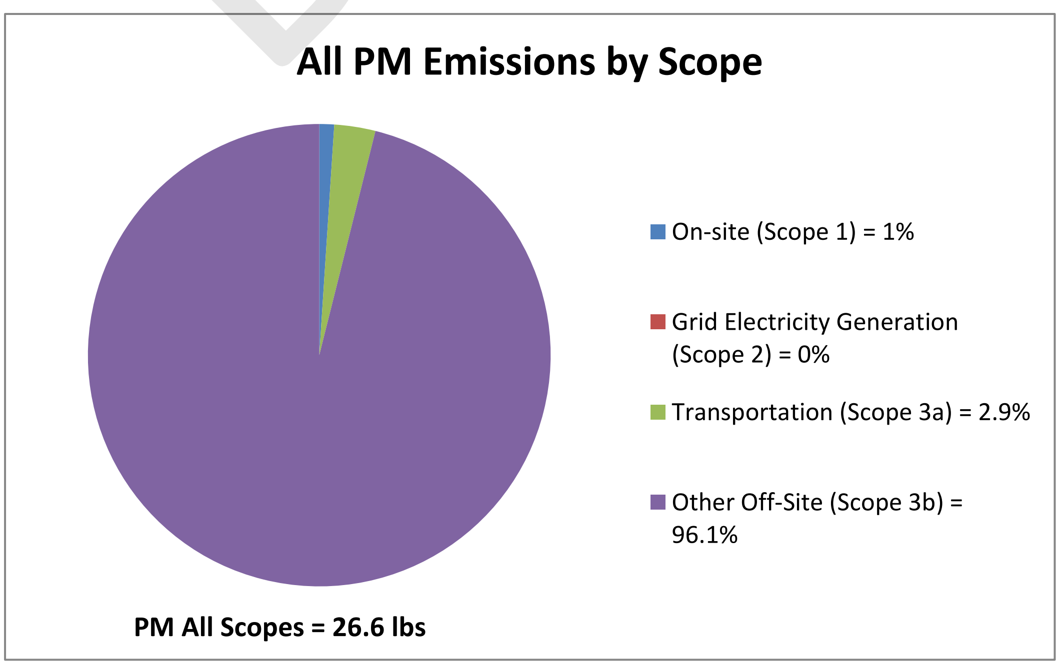
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 0.3%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 0.2%
Other Off-Site (Scope 3b) = 99.6%

SOx All Components = 170.3 lbs
SOx All Scopes = 170.3 lbs


All PM Emissions by Remedy Component and Scope
(in Lbs)
30
25
20
15
10
5
0
RI
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
PM All Components = 26.6 lbs


All PM Emissions by Remedy Component
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
PM All Components = 26.6 lbs


All PM Emissions by Scope
On-site (Scope 1) = 1%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 2.9%
Other Off-Site (Scope 3b) = 96.1%
PM All Scopes = 26.6 lbs

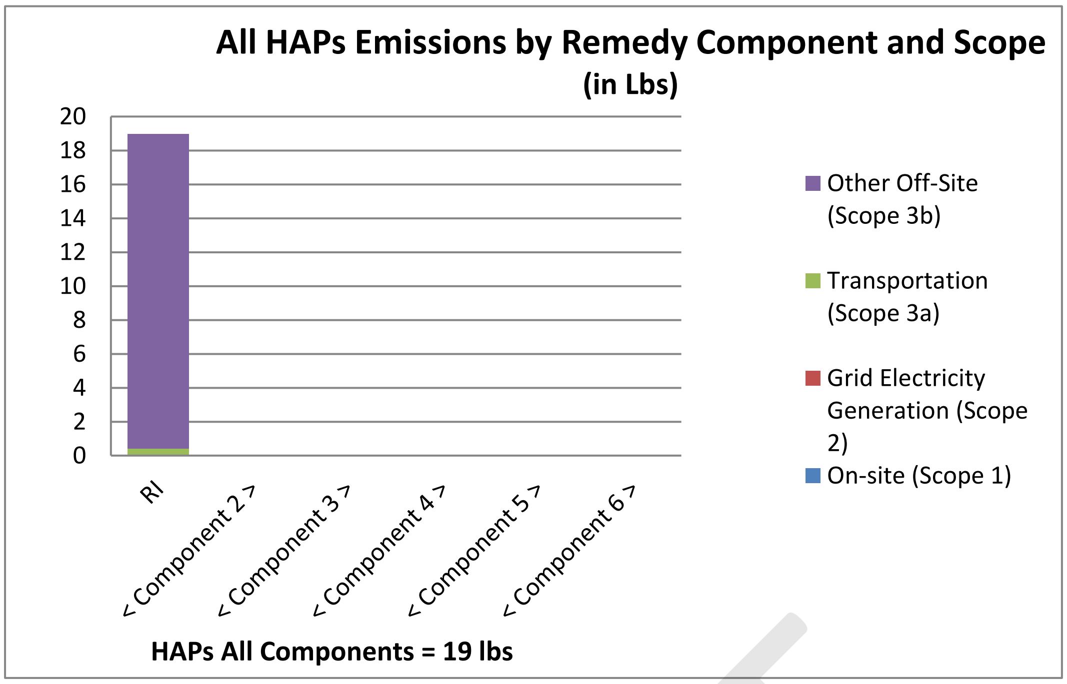
PM
lbs

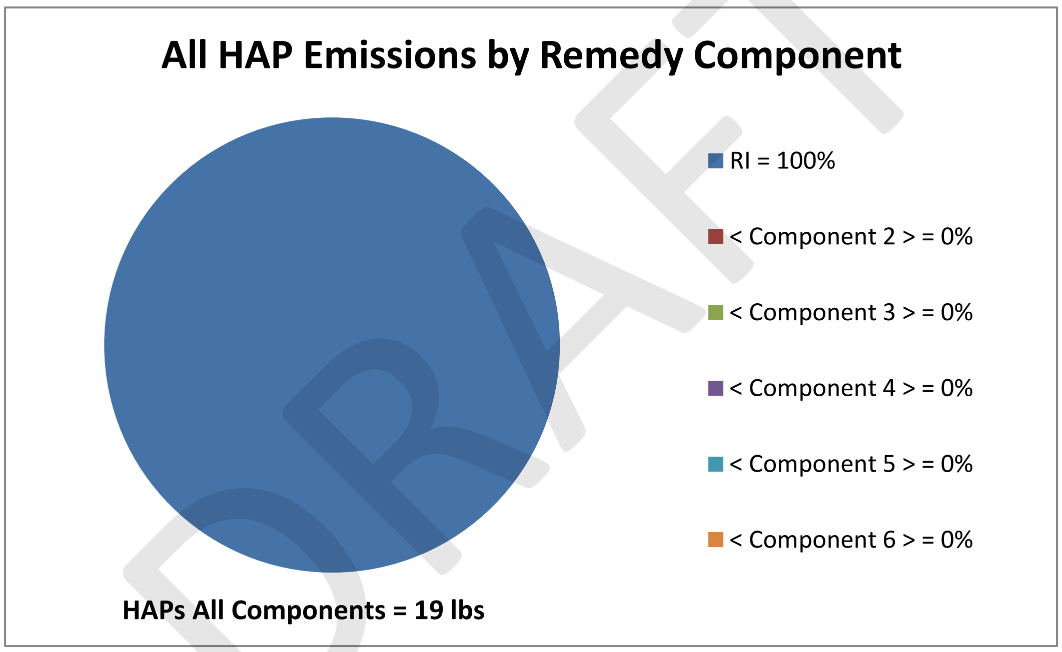
	RI	< Compon	< Compon	< Compon	< Compon	< Compon	Total	
On-site (Scope 1)	0.3	0.0	0.0	0.0	0.0	0.0	0.3	
Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	d Electricity
ısportation (Scope 3a)	0.8	0.0	0.0	0.0	0.0	0.0	0.8	Trar
ıer Off-Site (Scope 3b)	25.6	0.0	0.0	0.0	0.0	0.0	25.6	Oth
Total	26.6	0.0	0.0	0.0	0.0	0.0	26.6	

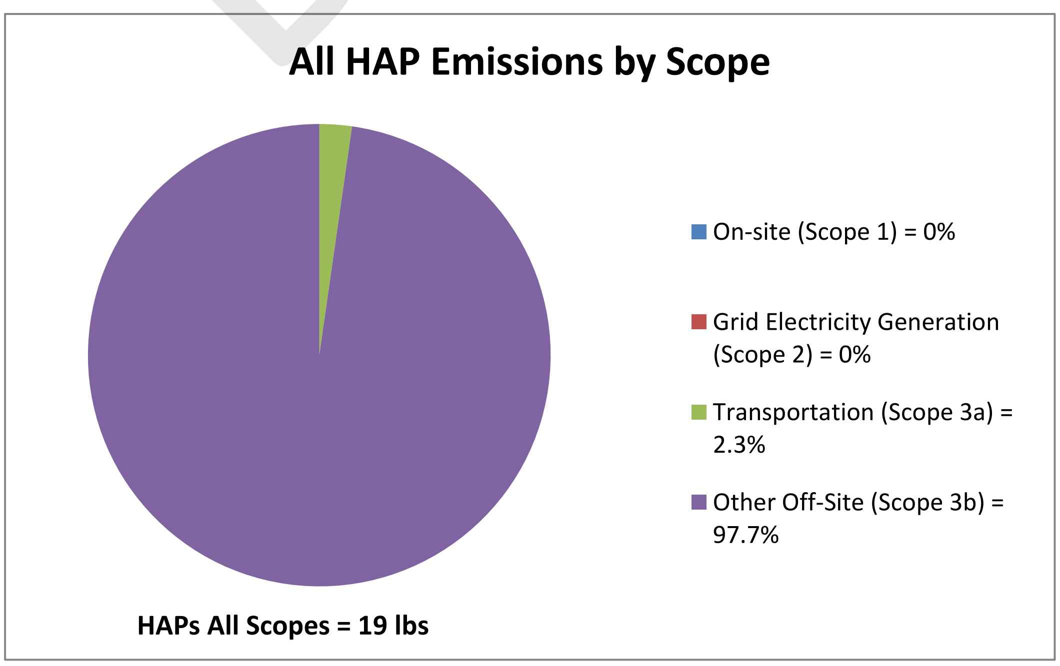
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 1%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 2.9%
Other Off-Site (Scope 3b) = 96.1%

PM All Components = 26.6 lbs
PM All Scopes = 26.6 lbs


All HAPs Emissions by Remedy Component and Scope
(in Lbs)
20
18
16
14
12
10
8
6
4
2
0
RI
< Component 2 >
< Component 3 >
< Component 4 >
< Component 5 >
< Component 6 >
Other Off-Site (Scope 3b)
Transportation (Scope 3a)
Grid Electricity Generation (Scope 2)
On-site (Scope 1)
HAPs All Components = 19 lbs


All HAP Emissions by Remedy Component
RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%
HAPs All Components = 19 lbs


All HAP Emissions by Scope
On-site (Scope 1) = 0%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 2.3%
Other Off-Site (Scope 3b) = 97.7%
HAPs All Scopes = 19 lbs

HAPs
lbs

	RI	< Compon	< Compon	< Compon	< Compon	< Compon	Total
On-site (Scope 1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Generation (Scope 2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
sportation (Scope 3a)	0.4	0.0	0.0	0.0	0.0	0.0	0.4
er Off-Site (Scope 3b)	18.5	0.0	0.0	0.0	0.0	0.0	18.5
Total	19.0	0.0	0.0	0.0	0.0	0.0	19.0

RI = 100%
< Component 2 > = 0%
< Component 3 > = 0%
< Component 4 > = 0%
< Component 5 > = 0%
< Component 6 > = 0%

On-site (Scope 1) = 0%
Grid Electricity Generation (Scope 2) = 0%
Transportation (Scope 3a) = 2.3%
Other Off-Site (Scope 3b) = 97.7%

HAPs All Components = 19 lbs
HAPs All Scopes = 19 lbs

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Input Summary

Remedy Component Number →		1	2	3	4	5	6									Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																				
Item		RI	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
On-Site																						
On-site Renewable Energy																						
Renewable electricity generated on-site	MWh	0														0	0	0	0	0	0	0
Landfill gas combusted on-site for energy use	ccf CH_4	0														0	0	0	0	0	0	0
On-site biodiesel use	gal	0														0	0	0	0	0	0	0
On-site biodiesel use - Other	gal	0														0	0	0	0	0	0	0
User-defined on-site renewable energy use #1	TBD	0														0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD	0														0	0	0	0	0	0	0
On-Site Conventional Energy																						
Grid electricity	MWh	0.0006														0.0006	0	0	0	0	0	0.0006
On-site diesel use - Other	Gal	81														81	0	0	0	0	0	81
On-site diesel use <75 hp	Gal	0														0	0	0	0	0	0	0
On-site diesel use 75<hp<750	Gal	0														0	0	0	0	0	0	0
On-site diesel use >750 hp	Gal	0														0	0	0	0	0	0	0
On-site gasoline use - Other	Gal	0														0	0	0	0	0	0	0
On-site gasoline use <25 hp	Gal	0														0	0	0	0	0	0	0
On-site gasoline use >25 hp	Gal	0														0	0	0	0	0	0	0
On-site natural gas use	ccf	0														0	0	0	0	0	0	0
On-site compressed natural gas use - Other	ccf	0														0	0	0	0	0	0	0
On-site compressed natural gas use	ccf	0														0	0	0	0	0	0	0
On-site liquified petroleum gas use - Other	gal	0														0	0	0	0	0	0	0
On-site liquified petroleum gas use	gal	0														0	0	0	0	0	0	0
Other forms of on-site conventional energy use #1	TBD	0														0	0	0	0	0	0	0
Other forms of on-site conventional energy use #2	TBD	0														0	0	0	0	0	0	0
Other On-site Emissions																						
On-site HAP process emissions	Lbs	0														0	0	0	0	0	0	0
On-site GHG emissions	Lbs CO2e	0														0	0	0	0	0	0	0
On-site carbon storage	Lbs CO2e	0														0	0	0	0	0	0	0
GHG avoided by flaring on-site landfill methane	ccf CH4	0														0	0	0	0	0	0	0
Other on-site NOx emissions or reductions	Lbs	0														0	0	0	0	0	0	0
Other on-site SOx emissions or reductions	Lbs	0														0	0	0	0	0	0	0
Other on-site PM emissions or reductions	Lbs	0														0	0	0	0	0	0	0
Electricity Generation																						
Grid electricity	MWh	0.0006														0.0006	0	0	0	0	0	0.0006
Voluntary purchase of renewable electricity	MWh	0														0	0	0	0	0	0	0
Voluntary purchase of RECs	MWh	0														0	0	0	0	0	0	0
Transportation																						
Transportation Fuel Use Breakdown																						
Biodiesel use - Personnel Transport	gal	0														0	0	0	0	0	0	0
Biodiesel use - Personnel Transport - User Defined	gal	0														0	0	0	0	0	0	0
Biodiesel use - Equipment Transport	gal	0														0	0	0	0	0	0	0
Biodiesel use - Equipment Transport - User Defined	gal	0														0	0	0	0	0	0	0
Biodiesel use - Material Transport	gal	0														0	0	0	0	0	0	0
Biodiesel use - Material Transport - User Defined	gal	0														0	0	0	0	0	0	0
Biodiesel use - Waste Transport	gal	0														0	0	0	0	0	0	0
Biodiesel use - Waste Transport - User Defined	gal	0														0	0	0	0	0	0	0
Diesel use - Personnel Transport - other vehicles	gal	0														0	0	0	0	0	0	0
Diesel use - Personnel Transport - car	gal	0														0	0	0	0	0	0	0
Diesel use - Personnel Transport - passenger truck	gal	66.2														66.2	0	0	0	0	0	66.2
Diesel use - Personnel Transport - User Defined	gal	0														0	0	0	0	0	0	0
Diesel use - Equipment Transport	gal	20														20	0	0	0	0	0	20
Diesel use - Equipment Transport - User Defined	gal	0														0	0	0	0	0	0	0
Diesel use - Material Transport	gal	35														35	0	0	0	0	0	35
Diesel use - Material Transport - User Defined	gal	0														0	0	0	0	0	0	0
Diesel use - Waste Transport	gal	0														0	0	0	0	0	0	0
Diesel use - Waste Transport - User Defined	gal	0														0	0	0	0	0	0	0
Gasoline use - Personnel Transport - other vehicles	gal	0														0	0	0	0	0	0	0
Gasoline use - Personnel Transport - car	gal	32														32	0	0	0	0	0	32
Gasoline use - Personnel Transport - passenger truck	gal	6.3														6.3	0	0	0	0	0	6.3
Gasoline use - Personnel Transport - User Defined	gal	0														0	0	0	0	0	0	0
Gasoline use - Equipment Transport	gal	0														0	0	0	0	0	0	0
Gasoline use - Equipment Transport - User Defined	gal	0														0	0	0	0	0	0	0
Natural Gas use - Personnel Transport	ccf	0														0	0	0	0	0	0	0
Natural Gas use - Personnel Transport - User Defined	ccf	0														0	0	0	0	0	0	0
Natural Gas use - Equipment Transport	ccf	0														0	0	0	0	0	0	0

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Input Summary

Remedy Component Number →		1	2	3	4	5	6															
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)													Remedy Component Subtotals						
Item		RI	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Conventional Energy																						
Transportation diesel use	gal	121.2														121.2	0	0	0	0	0	121.2
Transportation gasoline use	gal	38.3														38.3	0	0	0	0	0	38.3
Transportation natural gas use	ccf	0														0	0	0	0	0	0	0
User-defined conventional energy transportation #1	TBD	10														10	0	0	0	0	0	10
User-defined conventional energy transportation #2	TBD	0														0	0	0	0	0	0	0
Renewable Energy																						
Transportation biodiesel use	gal	0														0	0	0	0	0	0	0
User-defined renewable energy transportation #1	TBD	0														0	0	0	0	0	0	0
User-defined renewable energy transportation #2	TBD	0														0	0	0	0	0	0	0
Off-Site																						
Construction Materials																						
Aluminum, Rolled Sheet	lb	0														0	0	0	0	0	0	0
Asphalt, mastic	lb	0														0	0	0	0	0	0	0
Asphalt, paving-grade	lb	0														0	0	0	0	0	0	0
Ethanol, Corn, 95%	lb	0														0	0	0	0	0	0	0
Ethanol, Corn, 99.7%	lb	0														0	0	0	0	0	0	0
Ethanol, Petroleum, 99.7%	lb	0														0	0	0	0	0	0	0
Gravel/Sand Mix, 65% Gravel	lb	1520														1520	0	0	0	0	0	1520
Gravel/sand/clay	lb	0														0	0	0	0	0	0	0
HDPE	lb	0														0	0	0	0	0	0	0
Photovoltaic system (installed)	W	0														0	0	0	0	0	0	0
PVC	lb	138														138	0	0	0	0	0	138
Portland cement, US average	lb	1560																				
Ready-mixed concrete, 20 MPa	ft3	0														0	0	0	0	0	0	0
Round Gravel	lb	0														0	0	0	0	0	0	0
Sand	lb	0														0	0	0	0	0	0	0
Stainless Steel	lb	0														0	0	0	0	0	0	0
Steel	lb	0														0	0	0	0	0	0	0
Other refined construction materials	lb	0														0	0	0	0	0	0	0
Other unrefined construction materials	lb	0														0	0	0	0	0	0	0
Treatment Materials & Chemicals																						
Cheese Whey	lbs	0														0	0	0	0	0	0	0
Emulsified vegetable oil	lbs	0														0	0	0	0	0	0	0
Granular activated carbon, primary	lbs	0														0	0	0	0	0	0	0
Granular activated carbon, regenerated	lbs	0														0	0	0	0	0	0	0
Hydrogen Peroxide, 50% in H2O	lbs	0														0	0	0	0	0	0	0
Iron (II) Sulfate	lbs	0														0	0	0	0	0	0	0
Lime, Hydrated, Packed	lbs	0														0	0	0	0	0	0	0
Molasses	lbs	0														0	0	0	0	0	0	0
Phosphoric Acid, 70% in H2O	lbs	0														0	0	0	0	0	0	0
Potassium Permanganate	lbs	0														0	0	0	0	0	0	0
Sodium Hydroxide, 50% in H2O	lbs	0														0	0	0	0	0	0	0
Other Treatment Chemicals & Materials	lbs	0														0	0	0	0	0	0	0
Material Type																						
Total Virgin Refined Materials	tons	1.613														1.613	0	0	0	0	0	1.613
Total Recycled Refined Materials	tons	0														0	0	0	0	0	0	0
Total Reused Refined Materials	tons	0														0	0	0	0	0	0	0
Total Refined Material	tons	1.613														1.613	0	0	0	0	0	1.613
Total Virgin Unrefined Materials	tons	0														0	0	0	0	0	0	0
Total Recycled Unrefined Materials	tons	0														0	0	0	0	0	0	0
Total Reused Unrefined Materials	tons	0														0	0	0	0	0	0	0
Total Unrefined Material	tons	0														0	0	0	0	0	0	0
Fuel Processing																						
Biodiesel produced	gal	0														0	0	0	0	0	0	0
Diesel produced	gal	202.2														202.2	0	0	0	0	0	202.2
Gasoline produced	gal	38.3														38.3	0	0	0	0	0	38.3
Compressed natural gas produced	ccf	0														0	0	0	0	0	0	0
Liquified petroleum gas produced	gal	0														0	0	0	0	0	0	0
Natural gas produced	ccf	0														0	0	0	0	0	0	0
Water Use																						
Public Water Supply	gal x 1000	0.1														0.1	0	0	0	0	0	0.1
Extracted Groundwater	gal x 1000	0														0	0	0	0	0	0	0
Surface Water	gal x 1000	0														0	0	0	0	0	0	0
Reclaimed Water	gal x 1000	0														0	0	0	0	0	0	0
Collected/Diverted Storm Water	gal x 1000	0														0	0	0	0	0	0	0
User-defined water resource #1	gal x 1000	0														0	0	0	0	0	0	0
User-defined water resource #2	gal x 1000	0														0	0	0	0	0	0	0

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Input Summary

Remedy Component Number →		1	2	3	4	5	6									Remedy Component Subtotals						
		Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated ("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)																				
Item		RI	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Waste/Recycle Handling																						
Hazardous waste incineration	lbs	0														0	0	0	0	0	0	0
Off-site waste water treatment (POTW)	gal x 1000	0														0	0	0	0	0	0	0
Off-site non-hazardous waste landfill	tons	0														0	0	0	0	0	0	0
Off-site hazardous waste landfill	tons	0														0	0	0	0	0	0	0
Recycled/Reused On-Site	tons	0														0	0	0	0	0	0	0
Recycled/Reused Off-Site	tons	0														0	0	0	0	0	0	0
Solid Waste Totals																						
Total Non-Hazardous Waste	tons	0														0	0	0	0	0	0	0
Total Hazardous Waste	tons	0														0	0	0	0	0	0	0
Total Recycled/Reused	tons	0														0	0	0	0	0	0	0
Total Waste (all types)	tons	0														0	0	0	0	0	0	0
Lab Services																						
Off-site Laboratory Analysis - Other	sample	114														114	0	0	0	0	0	114
Off-site Laboratory Analysis - Metals	sample	57														57	0	0	0	0	0	57
Off-site Laboratory Analysis - Mercury	sample	0														0	0	0	0	0	0	0
Off-site Laboratory Analysis - Inorganic Anions	sample	0														0	0	0	0	0	0	0
Off-site Laboratory Analysis - Alkalinity	sample	0														0	0	0	0	0	0	0
Off-site Laboratory Analysis - Perchlorate	sample	0														0	0	0	0	0	0	0
Off-site Laboratory Analysis - Nitrogen/Nitrate	sample	0														0	0	0	0	0	0	0
Off-site Laboratory Analysis - Sulfate	sample	0														0	0	0	0	0	0	0
Off-site Laboratory Analysis - PCBs	sample	57														57	0	0	0	0	0	57
Off-site Laboratory Analysis - VOCs	sample	75														75	0	0	0	0	0	75
Off-site Laboratory Analysis - SVOCs	sample	57														57	0	0	0	0	0	57
Resource Extraction for Electricity																						
Coal extraction and processing	MWh	0.000183														0.000183	0	0	0	0	0	0.000183
Natural gas extraction and processing	MWh	0.0002034														0.0002034	0	0	0	0	0	0.0002034
Nuclear fuel extraction and processing	MWh	0.0001188														0.0001188	0	0	0	0	0	0.0001188
Oil extraction and processing	MWh	0.0000042														0.0000042	0	0	0	0	0	0.0000042
Other fuel extraction and processing	MWh	0.0000006														0.0000006	0	0	0	0	0	0.0000006
Electricity Transmission																						
Transmission and distribution losses	MWh	0.0006														0.0006	0	0	0	0	0	0.0006

Spreadsheets for Environmental Footprint Analysis (SEFA) Version 3.0, November 2019
515-519 West 43rd Street Redevelopment Site - BCP Remedial Investigation

Input Summary

Column headings in Row 6 must match the name of "Input" tabs in this workbook for Columns C - P in this table to be populated
("0" in Row 4 means "Input" tab is turned Off and will not be grouped to a Remedy Component (Columns Q - V) or used in subsequent calculations)

Remedy Component Number →		1	2	3	4	5	6									Remedy Component Subtotals						
Item		RI	Input Template (2)	Input Template (3)	Input Template (4)	Input Template (5)	Input Template (6)	Input Template (7)	Input Template (8)	Input Template (9)	Input Template (10)	Input Template (11)	Input Template (12)	Input Template (13)	Input Template (14)	1	2	3	4	5	6	Total
Other																						
User-defined material #1	lb	8														8	0	0	0	0	0	8
User-defined material #2	lb	0														0	0	0	0	0	0	0
User-defined material #3	lb	0														0	0	0	0	0	0	0
User-defined material #4	TBD	0														0	0	0	0	0	0	0
User-defined material #5	TBD	0														0	0	0	0	0	0	0
User-defined material #6	TBD	0														0	0	0	0	0	0	0
User-defined material #7	TBD	0														0	0	0	0	0	0	0
User-defined material #8	TBD	0														0	0	0	0	0	0	0
User-defined material #9	TBD	0														0	0	0	0	0	0	0
User-defined material #10	TBD	0														0	0	0	0	0	0	0
User-defined material #11	TBD	0														0	0	0	0	0	0	0
User-defined material #12	TBD	0														0	0	0	0	0	0	0
User-defined material #13	TBD	0														0	0	0	0	0	0	0
User-defined material #14	TBD	0														0	0	0	0	0	0	0
User-defined material #15	TBD	0														0	0	0	0	0	0	0
User-defined material #16	TBD	0														0	0	0	0	0	0	0
User-defined material #17	TBD	0														0	0	0	0	0	0	0
User-defined material #18	TBD	0														0	0	0	0	0	0	0
User-defined material #19	TBD	0														0	0	0	0	0	0	0
User-defined material #20	TBD	0														0	0	0	0	0	0	0
User-defined Waste Destinations																						
User-defined recycled/reused on-site #1	TBD	0														0	0	0	0	0	0	0
User-defined recycled/reused on-site #2	TBD	0														0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD	0														0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD	0														0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD	0														0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD	0														0	0	0	0	0	0	0
User-defined non-hazardous waste destination #1	TBD	0														0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD	0														0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD	0														0	0	0	0	0	0	0
User-defined hazardous waste destination #1	TBD	0														0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD	0														0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD	0														0	0	0	0	0	0	0

RI - On-Site Footprint (Scope 1)

Contributors to Footprints	Units	Usage	Energy		GHG		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
On-Site														
On-site Renewable Energy														
Renewable electricity generated on-site	MWh	0	3.413	0										
Landfill gas combusted on-site for energy use	ccf CH4	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
On-site biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
On-site biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
User-defined on-site renewable energy use #1	gal	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined on-site renewable energy use #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Renewable Energy Subtotals				**0**		**0**		**0**		**0**		**0**		**0**
Notes:														
On-site Conventional Energy														
On-site grid electricity	MWh	0.0006	3.413	0.0020478										
On-site diesel use - Other	Gal	81	0.139	11.259	22.5	1822.5	0.17	13.77	0.0054	0.4374	0.0034	0.2754	0.0000052	0.0004212
On-site diesel use <75 hp	Gal	0	0.139	0	22.21	0	0.1565	0	0.000145	0	0.0145	0	0.00004	0
On-site diesel use 75<hp<750	Gal	0	0.139	0	22.24	0	0.101	0	0.00013	0	0.009	0	0.00004	0
On-site diesel use >750 hp	Gal	0	0.139	0	22.24	0	0.149	0	0.00013	0	0.006	0	0.00004	0
On-site gasoline use - Other	Gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
On-site gasoline use <25 hp	Gal	0	0.124	0	17.48	0	0.037	0	0.00025	0	0.165	0	0.00008	0
On-site gasoline use >25 hp	Gal	0	0.124	0	19.93	0	0.032	0	0.00029	0	0.002	0	0.00009	0
On-site natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
On-site compressed natural gas use - Other	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site compressed natural gas use	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site liquified petroleum gas use - Other	gal	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
On-site liquified petroleum gas use	gal	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
Other forms of on-site conventional energy use #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Other forms of on-site conventional energy use #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
On-site Conventional Energy Subtotals				**11**		**1,823**		**14**		**0**		**0**		**0**
Notes:														
Other On-site Emissions														
On-site HAP process emissions	lbs	0											1	0
On-site GHG emissions	lbs CO2e	0			1	0								
On-site carbon storage	lbs CO2e	0			1	0								
GHG avoided by flaring on-site landfill methane	Lbs	0			-262	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Other on-site NOx emissions or reductions	lbs	0					1	0						
Other on-site SOx emissions or reductions	lbs	0							1	0				
Other on-site PM emissions or reductions	lbs	0									1	0		
User-defined recycled/reused on-site #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused on-site #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
On-site Totals				**11.26**		**1,823**		**14**		**0**		**0**		**0**

RI - Electricity Generation Footprint (Scope 2)

			Energy		GHG		NOx		SOx		PM		HAPs	
Contributors to Footprints	**Units**	**Usage**	**Conv. Factor**	**MMBtus**	**Conv. Factor**	**lbs CO_2e**	**Conv. Factor**	**lbs**	**Conv. Factor**	**lbs**	**Conv. Factor**	**lbs**	**Conv. Factor**	**lbs**
Electricity Generation														
Grid electricity	MWh	0.0006	6.929	0.0041574	1124.3	0.67458	2.2421	0.0013453	4.6078874	0.0027647	0.057518	3.451E-05	0.2102371	0.0001261
Voluntary purchase of renewable electricity	MWh	0												
Voluntary purchase of RECs	MWh	0												
Notes:														

RI - Transportation Footprint (Scope 3a)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	**MMBtus**	**Conv. Factor**	**lbs CO2e**	**Conv. Factor**	**lbs**	**Conv. Factor**	**lbs**	**Conv. Factor**	**lbs**	**Conv. Factor**	**lbs**
Conventional Energy														
Transportation diesel use	gal	55	0.139	7.645	22.5	1237.5	0.17	9.35	0.0054	0.297	0.0034	0.187	0.0000052	0.000286
Transportation diesel use - car	gal	0	0.139	0	22.57	0	0.015	0	0.0002	0	0.003	0	0.00252	0
Transportation diesel use - passenger truck	gal	66.2	0.139	9.2018	22.545	1492.479	0.0585	3.8727	0.0002	0.01324	0.007	0.4634	0.002605	0.172451
Transportation diesel use - User Defined	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
Transportation gasoline use	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation gasoline use - car	gal	32	0.124	3.968	19.77	632.64	0.027	0.864	0.00036	0.01152	0.003	0.096	0.0067	0.2144
Transportation gasoline use - passenger truck	gal	6.3	0.124	0.7812	19.79	124.677	0.035	0.2205	0.00036	0.002268	0.003	0.0189	0.00661	0.041643
Transportation gasoline use - User Defined	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use - User Defined	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
User-defined conventional energy transportation #1	TBD	10	0	0	0	0	0	0	0	0	0	0	0	0
User-defined conventional energy transportation #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Conventional Energy Subtotals				**22**		**3,487**		**14**		**0**		**1**		**0**
Notes:														
Renewable Energy														
Transportation biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
User-defined renewable energy transportation #1	TBD	0	Biodiesel		0	0	0	0	0	0	0	0	Ref.	
User-defined renewable energy transportation #2	TBD	0	mpg or pmp		0	0	0	0	0	0	0	0	0	0
Renewable Energy Subtotals				**0**		**0**		**0**		**0**		**0**		**0**
Notes:														
Transportation Totals				**22**		**3487**		**14**		**0**		**1**		**0**

RI - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv. Factor	MMBtus	Conv. Factor	lbs CO2e	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs	Conv. Factor	lbs
Construction Materials														
Aluminum, Rolled Sheet	lb	0	0.0633	0	9.15	0	0.0148	0	0.0283	0	0.0088	0	0.00102	0
Asphalt, mastic	lb	0	0.0412	0	0.85	0	0.00271	0	0.00798	0	0.000766	0	0.00107	0
Asphalt, paving-grade	lb	0	0.5	0	8.58	0	0.0299	0	0.0969	0	0.0091	0	0.0133	0
Ethanol, Corn, 95%	lb	0	0.0318	0	-0.0199	0	0.00425	0	0.00303	0	0.000469	0	0.0000846	0
Ethanol, Corn, 99.7%	lb	0	0.0324	0	0.0591	0	0.00431	0	0.0031	0	0.000472	0	0.000087	0
Ethanol, Petroleum, 99.7%	lb	0	0.0205	0	1.25	0	0.00199	0	0.00214	0	0.000277	0	0.0000589	0
Gravel/Sand Mix, 65% Gravel	lb	1520	0.0000248	0.037696	0.0024	3.648	0.000018	0.02736	4.52E-06	0.0068704	2.61E-06	0.0039672	3.08E-07	0.0004682
Gravel/sand/clay	lb	0	0.000028	0	0.00335	0	0.0000165	0	0.000015	0	0.000002	0	2.05E-10	0
HDPE	lb	0	0.0332	0	1.94	0	0.00325	0	0.00409	0	0.000439	0	0.0000641	0
Photovoltaic system (installed)	W	0	0.0336	0	4.47	0	0.015	0	0.032	0	0.00063	0	0.0000029	0
PVC	lb	138	0.0262	3.6156	2.02	278.76	0.004	0.552	0.00274	0.37812	0.000372	0.051336	0.000375	0.05175
Portland cement, US average	lb	0	0.0139	0	1.34	0	0.00654	0	0.0104	0	0.00378	0	0.00097	0
Ready-mixed concrete, 20 MPa	ft3	0	0.217	0	19.5	0	0.0975	0	0.154	0	0.057	0	0.0141	0
Round Gravel	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Sand	lb	0	0.0000248	0	0.0024	0	0.000018	0	4.52E-06	0	2.61E-06	0	3.08E-07	0
Stainless Steel	lb	0	0.0116	0	3.4	0	0.0075	0	0.012	0	0.0044	0	0.000144	0
Steel	lb	0	0.0044	0	1.1	0	0.0014	0	0.0017	0	0.00056	0	0.000067	0
Other refined construction materials	lb	0	0.01885	0	2.115	0	0.0040375	0	0.0051325	0	0.0014428	0	0.0001625	0
Other unrefined construction materials	lb	0	0.000028	0	0.00335	0	0.0000165	0	0.000015	0	0.000002	0	2.05E-10	0

Notes:

RI - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy Conv. Factor	Energy MMBtus	Greenhouse Gas Conv. Factor	Greenhouse Gas lbs CO2e	NOx Conv. Factor	NOx lbs	SOx Conv. Factor	SOx lbs	PM Conv. Factor	PM lbs	HAPs Conv. Factor	HAPs lbs
Treatment Materials & Chemicals														
Cheese Whey	lbs	0	0.0025	0	0.031	0	0.000062	0	0.000033	0	0.000002	0	NP	
Emulsified vegetable oil	lbs	0	0.0077	0	3.44	0	0.0066	0	0.0019	0	0.000033	0	NP	
Granular activated carbon, primary	lbs	0	0.0356	0	4.82	0	0.0793	0	0.128	0	0.000987	0	0.000657	0
Granular activated carbon, regenerated	lbs	0	0.00873	0	1.7	0	0.00733	0	0.0129	0	0.000886	0	0.000671	0
Hydrogen Peroxide, 50% in H2O	lbs	0	0.00979	0	1.19	0	0.00142	0	0.0024	0	0.000308	0	0.0000629	0
Iron (II) Sulfate	lbs	0	0.00147	0	0.167	0	0.000316	0	0.000589	0	0.000103	0	0.000023	0
Lime, Hydrated, Packed	lbs	0	0.00206	0	0.762	0	0.000513	0	0.000358	0	0.00013	0	6.57E-06	0
Molasses	lbs	0	0.0044	0	0.48	0	0.0011	0	0.00024	0	0.0000041	0	NP	
Phosphoric Acid, 70% in H2O	lbs	0	0.0067	0	0.882	0	0.00282	0	0.0294	0	0.00171	0	0.000163	0
Potassium Permanganate	lbs	0	0.00981	0	1.16	0	0.00234	0	0.0032	0	0.000422	0	0.000122	0
Sodium Hydroxide, 50% in H2O	lbs	0	0.00977	0	1.09	0	0.00194	0	0.00352	0	0.000403	0	0.000129	0
Other Treatment Chemicals & Materials	lbs	0	0.015	0	1.67	0	0.003	0	0.0065	0	0.00061	0	0.000016	0
Notes:														
Fuel Processing														
Biodiesel produced	gal	0	0.029	0	-16.8	0	0.018	0	0.033	0	0.00082	0	NP	
Diesel produced	gal	202.2	0.017	3.4374	3.02	610.644	0.0051	1.03122	0.0062	1.25364	0.0017	0.34374	0.0011	0.22242
Gasoline produced	gal	38.3	0.033	1.2639	2.8	107.24	0.0046	0.17618	0.005	0.1915	0.0015	0.05745	0.001	0.0383
Liquefied Petroleum Gas Produced	gal	0	0.088	0	1.47	0	0.0016	0	0.0024	0	0.0007	0	0.0003	0
Natural Gas - Compressed Produced	ccf	0	19.983	0	343.92	0	0.4732	0	2.1651	0	0.1846	0	0.2895	0
Natural Gas Produced	ccf	0	0.0052	0	2.2	0	0.0037	0	0.0046	0	0.000072	0	0.0000061	0
Fuel Processing Subtotals				**4.7013**		**717.884**		**1.2074**		**1.44514**		**0.40119**		**0.26072**
Notes:														
Public water	gal x 1000	0.1	0.0092	0.00092	5	0.5	0.0097	0.00097	0.0059	0.00059	0.016	0.0016	0.000015	0.0000015
User-defined water resource #1	gal x 1000	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined water resource #2	gal x 1000	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														

RI - Off-Site Footprint (Scope 3b)

Category	Units	Usage	Energy Conv. Factor	Energy MMBtus	Greenhouse Gas Conv. Factor	Greenhouse Gas lbs CO2e	NOx Conv. Factor	NOx lbs	SOx Conv. Factor	SOx lbs	PM Conv. Factor	PM lbs	HAPs Conv. Factor	HAPs lbs
Off-Site Services														
Hazardous waste incineration	lb	0	0.00609	0	2.43	0	0.0016	0	0.00167	0	0.000209	0	0.000087	0
Off-site waste water treatment (POTW)	gal x 1000	0	0.015	0	4.4	0	0.016	0	0.015	0	NP		NP	
Off-site non-hazardous waste landfill	ton	0	0.16	0	25	0	0.14	0	0.075	0	0.4	0	0.0014	0
Off-site hazardous waste landfill	ton	0	0.18	0	27.5	0	0.154	0	0.0825	0	0.44	0	0.00154	0
Off-site Laboratory Analysis - Other	sample	114	0.058071	6.6200973	6.8534384	781.29198	0.131402	14.979823	0.3038758	34.641837	0.0455698	5.19496	0.0330165	3.7638843
Off-site Laboratory Analysis - Metals	sample	57	0.212	12.084	27.4693	1565.7501	0.6423	36.6111	1.5072	85.9104	0.2264	12.9048	0.1643	9.3651
Off-site Laboratory Analysis - Mercury	sample	0	0.0731715	0	9.325458	0	0.2127439	0	0.4982396	0	0.0747359	0	0.0542332	0
Off-site Laboratory Analysis - Inorganic Anions	sample	0	0.0074025	0	0.6459478	0	0.0067681	0	0.0147929	0	0.0022024	0	0.0015542	0
Off-site Laboratory Analysis - Alkalinity	sample	0	0.0174398	0	1.3381922	0	0.0070106	0	0.0132496	0	0.00194	0	0.0012831	0
Off-site Laboratory Analysis - Perchlorate	sample	0	0.023885	0	1.8717054	0	0.0079807	0	0.0141535	0	0.0020547	0	0.0012875	0
Off-site Laboratory Analysis - Nitrogen/Nitrate	sample	0	0.0336475	0	4.29897	0	0.0954592	0	0.2226646	0	0.0335099	0	0.0242506	0
Off-site Laboratory Analysis - Sulfate	sample	0	0.0141225	0	1.4726728	0	0.0079807	0	0.0136024	0	0.0019797	0	0.0012015	0
Off-site Laboratory Analysis - PCBs	sample	57	0.0512769	2.9227833	5.224902	297.81941	0.0833339	4.7500312	0.1904774	10.857214	0.0284393	1.6210424	0.0212083	1.2088704
Off-site Laboratory Analysis - VOCs	sample	75	0.0762045	5.7153365	9.016814	676.26105	0.104498	7.837353	0.2270738	17.030535	0.0339508	2.546313	0.0235892	1.7691915
Off-site Laboratory Analysis - SVOCs	sample	57	0.0715602	4.0789305	7.870422	448.61405	0.1459445	8.3188376	0.3373038	19.226317	0.0504853	2.8776644	0.0372577	2.1236912
Notes:														
Resource Extraction for Electricity														
Coal extraction and processing	MWh	0.000183	3.1	0.0005588	180.0	0.03294	0.8	0.0001409	0.2	2.745E-05	0.0	3.294E-06	NP	
Natural gas extraction and processing	MWh	0.0002034	1.6	0.0003319	270.0	0.054918	0.2	3.661E-05	13.0	0.0026442	0.0	1.444E-06	NP	
Nuclear fuel extraction and processing	MWh	0.0001188	0.2	1.847E-05	25.0	0.00297	0.2	1.782E-05	0.5	0.0000594	0.0	1.782E-07	NP	
Oil extraction and processing	MWh	0.0000042	2.3	9.641E-06	270.0	0.001134	1.7	7.14E-06	0.1	2.898E-07	0.0	1.764E-07	NP	
Other fuel extraction and processing	MWh	0.0000006	0	0	0	0	0	0	0	0	0	0	0	0
Resource Extraction Subtotals				**0.0009189**		**0.091962**		**0.0002025**		**0.0027313**		**5.093E-06**		**0**
Notes:														
Electricity Transmission														
Transmission and distribution losses	MWh	0.0006	1.0342	0.0006205	112.43	0.067458	0.22421	0.0001345	0.4607887	0.0002765	0.0057518	3.451E-06	0.0210237	1.261E-05
Notes:														

RI - Off-Site Footprint (Scope 3b)

			Energy		Greenhouse Gas		NOx		SOx		PM		HAPs	
			Conv.		Conv.		Conv.		Conv.		Conv.		Conv.	
Category	**Units**	**Usage**	**Factor**	**MMBtus**	**Factor**	**lbs CO2e**	**Factor**	**lbs**	**Factor**	**lbs**	**Factor**	**lbs**	**Factor**	**lbs**
User-defined Materials														
User-defined material #1	lb	8	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #2	lb	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #3	lb	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #4	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #5	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #6	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #7	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #8	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #9	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #10	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #11	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #12	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #13	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #14	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #15	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #16	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #17	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #18	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #19	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined material #20	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
User-defined Waste Destinations														
User-defined recycled/reused off-site #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined recycled/reused off-site #3	TBD	0	y(MMBtu/u		(lbs CO2e/u		Ox(lbs/unit)		Ox(lbs/unit)		M(lbs/unit)		APs(lbs/unit	
User-defined non-hazardous waste destination #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined non-hazardous waste destination #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined non-hazardous waste destination #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #1	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #2	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
User-defined hazardous waste destination #3	TBD	0	0	0	0	0	0	0	0	0	0	0	0	0
Notes:														
Off-site Totals				**39.778203**		**4770.688**		**74.285212**		**169.50003**		**25.602881**		**18.54369**

RI - Intermediate Totals

Category	Units	Usage	Energy Conv. Factor	Energy MMBtus	Greenhouse Gas Conv. Factor	Greenhouse Gas lbs CO2e	NOx Conv. Factor	NOx lbs	SOx Conv. Factor	SOx lbs	PM Conv. Factor	PM lbs	HAPs Conv. Factor	HAPs lbs
Total Grid Electricity Footprint														
On-site grid electricity	MWh	0.0006	3.413	0.0020478										
Electricity Generation														
Grid electricity	MWh	0.0006	6.929	0.0041574	1124.3	0.67458	2.2421	0.0013453	4.6078874	0.0027647	0.057518	3.451E-05	0.2102371	0.0001261
Resource Extraction for Electricity														
Coal extraction and processing	MWh	0.000183	3.1	0.0005588	180.0	0.03294	0.8	0.0001409	0.2	2.745E-05	0.0	3.294E-06	NP	
Natural gas extraction and processing	MWh	0.0002034	1.6	0.0003319	270.0	0.054918	0.2	3.661E-05	13.0	0.0026442	0.0	1.444E-06	NP	
Nuclear fuel extraction and processing	MWh	0.0001188	0.2	1.847E-05	25.0	0.00297	0.2	1.782E-05	0.5	0.0000594	0.0	1.782E-07	NP	
Oil extraction and processing	MWh	0.0000042	2.3	9.641E-06	270.0	0.001134	1.7	7.14E-06	0.1	2.898E-07	0.0	1.764E-07	NP	
Other fuel extraction and processing	MWh	0.0000006	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0
Electricity Transmission														
Transmission and distribution losses	MWh	0.0006	1.0342	0.0006205	112.43	0.067458	0.22421	0.0001345	0.4607887	0.0002765	0.0057518	3.451E-06	0.0210237	1.261E-05
Total Grid Electricity Footprint				**0**		**1**		**0**		**0**		**0**		**0**
Total Fuel Footprints														
Total Gasoline Footprint														
On-site gasoline use - Other	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
On-site gasoline use <25 hp	gal	0	0.124	0	17.48	0	0.037	0	0.00025	0	0.165	0	0.00008	0
On-site gasoline use >25 hp	gal	0	0.124	0	19.93	0	0.032	0	0.00029	0	0.002	0	0.00009	0
Transportation gasoline use	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Transportation gasoline use - car	gal	32	0.124	3.968	19.77	632.64	0.027	0.864	0.00036	0.01152	0.003	0.096	0.0067	0.2144
Transportation gasoline use - passenger truck	gal	6.3	0.124	0.7812	19.79	124.677	0.035	0.2205	0.00036	0.002268	0.003	0.0189	0.00661	0.041643
Transportation gasoline use - User Defined	gal	0	0.124	0	19.6	0	0.11	0	0.0045	0	0.00054	0	0.000039	0
Gasoline produced	gal	38.3	0.033	1.2639	2.8	107.24	0.0046	0.17618	0.005	0.1915	0.0015	0.05745	0.001	0.0383
Total Gasoline Footprint		**38.3**		**6.0131**		**864.557**		**1.26068**		**0.205288**		**0.17235**		**0.294343**
Total Diesel Footprint														
On-site diesel use - Other	gal	81	0.139	11.259	22.5	1822.5	0.17	13.77	0.0054	0.4374	0.0034	0.2754	0.0000052	0.0004212
On-site diesel use <75 hp	gal	0	0.139	0	22.21	0	0.1565	0	0.000145	0	0.0145	0	0.00004	0
On-site diesel use 75<hp<750	gal	0	0.139	0	22.24	0	0.101	0	0.00013	0	0.009	0	0.00004	0
On-site diesel use >750 hp	gal	0	0.139	0	22.24	0	0.149	0	0.00013	0	0.006	0	0.00004	0
Transportation diesel use	gal	55	0.139	7.645	22.5	1237.5	0.17	9.35	0.0054	0.297	0.0034	0.187	0.0000052	0.000286
Transportation diesel use - car	gal	0	0.139	0	22.57	0	0.015	0	0.0002	0	0.003	0	0.00252	0
Transportation diesel use - passenger truck	gal	66.2	0.139	9.2018	22.545	1492.479	0.0585	3.8727	0.0002	0.01324	0.007	0.4634	0.002605	0.172451
Transportation diesel use - User Defined	gal	0	0.139	0	22.5	0	0.17	0	0.0054	0	0.0034	0	0.0000052	0
Diesel produced	gal	202.2	0.017	3.4374	3.02	610.644	0.0051	1.03122	0.0062	1.25364	0.0017	0.34374	0.0011	0.22242
Total Diesel Footprint		**202.2**		**31.5432**		**5163.123**		**28.02392**		**2.00128**		**1.26954**		**0.3955782**
Total Biodiesel Footprint														
On-site biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
On-site biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Transportation biodiesel use - User Defined	gal	0	0.127	0	22.3	0	0.2	0	0	0	0.00099	0	NP	
Biodiesel produced	gal	0	0.029	0	-16.8	0	0.018	0	0.033	0	0.00082	0	NP	
Total Biodiesel Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Natural Gas Footprint														
On-site natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Transportation natural gas use - User Defined	ccf	0	0.103	0	13.1	0	0.01	0	0.0000063	0	0.00076	0	0.0000084	0
Natural gas produced	ccf	0	0.0052	0	2.2	0	0.0037	0	0.0046	0	0.000072	0	0.0000061	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Liquified Petroleum Gas Footprint														
On-site liquified petroleum gas use - Other	ccf	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
On-site liquified petroleum gas use	ccf	0	NP		12.69	0	0.021	0	0.00013	0	0.001	0	0	0
Liquified petroleum gas produced	ccf	0	0.088	0	1.47	0	0.0016	0	0.0024	0	0.0007	0	0.0003	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**
Total Compressed Gas Footprint														
On-site compressed gas use - Other	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
On-site compressed gas use	ccf	0	NP		1957.835	0	16.0325	0	0.023045	0	0.2775	0	0	0
Compressed gas produced	ccf	0	19.983	0	343.92	0	0.4732	0	2.1651	0	0.1846	0	0.2895	0
Total Natural Gas Footprint		**0**		**0**		**0**		**0**		**0**		**0**		**0**

Notes:

Note: Please refer to the "Default Conversions" tab for references for the default conversion factors used on this calculation sheet.

Space below available for notes and calculations:

APPENDIX H
Health and Safety Plan

HALEY & ALDRICH, INC.
SITE-SPECIFIC SAFETY PLAN

FOR

515-519 West 43rd Street Redevelopment Site

515-519 West 43rd Street and 514-518 West 44th Street

New York, New York 10036

Project/File No. 0211280

Gensuite EZ Scan®

BI - Developers

Prepared By: Nicole Mooney	**Date: 10/31/2024**
Approvals: The following signatures constitute approval of this Health & Safety Plan.	
Field Safety Manager: Brian Ferguson	**Date: 11/6/2024**
Project Manager: Luke McCartney, P.G.	**Date: 11/4/2024**
HASP Valid Through: 12/31/2024	

Table of Contents

Attachments

STOP WORK AUTHORITY

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

STOP Work Authority is the stop work policy for all personnel and subcontractors on the Site. When work has been stopped due to an unsafe condition, Haley & Aldrich site management (e.g., Project Manager [PM], Site Health & Safety Officer [SHSO], etc.) and the Haley & Aldrich Senior Project Manager (SPM) will be notified immediately.

Reasons for issuing a stop work order include, but are not limited to:

- The belief/perception that injury to personnel or accident causing significant damage to property or equipment is imminent.
- An Haley & Aldrich subcontractor is in breach of site safety requirements and/or their own site HASP.
- Identifying a substandard condition (e.g., severe weather) or activity that creates an unacceptable safety risk as determined by a qualified person.

Work will not resume until the unsafe act has been stopped OR sufficient safety precautions have been taken to remove or mitigate the risk to an acceptable degree. Stop work orders will be documented as part of an on-site stop work log, on daily field reports to include the activity/activities stopped, the duration, person stopping work, person in-charge of stopped activity/activities, and the corrective action agreed to and/or taken. Once work has been stopped, only the Haley & Aldrich SPM or SHSO can give the order to resume work. Haley & Aldrich senior management is committed to support anyone who exercises his or her "Stop Work" authority.

ISSUANCE AND COMPLIANCE

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

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

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

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

EMERGENCY EVENT PROCEDURES

1 - ASSESS THE SCENE

- STOP WORK
- Review the situation and ascertain if it's safe to enter the area.
- Evacuate the site if the conditions are unsafe.

2 - EVALUATE THE EMERGENCY

- **Call 911, or designated emergency number, if required.**
- **Provide first aid for the victim if qualified and safe to do so.**
  - First aid will be addressed using the onsite first aid kit. *
    - If providing first aid, remember to use proper first aid universal precautions if blood or bodily fluids are present.
- **If exposure to hazardous substance is suspected, immediately vacate the contaminated area.**
  - Remove any contaminated clothing and/or equipment.
  - Wash any affected dermal/ocular area(s) with water for at least 15 minutes.
  - Seek immediate medical assistance if any exposure symptoms are present.

** Note: Haley & Aldrich employees are not required or expected to administer first aid / CPR to any Haley & Aldrich staff member, Contractor, or Civilian personnel at any time; it is Haley & Aldrich´s position that those who do are doing so on their own behalf and not as a function of their job.*

3 - SECURE THE AREA

- **Cordon off the incident area, if possible.**
  - Notify any security personnel, if required.
  - Escort all non-essential personnel out of the area, if able.

4 - REPORT ON-SITE ACCIDENTS / INCIDENTS TO PM / SSO

- **Notify the PM and SSO as soon as it is safe to do so.**
  - Assist PM and SSO in completing any additional tasks, as required.

5 - INVESTIGATE / REPORT THE INCIDENT

- **Record details of the incident for input to the Gensuite.**
  - Complete any additional forms as requested by the PM and SSO.

6 - TAKE CORRECTIVE ACTION

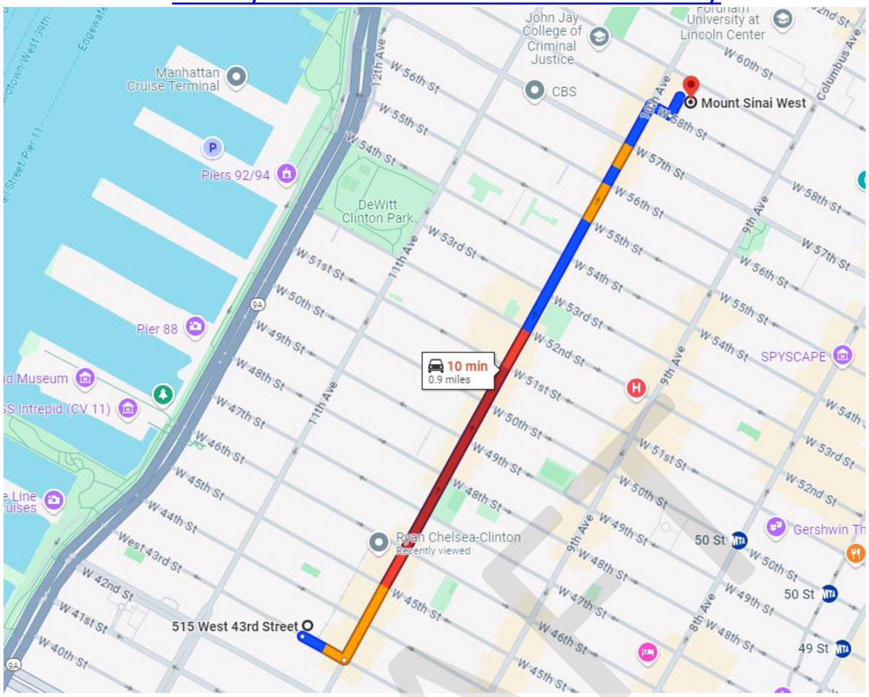
- **Implement corrective actions per the PM following root cause analysis.**
  - Complete Lessons Learned form.

PROJECT INFORMATION AND CONTACTS	
Project Name: 515-519 West 43rd Street Redevelopment Site	**Haley & Aldrich File No.:** 0211280
Location: 515-519 West 43rd Street and 514-518 West 44th Street, New York, New York	
Client/Site Contact: Phone Number:	Alexander Ashkenazi Enter Phone Number
Haley & Aldrich Field Representative: Phone Number: Emergency Phone Number:	Owen Hennigan 315-679-2368 646-413-6605
Haley & Aldrich Project Manager: Phone Number: Emergency Phone Number:	**Luke McCartney, P.G.** 347-640-2759 646-277-5686
Field Safety Manager: Office Phone Number: Cell Phone Number:	Brian Ferguson 617-886-7439 617-908-2761
Subcontractor Project Manager: Phone Number:	TBD Enter Phone Number
Nearest Hospital: Address: (see map on next page) Phone Number:	Mount Sinai West 1000 10th Ave New York, NY 12550 212-523-4000
Nearest Occ. Health Clinic: **http://www.talispoint.com/liberty/ext/** Address: (see map on next page) Phone Number:	Ryan Chelsea-Clinton 645 10th Ave New York, NY 10036 212.749.1820
Liberty Mutual Claim Policy	**WC6-Z11-254100-034**
WorkCare Injury & Illness HOTLINE	**1-888-449-7787**
Emergency Response Number:	**911**
Other Local Emergency Response Number:	N/A
Other Ambulance, Fire, Police, or Environmental Emergency Resources:	911

Note: This HASP is developed for Haley & Aldrich purposes only and not for use by others.

DIRECTIONS TO THE NEAREST HOSPITAL

[Liberty Mutual Medical Location Directory]



Directions to the Nearest Hospital:

515 West 43rd St
New York, NY 10036

↑ Head southeast on West 43rd St toward 10th Ave

299 ft

↰ Turn left at the 1st cross street onto 10th Ave
Pass by Grace Wine & Spirits (on the right)

0.7 mi

↱ Turn right onto W 58th St

138 ft

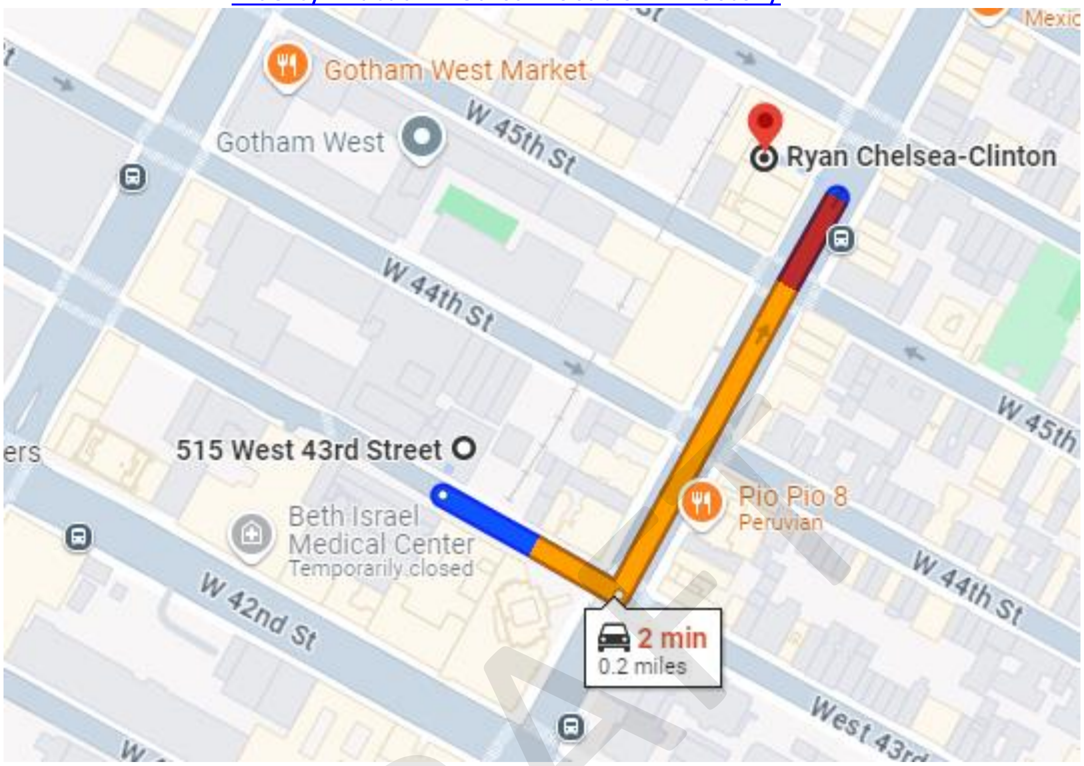
↰ Turn left
Destination will be on the right

131 ft

Mount Sinai West
1000 10th Ave, New York, NY 10019

DIRECTIONS TO THE NEAREST URGENT CARE

[Liberty Mutual Medical Location Directory]



Directions to the Nearest Occupational Clinic:

515 West 43rd St
New York, NY 10036

↑ Head southeast on West 43rd St toward 10th Ave

299 ft

↰ Turn left at the 1st cross street onto 10th Ave

Pass by Grace Wine & Spirits (on the right)

Destination will be on the left

0.1 mi

Ryan Chelsea-Clinton
645 10th Ave, New York, NY 10036

1. WORK SCOPE

This Site-Specific Health and Safety Plan addresses the health and safety practices and procedures that will be exercised by all Haley & Aldrich employees participating in all work on the Project Site. This plan is based on an assessment of the site-specific health and safety risks available to Haley & Aldrich and Haley & Aldrich's experience with other similar project sites. The scope of work includes the following:

1.) Drilling and monitoring well installation; and, 2.) Soil, soil vapor, and groundwater sampling

Project Task Breakdown

Task No.	Task Description	Employee(s) Assigned	Work Date(s) or Duration
1	Drilling and Monitoring Well Installation	Owen Hennigan	1 Week
2	Soil, Soil Vapor, and Groundwater Sampling	Owen Hennigan	1 Week

Subcontractor(s) Tasks

Firm Name	Work Activity	Work Date(s) or Duration
TBD	Drilling and monitoring well installation	1 Week

Projected Start Date: 3/3/2025

Projected Completion Date: 3/14/2025

2. SITE OVERVIEW / DESCRIPTION

Site Classification

Commercial

Site Description

The Site is identified as Block 1072, Lots 21 (515-519 West 43rd Street), 42 (514 West 44th Street), and 44 (518 West 44th Street) on the New York City tax map. The Site is approximately 15,070 square feet (sq ft) (0.346 acres) and is currently improved with a three-story building and one-story addition encompassing all of Lot 21 with a partial cellar located on the southern portion of Lot 21, a one-story auto repair and taxi garage encompassing all of Lot 42, and a one-story auto repair and taxi garage encompassing all of Lot 44. The cellar and first floors of the one- to three-story building on Lot 21 are currently occupied by "Avis," an automotive rental company, and the second and third floors are currently vacant. The two one-story garages on Lots 42 and 44 are currently occupied by "Rosenberg Auto Repair Inc.", an auto repair and maintenance shop. The Site is bounded to the north by West 44th Street followed by Public School 051, The Elias Howe School; to the east by a 15-story mixed residential and commercial building; to the south by West 43rd Street followed by a 35-story mixed residential and commercial building; and to the west by M479 Beacon High School and a one-story automotive repair shop.

Background and Historic Site Usage

According to a Phase I Environmental Site Assessment (ESA) conducted by Haley & Aldrich of New York in October 2024, the Site has been developed for residential and commercial uses since at least 1890, including print shops, a farrier, the "Park & Tilford" warehouse, parking garages, a service station, auto repair shops, and commercial operations. The Phase I ESA identified three potential buried 550-gallon USTs, an active 4,000-gallon gasoline UST, and an active 250-gallon waste oil AST at the site.

Site Status

Indicate current activity status and describe operations at the site:

Active

The Site is currently active and operated as an "Avis" auto rental shop and two one-story auto repair garages.

Site Plan

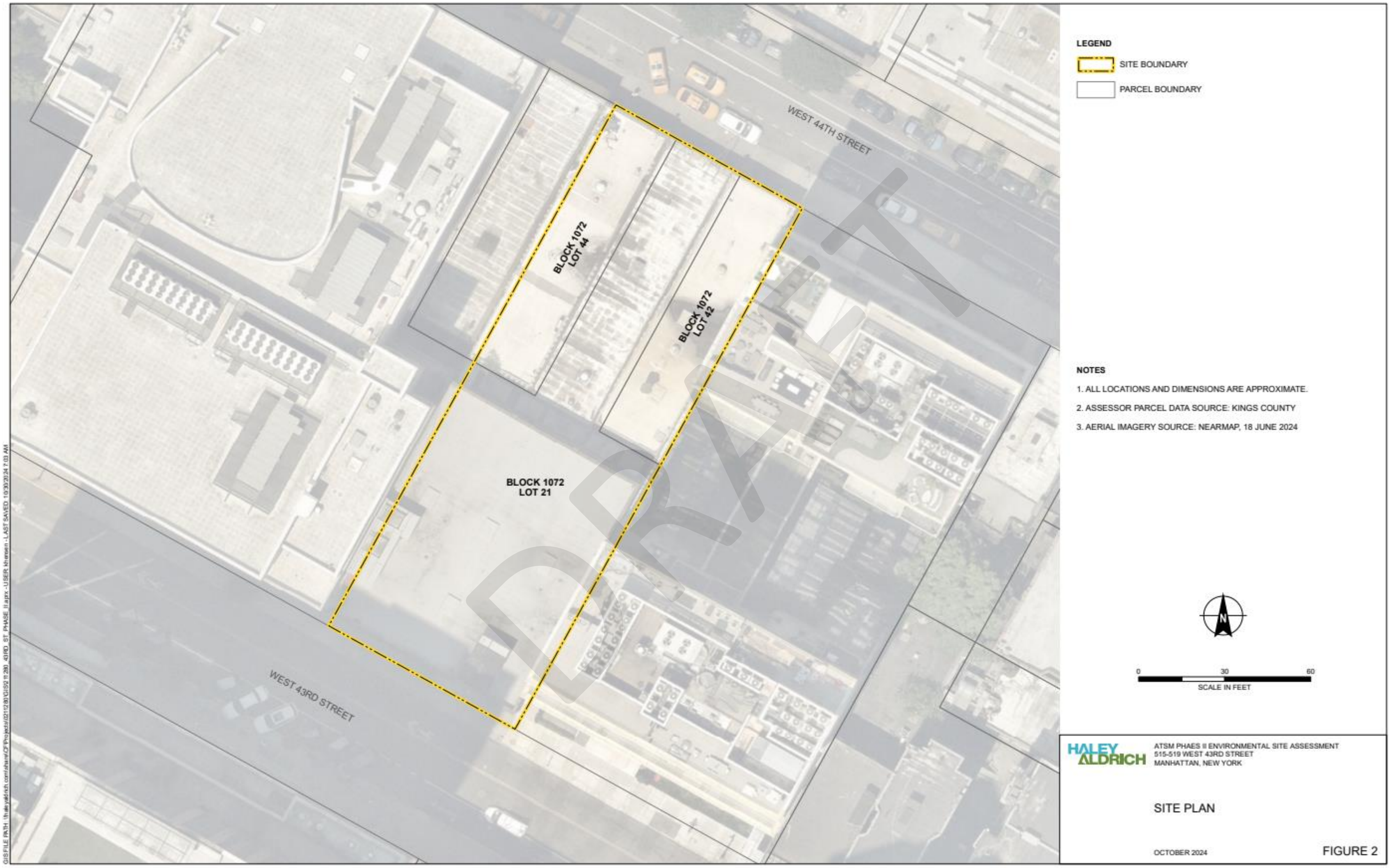
Is a site plan or sketch available? Yes

Work Areas

List and identify each specific work areas(s) on the job site and indicate its location(s) on the site plan:

Entire site

Site Plan


LEGEND
SITE BOUNDARY
PARCEL BOUNDARY
NOTES
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. ASSESSOR PARCEL DATA SOURCE: KINGS COUNTY
3. AERIAL IMAGERY SOURCE: NEARMAP, 18 JUNE 2024
WEST 44TH STREET
WEST 43RD STREET
BLOCK 1072 LOT 44
BLOCK 1072 LOT 42
BLOCK 1072 LOT 21
DRAFT
0
30
60
SCALE IN FEET
HALEY ALDRICH
ATSM PHAES II ENVIRONMENTAL SITE ASSESSMENT
515-519 WEST 43RD STREET
MANHATTAN, NEW YORK
SITE PLAN
OCTOBER 2024
FIGURE 2

3. HAZARD ASSESSMENT

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

Site Chemical Hazards

Is this Site impacted with chemical contamination? Yes

Source of information about contaminants: Previous Investigation

Contaminant of Concern	Location/Media	Concentration	Units
Polycyclic aromatic hydrocarbons (PAHs)	**Soil**	**54**	**mg/kg**
Volatile Organic Compounds (VOCs)	**Soil**	**230**	**mg/kg**
1,2,4-Trimethylbenzene	**Soil**	**230**	**mg/kg**
Ethylbenzene	**Soil**	**2.1**	**mg/kg**
Naphthalene	**Soil**	**34**	**mg/kg**
Xylenes	**Soil**	**140**	**mg/kg**
Arsenic	**Soil**	**13.4**	**mg/kg**
Barium	**Soil**	**487**	**mg/kg**
Lead	**Soil**	**2,720**	**mg/kg**
Mercury	**Soil**	**0.714**	**mg/kg**
Zinc	**Soil**	**3,300**	**mg/kg**
1,2,4-Trimethylbenzene	**Soil Vapor**	**90.5**	**ug/m3**
1,4-Dioxane	**Soil Vapor**	**5.73**	**ug/m3**
Benzene	**Soil Vapor**	**68.4**	**ug/m3**
Ethylbenzene	**Soil Vapor**	**291**	**ug/m3**
Naphthalene	**Soil Vapor**	**6.29**	**ug/m3**
Tetrachloroethylene	**Soil Vapor**	**135**	**ug/m3**

Trichloroethylene	**Soil Vapor**	**4.44**	**ug/m3**
Xylenes	**Soil Vapor**	**1,362**	**ug/m3**
Volatile Organic Compounds (VOCs)	**Soil Vapor**	**4,009.9**	**ug/m3**
BTEX/VOCs	**Soil Vapor**	**2,257.2**	**ug/m3**

Polycyclic aromatic hydrocarbons (PAHs): are a class of chemicals that occur naturally in coal, crude oil, and gasoline. They also are produced when coal, oil, gas, wood, garbage, and tobacco are burned. PAHs generated from these sources can bind to or form small particles in the air. High-temperature cooking will form PAHs in meat and in other foods. Naphthalene is a PAH that is produced commercially in the United States to make other chemicals and mothballs. Cigarette smoke contains many PAHs.

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

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

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

1,2,4-Trimethylbenzene: is a colorless liquid chemical with a strong, pleasant scent. 1,2,4-trimethylbenzene is a major part of what is known in the petroleum industry as the 'C9 fraction.' Oil refineries produce large amounts of C9 fraction each year for use as a gasoline additive.

BTEX/VOCs: BTEX is an acronym for benzene, toluene, ethylbenzene and xylenes. These compounds are VOCs, are common in petroleum-related products (e.g., oil, gasoline, coal-tar DNAPL, etc.), and frequently co-occur at hazardous waste sites. Benzene, toluene, ethylbenzene, and xylenes have acute and chronic harmful effects on the central nervous system. Benzene is classified as a carcinogen. Short-term health effects of low-level BTEX exposure include drowsiness, dizziness, accelerated heart rate, headaches, tremors, confusion, and unconsciousness.

Naphthalene: is a colorless or white/brown solid in flake or cake form, with mothball odor. Commonly found in coal tar, gasoline, or diesel fuels. Used to make mothballs and lubricants. This is a carcinogen and should be handled with extreme caution. Is a combustible solid and when heated is a dangerous fire hazard. Finely dispersed particles can form explosive mixtures. Absorption will cause irritation or burning to skin or eyes. Inhalation will cause irritation to nose and throat. High exposures will lead to headache, fatigue, tremors, and nausea. May also cause damage to liver and kidneys. The PEL 10 ppm averaged over an 8 hour shift.

Arsenic: The Occupational Safety and Health Administration has set limits of 10 microgram arsenic per cubic meter of workplace air (10 µg/m3) for 8 hour shifts and 40 hour work weeks. Several studies have shown that inorganic arsenic can increase the risk of lung cancer, skin cancer, bladder cancer, liver cancer, kidney cancer, and prostate cancer. The World Health Organization (WHO), the Department of Health and Human Services (DHHS), and the EPA have determined that inorganic arsenic is a human carcinogen.

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting high levels of inorganic arsenic can result in death. Lower levels of arsenic can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Barium: is a soft, silvery metal that rapidly tarnishes in air and reacts with water. It is mostly used in drilling fluids for oil and gas wells and used in paint and in glassmaking. All barium compounds are toxic; however, barium sulfate is insoluble and so can be safely swallowed. A suspension of barium sulfate is sometimes given to patients suffering from digestive disorders.

Barium has no known biological role, although barium sulfate has been found in one type of algae. Barium is toxic, as are its water- or acid-soluble compounds. Barium occurs only in combination with other elements. The major ores are barite (barium sulfate) and witherite (barium carbonate). Barium metal can be prepared by electrolysis of molten barium chloride, or by heating barium oxide with aluminum powder.

Lead: The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity is the nervous system. Long-term exposure to lead can result in decreased performance in some tests measuring functions of the nervous system in adults. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys and ultimately cause death.

Mercury: is an odorless, silver metallic liquid. It can be inhaled or absorbed through the skin. Contact may cause irritation to the skin or eyes. Toxic if ingested. Fume inhalation may cause irritation in the nose, throat or lungs. This is a corrosive chemical. Symptoms of poisoning include, muscle tremors, loss of appetite, and nausea. Long-term exposure may have effects on the central nervous system and kidneys. The PEL is 0.1 mg/m^3 averaged over an 8 hour shift.

Zinc: is an odorless, bluish-white powder. It is typically used in paints and can be mixed with other metals to make bass and other types of alloys. Zinc can produce flammable gases when in contact with water, sometimes creating vigorous or explosive reactions. It can also create gaseous hydrogen in contact with water or moist air. Inhalation will cause irritation to eyes and respiratory system. Exposures cause flu-like symptoms, called “metal fume fever”, which can sometimes be delayed up to 48 hours after initial exposure.

1,4-Dioxane: Industrial chemical that is not found naturally in the environment. It is a colorless liquid with a mild, ether-like odor and dissolves in water at all concentrations. It is primarily used as a solvent in the manufacturing of chemicals and as a laboratory reagent. 1,4-Dioxane is also a trace contaminant of some chemicals found in cosmetics and detergents.

Tetrachloroethylene: is a colorless liquid with a sharp sweet odor. Tetrachloroethylene vapor is heavier than air and will be found in low lying areas.

Trichloroethylene: is a nonflammable colorless liquid with a sweet odor. Trichloroethylene vapor is heavier than air and is found in low lying areas.

Site Hazards Checklist

Weather

Cold Temperatures	High Winds	Hot Temperatures	Select Hazard

Cold Temperatures

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

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

High Winds

While high winds are commonly associated with severe thunderstorms and hurricanes they may also occur as a result of differences in air pressures, such as when a cold front passes across the area. They can cause downed trees and power lines, and flying debris (such as dust or larger debris), which adds additional risks and could lead to power outages, transportation disruptions, damage to buildings and vehicles, and serious injury.

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

Hot Temperatures

Heat stress may occur at any time work is being performed at elevated ambient temperatures. Because heat stress is one of the most common and potentially serious illnesses associated with outdoor work during hot seasons, regular monitoring and other preventative measures are vital. Site workers must learn to recognize and treat the various forms of heat stress. The best approach is preventative heat stress management.

H&A employees and their subcontractors should be aware of potential health effects and/or physical hazards of working when there are hot temperatures or a high heat index. Refer OP1015-Heat Stress for a discussion on hot weather hazards.

Biological			
Small Mammals	Mosquitoes	Stinging Insects	Wildlife Droppings

Small Mammals

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

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

The House Mouse has the amazing ability to adapt and can frequently be found in human dwellings. In buildings, mice will live anywhere and difficult to keep out. Mice are omnivorous, they will eat anything. Rats and mice often become a serious problem in cold winter months when they seek food and warmth inside buildings. They may suddenly appear in large numbers when excavation work disturbs their in-ground nesting locations or their food source is changed.

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

Avoid contact with rodents, if possible. Avoid contact with rodent excrement. Do not eat food or water that may have encountered rodent excrement. If exposed, wash hands and avoid touching your face with your hands.

Mosquitos

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

Use repellents containing DEET, picaridin, IR3535, and some oil of lemon eucalyptus and para-menthane-diol products provide longer-lasting protection. To optimize safety and effectiveness, repellents should be used according to the label instructions. Cover as much of your skin as possible by wearing shirts with long-sleeves, long pants, and socks whenever possible. Avoid use of perfumes and colognes when working outdoors during peak times when mosquitoes may be active; mosquitoes may be more attracted to individuals wearing perfumes and colognes.

Stinging Insects

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

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

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

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

Wildlife Droppings

Project sites involving abandoned buildings may bring staff into contact with animal droppings. There are many diseases that one can be exposed to from a variety of animals.

Mice and Rats

Hantavirus is transmitted to humans from dried droppings, urine, or saliva of mice and rats. The disease begins as a flu-like illness with fever, chills, and muscle aches, but can rapidly progress to a life-threatening condition marked by respiratory failure as fluids fill the lungs. Persons working in infested buildings are at increased risk to this disease, particularly during dusty clean-up activities.

Birds and Bats

Large populations of roosting birds may present a disease risk. The most serious health risks arise from disease organisms that grow in the nutrient-rich accumulations of bird droppings, feathers and debris under a roost, particularly if roosts have been active for years.

Histoplasmosis and Cryptococcosis are the most common fungal diseases associated with bird and bat dropping. Infection occurs when spores, carried by the air, are inhaled, especially after a roost has been disturbed. The active and inactive roosts of blackbirds, starlings and cowbirds have also been found to be heavily contaminated with fungus spores. Most infections are mild and produce either no symptoms or a minor influenza-like illness. Occasionally the disease can cause high fever, blood abnormalities, pneumonia and even death.

Do not touch droppings with unprotected hands. Avoid disturbing the droppings and generating dust. Employee work practices and dust control measures that eliminate or reduce dust generation during removal of manure from a building will also reduce risks of infection and development of disease. Use an industrial vacuum cleaner with a high-efficiency (HEPA) filter to bag contaminated material.

Location/Terrain			
Slip/Trip/Falls	SIMOPS	Economically Depressed	Choose an item.

Slips, Trips & Falls

Slip and trip injuries are the most frequent injuries to workers. Statistics show most falls happen on the same level resulting from slips and trips. Both slips and trips result from unintended or unexpected change in the contact between the feet and the ground or walking surface. Good housekeeping, quality of walking surfaces (flooring), awareness of surroundings, selection of proper footwear, and appropriate pace of walking are critical for preventing fall accidents.

Site workers will be walking on a variety of irregular surfaces, that may affect their balance. Extra care must be taken to walk cautiously near rivers because the bottom of the riverbed maybe slick and may not be visible. Rocks, gradient changes, sandy bottoms, and debris may be present but not observable.

Take your time and pay attention to where you are going. Adjust your stride to a pace that is suitable for the walking surface and the tasks you are doing. Check the work area to identify hazards - beware of trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain. Establish and utilize a pathway free of slip and trip hazards. Choose a safer walking route. Carry loads you can see over. Keep work areas clean and free of clutter. Communicate hazards to on-site personnel and remove hazards as appropriate.

SIMOPS

SIMOPS are described as the potential class of activities which could bring about an undesired event or set of circumstances, e.g., safety, environment, damage to assets, schedule, commercial, financial, etc. SIMOPS are defined as performing two or more operations concurrently.

SIMOPS should be identified at an early stage before operations commence to understand issues such as schedule and physical clashes, maintenance activities, failure impacts, interferences between vessels, contracts and third part interfaces and environmental impacts.

Coordinate project with site activities. Identify and understand the hazards associated with the host and client's activities. Integrate site emergency response protocols where appropriate and communicate to all project staff. Integrate site communication protocols and communicate to all project staff.

Economically Depressed Areas

Economically depressed areas may have high crime rates. Projects involving work in and around inactive industrial sites may bring staff into contact with indigent and homeless persons. Staff could be subjected to crime that includes but may not be limited to thievery, vandalism, and violence. Prior to the start of work staff need to understand the work locations and the potential for exposure to low level crime.

Staff members should never work alone in these areas. A buddy system is required. Conduct during daylight hours. Secure equipment and vehicles. If warranted, contact the local police department for a security detail. Leave the work area immediately and contact the local authorities if staff members feel threatened or are threatened.

Miscellaneous			
Extended Shift	Choose an item.	Choose an item.	Choose an item.

Extended Shift

An extended shift can include extending a workday beyond eight hours. Extended or unusual work shifts may be more stressful physically, mentally, and emotionally. Non-traditional shifts and extended work hours may disrupt the body's regular schedule, leading to increased fatigue, stress, and lack of concentration. This leads to an increased risk of operator error, injuries and/or accidents. The degree to which an individual is exposed to fatigue risk factors depends upon the work schedule. As both the duration of the workday and the number of days worked increase so does the fatigue risk factors. Staff Managers need to be aware of the fatigue risk factors and ensure projects are structured to mitigate these factors. Staff Members also have a responsibility to manage the personal fatigue risk factors that they can control outside of work (e.g, duration and quality of sleep, diet, drugs, and alcohol)

Fatigue is a message to the body to rest and can be eliminated with proper rest. However, if rest is not possible, fatigue can increase and becomes distressing and eventually debilitating. Fatigue symptoms, both mental and physical, vary and depend on the person and degree of overexertion. Examples include: weariness, sleepiness, irritability, reduced alertness, lack of memory, concentration and motivation, increased susceptibility to illness, depression, headache, loss of appetite, and digestive problems.

When possible, managers should limit use of extended shifts and increase the number of days worked. Working shifts longer than 8 hours generally result in reduced productivity and alertness. Additional breaks and meals should be provided when working extended shift periods. Tasks requiring heavy physical labor or intense concentration should be performed at the beginning of the shift if possible. This is an important consideration for pre-emergency planning.

Make efforts, when feasible, to ensure that unavoidable extended work shifts and shift changes allow affected employees time for adequate rest and recovery. Project Managers need to plan to have an adequate number of personnel available to enable workers to take breaks, eat meals, relax, and sleep.

Plan for regular and frequent breaks throughout the work shift. If at remote sites, ensure if possible, that there is a quiet, secluded area designated for rest and recuperation. In addition to formal breaks such as lunch or dinner, encourage use of micro breaks to change positions, move about, and shift concentration. Personnel should look to obtain an adequate quantity and quality of sleep.

Task Hazard Summary

Task 1 – Drilling and Monitoring Well Installation

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

See OP 1002 Drilling Safety for more information.

Task 2A – Soil Sampling

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

Task 2B – Soil Vapor

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

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

Task 2C – Water Sampling

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

Sampling tasks could involve uncapping, purging (pumping water out of the well), and sampling, and/or monitoring, new or existing monitoring wells. A mechanical pump may be used to purge the wells and can be hand-, gas-, or electric-operated. Water samples taken from the wells are then placed in containers and shipped to an analytical laboratory for analysis. The physical hazards of these operations are primarily associated with the collection methods and procedures used.

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

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

Task Physical Hazards Checklist				
Potential Task Hazards	**Task 1** **Drilling and Monitoring Well Installation**	**Task 2** **Soil, Soil Vapor, and Groundwater Sampling**	**Task 3** Task Name	**Task 4** Task Name
Congested Area	☒	☒	☐	☐
Ergonomics	☒	☒	☐	☐
Energized Equipment	☒	☒	☐	☐
Generated Wastes	☒	☒	☐	☐
Ground Disturbance	☒	☐	☐	☐
Hand/Power Tools	☒	☒	☐	☐
Heavy Equipment	☒	☐	☐	☐
Line of Fire	☒	☒	☐	☐
Manual Lifting	☒	☒	☐	☐
Noise	☒	☐	☐	☐
Overhead Utilities	☒	☐	☐	☐
Repetitive Motion	☒	☒	☐	☐
Rotating Equipment	☒	☐	☐	☐
Slippery Surfaces	☒	☒	☐	☐
Sharp Objects	☒	☒	☐	☐
Underground Utilities	☒	☐	☐	☐
Other: Specify	☐	☐	☐	☐

Summary of Physical Hazards & Controls

Congested Areas

Working in congested areas can expose both workers and the public to a wide range of hazards depending upon the specific activities taking place. Staff Members need to understand the work scope, work areas, equipment on-site, and internal traffic patterns to minimize or eliminate exposure potential.

Controls

- Provide barricades, fencing, warning signs/signals and adequate lighting to protect people while working in or around congested areas.
- Vehicles and heavy equipment with restricted views to the rear should have functioning back-up alarms that are audible above the surrounding noise levels. Whenever possible, use a signaler to assist heavy equipment operators and/or drivers in backing up or maneuvering in congested areas.
- Lay out traffic control patterns to eliminate excessive congestion.
- Workers in congested areas should always wear high visibility clothing.
- Be aware of Line of Fire hazards when performing work activities in congested areas.
- Hazards associated with SIMOPs should be discussed daily at Tailgate Safety Meetings.

Energized Equipment

Energy sources including electrical, mechanical, hydraulic, pneumatic, or other sources in machines and equipment can be hazardous to workers. During servicing and maintenance of machines and equipment, the unexpected startup or release of stored energy can result in serious injury or death to workers.

Staff members that are required to work on energized equipment must first ensure that the source of energy is isolated and/or de-energized. In addition, any stored energy must also be released. Staff must ensure that the process to de-energize and isolate energy sources is documented and communicated to those who are working on the equipment. Staff must be trained on and understand the procedure.

See OP 1032 Control of Hazardous Energy for more information.

Controls

- Document process to de-energize or isolate energy sources.
- Ensure staff are appropriately trained to conduct work requiring LOTO.
- Affix log or tag to equipment to ensure improper start-up or release of energy.
- Execute an Energy Isolation Permit.

Ergonomics

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

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

See OP1053 Ergonomics for more information.

Controls

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

Generated Waste

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

Controls

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

Ground Disturbance

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

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

See OP1020 Working Near Utilities

Controls

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

- Confirm all approvals and agreements (as applicable) either verbal or written have been obtained.

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

Hand and Power Tools

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

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

See OP 1026 Hand and Power Tools for more information.

Controls

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

Heavy Equipment

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

See OP1052 Heavy Equipment for additional information.

Controls

- Only approach equipment once you have confirmed contact with the operator (e.g., operator places the bucket on the ground).

- Always maintain visual contact with operators and keep out of the strike zone whenever possible.
- Always be alert to the position of the equipment around you.
- Always approach heavy equipment with an awareness of the swing radius and traffic routes of all equipment and never go beneath a hoisted load.
- Avoid fumes created by heavy equipment exhaust.

Line of Fire

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

Controls

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

Manual Lifting/Moving

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

Controls

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

Noise

Working around heavy equipment (drill rigs, excavators, etc.) often creates excessive noise. The effects of noise include physical damage to the ear, pain, and temporary and/or permanent hearing loss.

Workers can also be startled, annoyed, or distracted by noise during critical activities. Noise monitoring data that indicates that working within 25 feet of operating heavy equipment result in exposure to hazardous levels of noise (levels greater than 85 dBA).

See OP 1031 Hearing Conservation for additional information.

Controls

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

Overhead Utilities

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

Table 1 Minimal Radial Clearance Distances *

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

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

Controls

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

Repetitive Motion

Repetitive Motion or Strain Injuries are injuries effecting muscles, nerves, and tendons by repetitive movement and overuse. Almost any kind of awkward or repetitive motion you make could lead to an injury over time. Actions like bending or twisting of the wrists, reaching for materials, working with your hands above shoulder level, or grasping objects can increase wear and tear on the body. The condition mostly effects the upper body.

Controls

- Arrange your work zone, supplies and tools as much as possible to avoid reaching, leaning, bending and twisting your waist or wrists.
- During rest breaks, use stretches to loosen up your body.
- Vary tasks if you can so that you are not making the same movement repeatedly over for a long period.

Rotating Equipment

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

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

Controls

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

Sharp Objects

Workers who handle sharp edged objects like sheets of steel or glass are at risk of cuts. Workers who handle sharp edged objects are also at risk of cuts. Injuries may occur to hands, fingers, or legs when they are in the way of the blade, when the blade slips, or if an open blade is handled unexpectedly. Other hazards at job sites include stepping on sharp objects (e.g. wooden boards with protruding nails, sharp work-tools, chisels, etc.) and colliding with sharp and/or protruding objects.

Controls

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

Slippery Surfaces

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

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

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

Controls

- Evaluate the work area to identify any conditions that may pose a slip hazard.
- Address any spills, drips or leaks immediately.
- Mark areas where slippery conditions exist.
- Select proper footwear or enhance traction with additional PPE.
- Where conditions are uncertain or environmental conditions result in slippery surfaces walk slowly, take small steps, and slide feet on wet or slippery surfaces.

Underground Utilities

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

See OP1020 Work Near Utilities for complete information.

Controls

- Obtain as-built drawings for the areas being investigated from the property owner;
- Visually review each proposed soil boring locations with the property owner or knowledgeable site representative;
- Perform a geophysical survey to locate utilities;
- Hire a private line locating firm to determine location of utility lines that are present at the property;
- Identifying a no-drill or dig zone;

- Hand dig or use vacuum excavation in the proposed ground disturbance locations if insufficient data is unavailable to accurately determine the location of the utility lines.

4. PROTECTIVE MEASURES

The personal protective equipment and safety equipment (if listed) is specific to the associated task. The required PPE and equipment listed must be onsite during the task being performed. Work shall not commence unless the required PPE or Safety Equipment is present.

Required Safety & Personal Protective Equipment				
Required Personal Protective Equipment (PPE)	**Task 1**	**Task 2**	**Task 3**	**Task 4**
	Drilling and Monitoring Well Installation	Soil, Soil Vapor, and Groundwater Sampling	Enter task description.	Enter task description.
Hard hat	☒	☒	☐	☐
Safety Glasses	☒	☒	☐	☐
Safety Toed Shoes	☒	☒	☐	☐
Class 2 Safety Vest	☒	☒	☐	☐
Hearing Protection	☒	☐	☐	☐
Nitrile Gloves	☐	☒	☐	☐
Cut Resistant Gloves	☒	☒	☐	☐
Level of protection required	D	D	Select	Select
Required Safety Equipment				
First Aid Kit	☒	☒	☐	☐

5. TRAINING REQUIREMENTS

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

Site Specific Training Requirements

HAZWOPER - 40 Hour (Initial)

HAZWOPER - 8 Hour (Annual Refresher)

Task Specific Training Requirements

Required Training Type	Task 1	Task 2	Task 3	Task 4
	Drilling and Monitoring Well Installation	Soil, Soil Vapor, and Groundwater Sampling	Enter task description.	Enter task description.
N/A	☒	☒	☐	☐

6. AIR MONITORING PLAN AND EQUIPMENT

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

Is air/exposure monitoring required at this work site for personal protection? Yes

Is perimeter monitoring required for community protection? Yes

Air monitoring plan not applicable No

Air Monitoring/Screening Equipment Requirements

Photo-Ionization Detector (PID) 10.6eV

Dust Monitor (DustTrak)

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

Monitoring Plans

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

Zone Location and Monitoring Interval
Breathing zone and edge of Exclusion Zone.

Parameter/ Contaminant	Equipment	Action Level	Response Activity
Particulate Matter (PM10)	Dust Monitor	150 ug/m^3	Dust suppression of work area using sprayed water, if conditions persist **Stop Work if visible dust cannot be controlled. Contact PM and FSM**
Zone Location and Monitoring Interval Breathing zone			

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

7. DECONTAMINATION & DISPOSAL METHODS

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

Personal Hygiene Safeguards

The following minimum personal hygiene safeguards shall be adhered to:

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

It is recommended that personnel present on site shower or bathe at home at the end of each day of working on the site.

Decontamination Supplies

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

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

Location of Decontamination Station

To be communicated during kick-off meeting.

Standard Personal Decontamination Procedures

Outer gloves and boots should be decontaminated periodically as necessary and at the end of the day. Brush off solids with a hard brush and clean with soap and water or other appropriate cleaner whenever possible. Remove inner gloves carefully by turning them inside out during removal. Wash hands and forearms frequently. It is good practice to wear work-designated clothing while on-site which can be removed as soon as possible. Non-disposable overalls and outer work clothing should be bagged onsite prior to laundering. If gross contamination is encountered on-site contact the Project Manager and Field Safety Manager to discuss proper decontamination procedures.

The steps required for decontamination will depend upon the degree and type of contamination but will generally follow the sequence below.

1. Remove and wipe clean hard hat
2. Rinse boots and gloves of gross contamination
3. Scrub boots and gloves clean
4. Rinse boots and gloves
5. Remove outer boots (if applicable)
6. Remove outer gloves (if applicable)
7. Remove Tyvek coverall (if applicable)
8. Remove respirator, wipe clean and store (if applicable)
9. Remove inner gloves (if outer gloves were used)

PPE that is not grossly contaminated can be bagged and disposed in regular trash receptacles.

Small Equipment Decontamination

Pretreatment of heavily contaminated equipment may be conducted as necessary:

1. Remove gross contamination using a brush or wiping with a paper towel
2. Soak in a solution of Alconox and water (if possible)
3. Wipe off excess contamination with a paper towel

Standard decontamination procedure:

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

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

Disposal Methods

Procedures for disposal of contaminated materials, decontamination waste, and single use personal protective equipment shall meet applicable client, locate, State, and Federal requirements.

Disposal of Single Use Personal Protective Equipment

PPE that is not grossly contaminated can be bagged and disposed in regular trash receptacles. PPE that is grossly contaminated must be bagged (sealed and field personnel should communicate with the Project Manager to determine proper disposal.

Standard Disposal Methods for Contaminated Materials

- Excess sample solids, decontamination materials, rags, brushes, poly-sheeting, etc. that are determined to be free of contamination through field screening can usually be disposed into client-approved, on-site trash receptacles.
- Uncontaminated wash water may be discarded onto the ground surface away from surface water bodies in areas where infiltration can occur.
- Contaminated materials must be segregated into liquids or solids and containerized separately for offsite disposal.

Any additional requirements that are designated by the workplan or by client specifications should be entered here.

Disposal Method for Contaminated Soil

- Contaminated soil cuttings and spoils must be containerized for disposal off-site unless otherwise specifically directed.
- Soil cuttings and spoils determined to be free of contamination through field screening can usually be returned to the boreholes or excavations from which they came.

Any additional requirements that are designated by the workplan or by client specifications should be entered here.

8. SITE CONTROL

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

Communication

Internal
Haley & Aldrich site personnel will communicate with other Haley & Aldrich staff member and/or subcontractors or contractors with:

Face to Face Communication

External
H&S site personnel will use the following means to communicate with off-site personnel or emergency services.

Cellular Phones

Visitors

Project Site
Will visitors be required to check-in prior to accessing the project site?

Yes

Visitor Access
Authorized visitors that require access to the project site need to be provided with known information with respect to the site operations and hazards as applicable to the purpose of their site visit. Authorized visitors must have the required PPE and appropriate training to access the project site.

Owen Hennigan is responsible for facilitating authorized visitor access.

Zoning

Work Zone

The work zone will be clearly delineated to ensure that the general public or unauthorized worker access is prevented. The following will be used:

Cones
Barricades
Temporary Fencing

9. SITE SPECIFIC EMERGENCY RESPONSE PLAN

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

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

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

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

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

Pre-Emergency Planning

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

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

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

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

Onsite Emergency Response Equipment

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

Table 9.1 Emergency Equipment and Emergency PPE			
Emergency Equipment	**Specific Type**	**Quantity Stocked**	**Location Stored**
First Aid Kit	ANSI	1	With H&A Staff
Fire Extinguisher	A/B/C	1	Within 25 Feet of Drill Rig
Emergency PPE	**Specific Type**	**Quantity Stocked**	**Location Stored**
Gloves - "Nitrile"	Nitrile	1	With H&A Staff

EVACUATION ALARM
Will be communicated during the Onsite Kickoff Meeting
EVACUATION ROUTES
Will be given a map after site specific training
EVACUATION MUSTER POINT(S)/ SHELTER AREA(S)
Will be given locations after site specific training
EVACUTION RESPONSE DRILLS
The Site relies on outside emergency responders and a drill is not required.

Table 9-2 – Emergency Planning

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

10. HASP ACKNOWLEDGEMENT FORM

All Haley & Aldrich employees onsite must sign this form prior to entering the site.

I hereby acknowledge receipt of, and briefing on, this HASP prior to the start of on-site work. I declare that I understand and agree to follow the provisions, processes, and procedures set forth herein at all times while working on this site.

Printed Name	Signature	Date

ATTACHMENT A
HASP AMENDMENT FORM

HASP AMENDMENT FORM	
This form is to be used whenever there is an immediate change in the project scope that will require an amendment to the HASP. For project scope changes associated with "add-on" tasks, the changes must be made in the body of the HASP. Before changes can be made, a review of the potential hazards must be initiated by the Haley & Aldrich Project Manager. This original form must remain on site with the original HASP. If additional copies of this HASP have been distributed, it is the Project Manager's responsibility to forward a signed copy of this amendment to those who have copies.	
Amendment No.	
Site Name	
Work Assignment No.	
Date	
Type of Amendment	
Reason for Amendment	
Alternate Safeguard Procedures	
Required Changes in PPE	

Project Manager Name (Print)	Project Manager Signature	Date
Health & Safety Approver Name (Print)	Health & Safety Approver Signature	Date

ATTACHMENT B
TRAINING REQUIREMENTS

TRAINING REQUIREMENTS

Health and Safety Training Requirements

Personnel will not be permitted to supervise or participate in field activities until they have been trained to a level required by their job function and responsibility. Haley & Aldrich staff members, contractors, subcontractors, and consultants who have the potential to be exposed to contaminated materials or physical hazards must complete the training described in the following sections.

The Haley & Aldrich Project Manager/FSM will be responsible for maintaining and providing to the client/site manager documentation of Haley & Aldrich staff members' compliance with required training as requested. Records shall be maintained per OSHA requirements.

40-Hour Health and Safety Training

The 40-Hour Health and Safety Training course provides instruction on the nature of hazardous waste work, protective measures, proper use of personal protective equipment, recognition of signs and symptoms which might indicate exposure to hazardous substances, and decontamination procedures. It is required for all personnel working on-site, such as equipment operators, general laborers, and supervisors, who may be potentially exposed to hazardous substances, health hazards, or safety hazards consistent with 29 CFR 1910.120.

8-hour Annual Refresher Training

Personnel who complete the 40-hour health and safety training are subsequently required to attend an annual 8-hour refresher course to remain current in their training. When required, site personnel must be able to show proof of completion (i.e., certification) at an 8-hour refresher training course within the past 12 months.

8-Hour Supervisor Training

On-site managers and supervisors directly responsible for, or who supervise staff members engaged in hazardous waste operations, should have eight additional hours of Supervisor training in accordance with 29 CFR 1910.120. Supervisor Training includes, but is not limited to, accident reporting/investigation, regulatory compliance, work practice observations, auditing, and emergency response procedures.

Additional Training for Specific Projects

Haley & Aldrich personnel will ensure their personnel have received additional training on specific instrumentation, equipment, confined space entry, construction hazards, etc., as necessary to perform their duties. This specialized training will be provided to personnel before engaging in the specific work activities including:

- Client specific training or orientation
- Competent person excavations
- Confined space entry (entrant, supervisor, and attendant)
- Heavy equipment including aerial lifts and forklifts
- First aid/ CPR
- Use of fall protection
- Use of nuclear density gauges
- Asbestos awareness

ATTACHMENT C

ROLES AND RESPONSIBILITIES

SITE ROLES AND RESPONSIBILITIES

Haley & Aldrich Personnel

Field Safety Manager (FSM)

The Haley & Aldrich FSM is a full-time Haley & Aldrich staff member, trained as a safety and health professional, who is responsible for the interpretation and approval of this Safety Plan. Modifications to this Safety Plan cannot be undertaken by the PM or the SSO without the approval of the FSM.

Specific duties of the FSM include:

- Approving and amending the Safety Plan for this project
- Advising the PM and SHSOs on matter relating to health and safety
- Recommending appropriate personal protective equipment (PPE) and air monitoring instrumentation
- Maintaining regular contact with the PM and SSO to evaluate the conditions at the property and new information which might require modifications to the HASP and
- Reviewing and approving JSAs developed for the site-specific hazards.

Project Manager (PM)

The Haley & Aldrich PM is responsible for ensuring that the requirements of this HASP are implemented at that project location. Some of the PM´s specific responsibilities include:

- Assuring that all personnel to whom this HASP applies have received a copy of it;
- Providing the FSM with updated information regarding environmental conditions at the site and the scope of site work;
- Providing adequate authority and resources to the on-site SHSO to allow for the successful implementation of all necessary safety procedures;
- Supporting the decisions made by the SHSO;
- Maintaining regular communications with the SHSO and, if necessary, the FSM;
- Coordinating the activities of all subcontractors and ensuring that they are aware of the pertinent health and safety requirements for this project;
- Providing project scheduling and planning activities; and
- Providing guidance to field personnel in the development of appropriate Job Safety Analysis (JSA) relative to the site conditions and hazard assessment.

Site Health & Safety Officer (SHSO)

The SHSO is responsible for field implementation of this HASP and enforcement of safety rules and regulations. SHSO functions may include some or all of the following:

- Act as Haley & Aldrich´s liaison for health and safety issues with client, staff, subcontractors, and agencies.
- Verify that utility clearance has been performed by Haley & Aldrich subcontractors.
- Oversee day-to-day implementation of the Safety Plan by Haley & Aldrich personnel on site.

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

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

Field Personnel

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

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

Visitors

Authorized visitors (e.g., Client Representatives, Regulators, Haley & Aldrich management staff, etc.) requiring entry to any work location on the site will be briefed by the Site Supervisor on the hazards present at that location. Visitors will be escorted at all times at the work location and will be responsible for compliance with their employer´s health and safety policies. In addition, this safety plan specifies the minimum acceptable qualifications, training and personal protective equipment which are required for entry to any controlled work area; visitors must comply with these requirements at all times. Unauthorized visitors, and visitors not meeting the specified qualifications, will not be permitted within established controlled work areas.

SUBCONTRACTOR PERSONNEL

Subcontractor Site Representative

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

Subcontractor Site Safety Manager

Each contractor / subcontractor will provide a qualified representative who will act as their Site Safety Manager (Sub-SSM). This person will be responsible for the planning, coordination, and safe execution of subcontractor tasks, including preparation of job hazard analyses (JHA), performing daily safety planning, and coordinating directly with the Haley & Aldrich SHSO for other site safety activities. This person will play a lead role in safety planning for Subcontractor tasks, and in ensuring that all their employees and lower tier subcontractors are in adherence with applicable local, state, and/or federal regulations, and/or industry and project specific safety standards or best management practices.

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

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

ATTACHMENT D
JOB SAFETY ANALYSES

Safety
in everything we do

515-519 WEST 43RD STREET REDEVELOPMENT SITE

KEY TASK ENTER TASK NUMBER.: ENTER TASK NAME.

Subtask Category	Potential Hazards	Controls
Enter subtask information.	Choose category.	• Enter control(s) for each hazard.
Enter subtask information.	Choose category.	• Enter control(s) for each hazard.
Enter subtask information.	Choose category.	• Enter control(s) for each hazard.
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ATTACHMENT E
PROJECT SITE FORMS

ATTACHMENT F
SITE-SPECIFIC OPERATING PROCEDURES

APPENDIX I
NYSDOH CAMP Guidance Document

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

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

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

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

Community Air Monitoring Plan

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

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

<u>VOC Monitoring, Response Levels, and Actions</u>

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

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

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

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

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

<u>Particulate Monitoring, Response Levels, and Actions</u>

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

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

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.