REMEDIAL INVESTIGATION WORK PLAN

for

550 Tenth Avenue Redevelopment
New York, New York
NYSDEC BCP No. C231148

Prepared for:

GO Covenant LLC
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Prepared by:

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CERTIFICATION

I, Christopher McMahon, certify that I am currently a Qualified Environmental Professional as defined in 6 New York Codes, Rules, and Regulations (NYCRR) Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation.

Christopher McMahon, CHMM

1.0 INTRODUCTION

This Remedial Investigation Work Plan (RIWP) was prepared on behalf of GO Covenant LLC (the Applicant) for the ±16,000-square foot property located at 550 Tenth Avenue (Block 1050, Lot 61) in the Clinton Neighborhood of Manhattan, New York (the Site). The site is currently occupied by asphalt paved parking and walkway areas, and landscaped areas.

The following work scope has been developed to meet the investigation requirements of the NYSDEC Brownfield Cleanup Program in accordance with the requirements of Environmental Conservation Law (ECL) Article 27-1415(2). This RIWP was developed in accordance with the process and requirements identified in the NYSDEC Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation (May 2010) and the New York State Department of Health (NYSDOH) "Guidance for Evaluating Soil Vapor Intrusion in the State of New York, with updates" (October 2006).

Several previous investigations have been completed at the Site for the purposes of due diligence, the New York City Office of Environmental Remediation's (NYCOER) E-Designation program, and environmental soil pre-characterization investigations. As part of the NYCOER's E-Designation program, NYCOER approved the proposed scope of work presented in the December 2019 Phase II Investigation Work Plan which was developed to further characterize the Site and is described in Section 2.6 below. Additionally, a May 2021 Remedial Investigation Report (RIR) was submitted to NYC OER documenting the investigation activities and is also discussed in Section 2.6 below. Based on the results of May 2021 RIR, a decision was made to transition this Site into the BCP since hazardous waste level soil was unexpectedly encountered.

2.0 SITE BACKGROUND

2.1 Site Description

The Site is located in the Clinton neighborhood of Manhattan, New York and is identified as Lot 61. The Site historically consisted of portions of former Lot 1 and Lot 61 until the tax lots were reapportioned in June 2020 to match the current proposed redevelopment extents. A Site Location Plan is provided as Figure 1. The Site is an approximately 16,000-square foot parcel and is bordered by 10th Avenue to the west, West 41st Street to the north, West 40th Street to the south, and the active redevelopment of former Covenant House New York Wings B and C to the east. New York City Transit (NYCT) tunnels are located to the north of the site, below West 41st Street. In addition, Lincoln Tunnel entrance roads and access ramps for the nearby Port Authority Bus Terminal are located to the south of the site, beyond West 40th Street. The Site is currently

occupied by Wing A of the Covenant House New York shelter for homeless youth, a parking lot, and construction field offices associated with the redevelopment of the former Wings B and C of the Covenant House New York facility (NYCOER OER Site No. 16TMP0060M, 16EH-N056M) located adjacent to the east of the Site; remediation of the adjacent parcel was completed in June 2020 and construction of the superstructure is ongoing. A Site Location Map is provided as Figure 1.

2.2 Surrounding Property Land Use

According to records maintained online by New York City Open Accessible Space Information System (NYCOASIS) and aerial/street-view observations provided by Google Maps, surrounding properties include multi-story mixed-use residential/commercial buildings and public institutional buildings as well as transportation/utilities properties associated with the nearby Lincoln Tunnel entrance. The following is a summary of adjacent property usage:

Direction	Adjacent Properties		
	Block No.	Lot No.	Description
North	1051	7502	West 41st Street followed by a 59-story mixed-use residential/commercial building
East	1050	1	A Currently under construction 12-story Covenant House residential building (Phase 1)
South	737	1	West 40th Street followed by the Port Authority Bus Terminal flyover approach to the Lincoln Tunnel
West	1069	7501	Tenth Avenue followed by a 51-story mixed-use residential/commercial building

Public infrastructure (storm drains, sewers, and underground utility lines) exists within the streets surrounding the Site. Sensitive receptors, as defined in DER-10, located within a half-mile of the Site, include those listed below:

Number	Name (Approximate distance from site)	Address
1	GED-Pg2 At Covenant House/West 41 (located adjacent to the east of the site)	460 W 41st Street New York, NY 10036
2	Success Academy Charter – Hudson Yards (located adjacent to the west of the site)	500 West 41st Street New York, NY 10036
3	43rd Street Kids Preschool, Inc. (approximately 0.1-miles north of the site)	484 West 43rd Street New York, NY 10036
4	The Hudson Guild (approximately 0.1-miles southeast of the site)	410 West 40th Street New York, NY 10036
5	PS 051 Elias Howe (approximately 0.2-miles northwest of the site)	520 West 45th Street New York, NY 10036
6	Matthews – Palmer Playground (approximately 0.2-miles north-northeast of the site)	445 West 45th Street New York, NY 10036
7	McCaffrey Playground (approximately 0.2-miles east-northeast of the site)	West 43rd Street New York, NY 10036
8	Preschool of America LLC (approximately 0.2-miles east of the site)	345 West 42nd Street New York, NY 10036
9	De La Salle Academy (approximately 0.2-miles east of the site)	332 West 43rd Street New York, NY 10036
10	Bright Horizons Children's Centers, Inc. (approximately 0.3-miles east-southeast of the site)	640 8th Avenue New York, NY 10036
11	Los Ninos Early Childhood Services (approximately 0.3-miles southeast of the site)	535 8th Avenue New York, NY 10018
12	City Knoll Middle School (approximately 0.3-miles south of the site)	425 West 33rd Street New York, NY 10001
13	Gramercy School (approximately 0.3-miles south of the site)	460 West 34th Street New York, NY 10001
14	Gutenberg Playground (approximately 0.4-miles north-northeast of the site)	420 West 49th Street New York, NY 10019
15	HS Communication Graphic Art (approximately 0.4-miles north-northeast of the site)	439 West 49th Street New York, NY 10019
16	PS 212 Midtown West (approximately 0.4-miles northeast of the site)	328 West 48th Street New York, NY 10036
17	Success Academy Charter School – Hells Kitchen (approximately 0.4-miles northeast of the site)	439 West 49th Street New York, NY 10019
18	The Montessori Family School of Manhattan (approximately 0.4-miles northeast of the site)	308 West 46th Street New York, NY 10036

Number	Name (Approximate distance from site)	Address
19	Park West High School (approximately 0.5-miles north of the site)	525 West 50th Street New York, NY 10019
20	Sacred Heart Parochial (approximately 0.5-miles north-northeast of the site)	457 West 51st Street New York, NY 10019
21	Christine Beshar Children's Center (approximately 0.5-miles northeast of the site)	825 8th Avenue New York, NY 10019
22	Star America M Inc. (approximately 0.5-miles northeast of the site)	780 8th Avenue New York, NY 10036

2.3 Site Physical Conditions

2.3.1 Topography

According to the Boundary and Topographic Survey prepared by True North Surveyors, P.C. dated 15 September 2017, last revised 3 November 2020, the site slopes gently downward from the southwest (elevation el 25.1) to the northeast (elevation el 24.31). All elevations are North American Vertical Datum of 1988 (NAVD 88).

2.3.2 Geology

Based on the result of sub-surface investigations completed in 2017, 2018, and 2021 by Langan, Site stratigraphy below the asphalt parking lot on the northern portion of the Site consists of an approximately 9.5- to 20-foot thick layer of historic fill underlain by a silty sand unit followed by weathered mica schist rock.

The Site is underlain by historic fill to the depth of drilling refusal on presumed weathered mica schist rock (2.5' to 3.5' below the existing basement floor slab) in LSB-5, LSB-7, and LSB-8. Drilling refusal was encountered slightly deeper below the basement slab in LSB-6, LSB-9, LSB-22A, and LSB-24, where a 3- to 3.5-foot thick layer of historic fill was underlain by silty sand to the depth of drilling refusal which varied between 5- and 10.5-feet below the existing basement floor slab. Clay was also encountered in LSB-22A from 9 to 10.5 feet below the existing basement floor slab. Fill between 8 and 13 feet thick underlain by silty sand was observed in LSB-5A and LSB-8A; refusal was not encountered at these locations. Historic fill was not observed in soil borings LSB-22, LSB-23, LSB-23A, and LSB-24A although drilling refusal on weathered mica schist rock was encountered between 5- and 6-feet below the existing basement slab at LSB-22 and LSB-23. Native material at these locations generally consists of

silty sand. Based on the geotechnical investigation completed by Langan between January and February 2018, weathered mica schist was encountered between 24.5- and 34.9-feet below sidewalk level and competent mica schist was encountered between 28- and 45-feet below sidewalk level.

2.3.3 Hydrogeology

As part of the 2018 and 2021 RIs, groundwater depth was measured to be between 12 and 15.5 feet below street level (bsl) within the onsite monitoring wells (LMW-8 through LMW-11). During the March 2020 Preliminary Geotechnical Investigation, groundwater was encountered between el 12.1 and el 12.5. Based on the measured depth to groundwater identified in the environmental and geotechnical investigations, groundwater is anticipated to flow to the west towards the Hudson River.

2.3.4 Wetlands

Langan reviewed United States Fish and Wildlife National Wetland Inventory (NWI) and New York State Freshwater Wetlands maps. Based on these documents no mapped wetlands are listed on the subject property, although the Hudson River is approximately 1/2-mile west of the subject property.

2.4 Proposed Development Plan

The proposed future use of the Site will consist of demolishing the existing 8-story Covenant House building (Wing A) and associated cellar space, and constructing a new commercial office space for the adjacent Covenant House facility and a residential building above the commercial floors with an approximate footprint area of 14,000 square-feet. Excavation ranging from approximately 11.5 to 17.5 feet bsl (with deeper excavations ranging from 22.5 feet bsl to 26 feet bsl) will be completed for construction of the new building across the majority of the Site footprint. Portions of the Site will not require excavation of soil since the current basement slab is approximately the same elevation as the proposed bottom of excavation of the Site, and the existing 10-foot offset from 10th Avenue on the western side of the Site will remain undeveloped. The current zoning designation is commercial (C2-8). The proposed use is consistent with existing zoning for the property.

Recent investigation results described in Section 2.6 below identified contamination at excavation depths that will be illustrated in design drawings to be provided in the Remedial Action Work Plan (RAWP). Remediation of the site will be completed in accordance with the forthcoming RAWP subsequent to the performance of this Remedial Investigation.

2.5 Site History

According to the Phase I ESA completed by TRC Engineers, Inc. (TRC) in September 2015, historical use and features of the subject property include two filling stations and one automobile repair shop. The presence of historic urban fill or buried structures was identified as a Recognized Environmental Condition (REC) due to the potential of impacts to the Site. Historical Site operations, including two filling stations and one automobile repair shop, were also identified as a REC due to the potential use of hazardous substances associated with these operations and the duration of the activities. The Phase I ESA identified that the Covenant House is registered with NYSDEC for Spill No. 0613314, which was reported in 2007 following the observation of oily water in an onsite excavation. Approximately 3,000 gallons of oily water were pumped out of the excavation and no additional oily water infiltration was observed following the removal. The spill was administratively closed in 2009. A second spill was reported for the Site, but was associated with the 7 Line Subway Extension. According to the ESA, petroleum impacted soils were identified during drilling for the subway extension and Spill No. 04044424 was reported in 2004. Contaminated soil was reportedly removed and allegedly replaced with clean fill and the spill was administratively closed in 2005. Current and historical operations conducted at adjacent and nearby properties involving the use of ASTs, USTs, spills, and the generation and disposal of hazardous waste, which were also identified as an REC.

2.6 Previous Environmental Reports

The following environmental assessment and investigation reports have been prepared for the Site, which are provided in Appendix A.

- Phase I Environmental Site Assessment prepared by TRC, dated 18 September 2015;
- Phase II Investigation Work Plan prepared by Langan, dated December 2019 (Including the results of 2017 and 2018 Limited Phase II Investigations);
- Remedial Investigation Report prepared by Langan, dated May 2021; and,
- Environmental Soil Pre-Characterization Results Letter Report prepared by Langan, dated 5 May 2021.

September 2015 Phase I Environmental Site Assessment, prepared by TRC

A Phase I Environmental Site Assessment (ESA) dated September 2015 was prepared by TRC for the Covenant House. This Phase I ESA results are discussed in detail in Section 2.5 above.

December 2019 Phase II Investigation Work Plan, prepared by Langan

A Phase II Investigation Work Plan dated December 2019 was prepared by Langan for GO Covenant LLC and was submitted to the NYCOER to satisfy the requirements of the E-Designation for hazardous materials that is associated with the Site.

For the purposes of due diligence, to determine if the above identified AOCs could potentially impact the proposed Site redevelopment plans, and to partially satisfy future NYCOER remedial investigation requirements a limited Phase II EI was completed within the Site in November 2017 which included completion of six soil borings (LSB-1, LSB-2, and LSB-5 through LSB-8) and collection of six soil samples, and the installation of two temporary monitoring wells (TW-2 and TW-3) and collection of two groundwater samples. An additional due diligence investigation completed by Langan in December 2018 included the completion of four additional soil borings (LSB-21 through LSB 24) and collection of four additional soil samples, installation of three permanent monitoring wells (LMW-8 through LMW-10) and collection of three groundwater samples, and installation of three soil vapor points (LSV-9 through LSV-11) and collection of three soil vapor samples. Each of these investigations were incorporated into the May 2021 Remedial Investigation Report.

The scope of work for the RI presented in the Phase II Investigation Work Plan consisted of:

- A limited ground-penetrating radar (GPR) survey within the vicinity of soil boring locations to investigate the location of subsurface utilities;
- Advancement of eight soil borings (LSB-2A, LSB-5A, LSB-8A, LSB-9A, and LSB-21A through LSB-24A) and collection of a minimum of 12 soil samples (including one duplicate sample);
- Collection of four groundwater samples (including one duplicate sample) from existing monitoring wells LMW-8 through LMW-10; and
- Installation of one soil vapor sampling point (LSV-12) and collection of two soil vapor samples (including one duplicate sample).

May 2021 Remedial Investigation Report, prepared by Langan

A Remedial Investigation Report (RIR) dated May 2021 was prepared by Langan for GO Covenant LLC. The RI was completed to investigate potential impacts to the soil and groundwater at the site associated with the RECs as identified in the Phase I ESA. GO Covenant LLC performed the following due diligence scope of work in 2017, 2018, and 2019:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e., structures, buildings, etc.);

2. Completed two geophysical surveys in the vicinity of drilled locations to identify the potential presence of unidentified underground storage tanks and underground utilities;

3. Installed 11 soil borings across the Site and collected 11 soil samples, in addition to 2 duplicate soil samples, for chemical analysis from the soil borings to evaluate soil quality;

4. Installed 3 permanent groundwater monitoring wells and 2 temporary groundwater monitoring wells within the Site and collected 5 groundwater samples, in addition to 2 duplicate groundwater samples, for chemical analysis to evaluate groundwater quality; and,

5. Installed 3 sub-slab soil vapor probes at the Site and collected 3 soil vapor samples, in addition to 1 duplicate soil vapor sample, for chemical analysis.

GO Covenant LLC performed the following scope of work in 2021 in accordance with the NYCOER approved Phase II Work Plan dated December 2019 to supplement the previously completed investigations and fill data gaps for meeting NYCOER RI requirements:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e., structures, buildings, etc.);

2. Completed a geophysical survey in the vicinity of drilled locations to identify the potential presence of unidentified underground storage tanks and underground utilities;

3. Installed 7 soil borings across the Site, and collected 12 soil samples, in addition to 1 duplicate soil sample, for chemical analysis from the soil borings to evaluate soil quality;

4. Installed 1 groundwater monitoring well within the Site and collected 3 groundwater samples, in addition to 1 duplicate groundwater sample, for chemical analysis to evaluate groundwater quality;

5. Installed 1 soil vapor probe at the Site and collected 1 soil vapor sample, in addition to 1 duplicate soil vapor sample, for chemical analysis.

The results of the RI have identified that the Site is underlain by an approximately 9.5- to 20-foot thick layer of historic fill underlain by a silty sand unit followed by weathered mica schist rock. Based on the results of the RI, this historic fill material is impacted with concentrations of PAHs and metals above the Unrestricted Use Soil Cleanup Objectives (SCOs) and Restricted-Residential Restricted Use SCOs and pesticides above the Unrestricted Use SCOs in one sample. Perfluorooctanesulfonic acid (PFOS) was detected in the sample collected from LSB-2A from 0 to 2 feet bsl at 10.7 micrograms per kilogram (µg/kg) exceeding the NYSDEC January 2021 Unrestricted Use SCO Guidance Value of 0.88 µg/kg. Soil analytical results are summarized in Tables 2A and 2B and are shown on Figure 2A.

The results of the RI have identified that groundwater at the Site is impacted with PAHs and metals above the NYCRR Part 703.5 and NYSDEC Technical & Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (collectively referred to as SGVs). PFOS (67.5 ng/l) and perfluorooctanoic acid (PFOA) (45.4 ng/l) were detected above the NYSDEC January 2021 Guidance Values in LMW-11. Groundwater analytical results are summarized in Tables 4A and 4B and are shown on Figure 3.

The results of the RI have identified that soil vapor at the Site is impacted petroleum-related VOCs (BTEX) within the four soil vapor samples ranged from 1.83 µg/m^3 to 12.3 µg/m^3. Additionally, chlorinated VOCs were also detected including carbon tetrachloride (max. 0.286 µg/m^3), methylene chloride (max. 11 µg/m^3), tetrachloroethylene (PCE) (max. 4.1 µg/m^3), and trichloroethelyne (TCE) (max. 1.2 µg/m^3). Soil vapor analytical results are summarized in Table 5 and are shown on Figure 4.

May 2021 Environmental Soil Pre-Characterization Letter Report, prepared by Langan

An Environmental Soil Pre-Characterization Letter Report dated 5 May 2021 was prepared by Langan for GO Covenant LLC. The environmental soil pre-characterization investigation sampling was completed at the Site in order to assess soil disposal options. During the February 2021 sampling event, Langan collected a total of six composite soil samples (WC 1A/B, WC-2 through WC-4) from 12 soil borings (LSB-2A, LSB-5A, LSB-8A, LSB 21A, LSB 22A, LSB-23A, LSB-24A, and LSB-25 through LSB-29) in order to characterize the anticipated excavation depth of 17.5 feet bsl. A deeper sample (WC-5) was also collected from the area of the proposed elevator pit to characterize material that will need to be removed for construction of deeper foundation elements to a depth of 27.5 feet bsl.

The soil analytical results identified SVOCs and metals at concentrations above the Unrestricted Use SCOs and/or Restricted-Residential Restricted Use SCOs in three of the six composite soil samples collected. The VOC acetone was detected above the Unrestricted Use SCOs in one composite soil sample, although the letter indicated acetone is considered a common laboratory artifact and is likely not indicative of subsurface conditions. Additionally, the metal lead was analyzed via toxicity characteristic leaching procedure (TCLP) and was detected at a concentration above the USEPA RCRA Maximum Concentration of Contaminants for the Toxicity Characteristic in one composite soil sample. As such, the material characterized by this composite soil sample is considered to be hazardous. Waste characterization soil analytical results are summarized in Tables 3A and 3B and are shown on Figure 2B. As noted above, the results of this investigation led to the conclusion the Site should be transitioned into the BCP.

3.0 SCOPE OF WORK

The objective of this RIWP is to complete the investigation of the Site and characterize "the nature and extent of the contamination at and/or emanating from the brownfield site," per ECL Article 27, Title 14 (Brownfield Cleanup Program). Additional investigation is necessary to further evaluate subsurface conditions following the identification of hazardous lead in Site soil and to supplement the investigation activities and results presented in the May 2021 Remedial Investigation Report. The rationale for each sampling location and analytical parameters for each proposed sample are provided in Table 1 and the locations of the proposed borings and groundwater monitoring wells are shown on Figure 5.

Geophysical Survey

- Langan will coordinate with a private utility markout contractor to complete a full geophysical survey throughout the Site to identify if any subsurface anomalies exist and to assess for the presence of subsurface structures, piping, and underground storage tanks which may contribute to the presence or migration of contamination. Exterior portions of the Site will be cleared of vehicles and debris for geophysical survey access.

Soil Borings and Sampling

- A total of eight soil borings will be completed for the purposes of characterizing soil conditions.
    - Advancement of two soil borings will be completed outside of the current building footprint as part of the Site-wide characterization and to supplement previously collected soil samples.
    - Advancement of six soil borings will be completed within the current building footprint as part of Site-wide characterization and to supplement previously collected soil samples.
- All soil borings will be advanced to a maximum depth of 22 feet below sidewalk level.
- Discrete soil samples will be collected from:
    - The two-foot interval directly below ground surface (i.e. 0- to 2-feet below sidewalk level) in LSB-25 and LSB-26;
    - The two-foot interval above the groundwater interface (i.e. 12- to 14-feet below sidewalk level) in LSB-25 and LSB-26;
    - The two-foot interval corresponding to immediately below the anticipated maximum excavation depth for the proposed remediation in LSB-25, LSB-27, and LSB-30; and,
    - The two-foot interval directly below the current basement slab in LSB-30 and LSB-32.
- Samples collected for Site-wide assessment will be analyzed for the TCL/Part 375 list of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), target analyte list (TAL) metals, hexavalent chromium, polychlorinated biphenyls (PCBs), herbicides, pesticides, perfluoroalkyl substances (PFAS), and 1,4-dioxane analysis in accordance with typical NYSDEC BCP requirements.
- At locations where previous soil sampling data has been generated, but that were not analyzed for herbicides, PFAS and 1,4-dioxane, new discrete soil samples will be collected from the two-foot intervals corresponding to depths that were previously sampled for

analysis of herbicides, PFAS and 1,4-dioxane to satisfy NYSDEC requirements for site characterization.

Groundwater Monitoring Well Installation and Sampling

- A total of five permanent monitoring wells will be sampled for the purposes of characterizing site-wide groundwater conditions.
    - Four existing onsite permanent monitoring wells will be sampled as part of the Site-wide characterization; and,
    - One of the soil borings completed as part of this investigation (LSB-28) will be constructed as a permanent monitoring) well (LMW-12) to allow for the collection of groundwater samples for laboratory analysis. The monitoring well will be installed by a licensed well driller and will be constructed using 2-inch diameter 0.020-slot screen. Prior to groundwater sample collection, the newly installed monitoring well will be developed to remove fines and stagnant water within the well. The monitoring well is being installed in the central portion of the Site where groundwater conditions have not previously been assessed due to inaccessibility.
- Langan will survey the vertical location of the monitoring wells, including ground surface elevation, outer casing elevation, and inner casing elevation. This data will be used with the groundwater well gauging data to prepare a sample location plan and a groundwater contour map depicting the elevation of the water table and groundwater flow direction across the Site.
- At least one week following development of the permanent groundwater monitoring well, groundwater samples will be collected from the newly installed monitoring well and the four existing permanent groundwater monitoring wells via USEPA low-flow sampling methods for analysis of the TCL/Part 375 list of VOCs, SVOCs, TAL Metals, PCBs, pesticides, herbicides, hexavalent chromium, PFAS and 1,4-dioxane analyses in accordance with DER-10.

Soil Vapor Point Installation and Sampling

- A total of seven soil vapor samples and six indoor air samples will be collected for the purposes of completing a soil vapor intrusion evaluation.
    - One soil vapor point (LSV-13) will be installed at the Site to a depth of approximately 13-feet bgs, which corresponds to the one-foot interval directly above the groundwater interface.

- Six sub-slab soil vapor points (LSV-14 through LSV-19) will be installed at the Site to a depth corresponding to immediately below the current building basement slab.
- Soil vapor points will be constructed with Teflon-lined polyethylene tubing and a stainless steel soil vapor screen and sealed using bentonite. Each point will be sampled as per NYSDOH and NYSDEC guidelines (including sample point seal helium-testing etc.) for analysis of VOCs via USEPA Method TO-15. Collocated indoor air samples will also be collected for each of the sub-slab soil vapor samples in order to complete the soil vapor intrusion evaluation required per the NYSDOH October 2006/May 2017 Vapor Intrusion Guidance prior to building demolition.

Modifications to this scope of work may be required: 1) due to Site operations, equipment or restrictions; 2) if unexpected contamination is detected and additional analytical data is needed to characterize the Site; and 3) to confirm that impacts are adequately characterized and delineated in compliance with the Brownfield Law, regulations, and applicable investigation guidance documents (e.g., DER-10). NYSDEC and NYSDOH will be contacted to obtain approval for these modifications.

The field investigation will be completed in accordance with the procedures specified in Langan's Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP) provided in Appendices A and B, respectively. A Community Air Monitoring Plan will be implemented during this investigation (see Section 3.6.2).

Names, contact information, and roles of the principal personnel who will participate in the investigation, including laboratory subcontractor, are listed below. Resumes for each Langan employee are provided in the QAPP (Appendix B).

Personnel	Investigation Role	Contact Information
Chris McMahon, CHMM Langan	Qualified Environmental Professional	Phone – 973-560-4861 Email – cmcmahon@langan.com
Ronald E. Boyer, P.E. Langan	Remedial Engineer	Phone – 973-560-4693 Email – rboyer@langan.com
Amanda Forsburg Langan	Project Manager	Phone – 973-560-4488 Email – aforsburg@langan.com
Tony Moffa, CHMM Langan	Langan Health & Safety Officer	Phone – 215-491-6500 Email – tmoffa@langan.com
Ashley Sandve Langan	Field Team Leader/Program Quality Assurance Monitor	Phone – 973-560-4871 Email – asandve@langan.com

Personnel	Investigation Role	Contact Information
Heather Nunn Langan	Quality Assurance Officer	Phone – 215-491-6569 Email – hnunn@langan.com
Joe Conboy Langan	Data Validator	Phone – 215-845-8985 Email – jconboy@langan.com
Lidya Gulizia York Analytical	Laboratory	Phone – 203-325-1371 x 833 Email – lgulizia@yorlklab.com

3.1 Geophysical Survey

A geophysical contractor will complete a full geophysical survey of the Site to clear the proposed RIWP boring locations and identify potential subsurface utilities and structures, including unknown USTs, prior to commencing subsurface work. The geophysical survey may be completed using a range of geophysical instruments, including electromagnetic and utility line locator instruments, and ground-penetrating radar (GPR). The results of the survey may necessitate relocation of the proposed boring locations shown on Figure 5.

3.2 Soil Investigation

3.2.1 Drilling and Logging

An environmental drilling subcontractor will advance eight soil borings as discussed above in Section 3.0. The soil borings will be completed to a maximum depth of 22-feet below sidewalk level. Soil sample depth intervals associated with this task are discussed in further detail in Section 3.2.2 below.

The soil boring to be completed as groundwater monitoring well will be advanced five-feet past the initial groundwater interface. A Langan field engineer, scientist, or geologist will document the work, screen the soil samples for environmental impacts, and collect soil samples for laboratory analyses per Section 3.2.2. Soil will be screened continuously to the boring termination depth for total organic vapor (TOV) concentration using a PID equipped with a 10.6 electron volt (eV) bulb, and for visual and olfactory indications of environmental impacts (e.g., staining and odor). Soil descriptions will be recorded in boring logs.

Non-disposable, down-hole drilling equipment and sampling apparatus will be decontaminated between locations with Alconox® (or similar) and water where grossly impacted material is identified. Following sampling, each soil boring will be backfilled with granulated bentonite below the groundwater interface and/or clean sand in the vadose zone.

3.2.2 Soil Sampling and Analysis

Soil borings advanced for Site-wide characterization will be sampled from the two-foot interval immediately below the surface (i.e. ground surface or current basement slab); the two-foot interval immediately above the groundwater interface, and/or the two-foot interval immediately below the anticipated maximum excavation depth for the proposed remediation. The following samples will be collected and submitted for laboratory analysis of the TCL/Part 375 list of VOCs, SVOCs, PCBs, pesticides, herbicides, TAL Metals, hexavalent chromium, PFAS, and 1,4-dioxane:

- LSB-25: discrete soil samples will be collected from the two-foot interval immediately below the surface (i.e. 0- to 2-feet below sidewalk level), the two-foot interval immediately above the groundwater interface (i.e. 10- to 12-feet below sidewalk level), and the two-foot interval immediately below the anticipated maximum excavation depth for the proposed remediation (i.e., 12- to 14-feet below sidewalk level).
- LSB-26: discrete soil samples will be collected from the two-foot interval immediately below the surface (i.e., 0- to 2-feet below sidewalk level) and the two-foot interval immediately above the groundwater interface (i.e. 10- to 12-feet below sidewalk level). A discrete soil has previously been collected from the two-foot interval immediately below the anticipated maximum excavation depth for the proposed remediation and a supplemental sample will be collected from this boring as discussed below.
- LSB-27: a discrete soil sample will be collected from the two-foot interval immediately below the current basement slab (i.e. 12- to 14-feet below sidewalk level). At this location, the two-foot interval immediately below the anticipated maximum excavation depth for the proposed remediation and the two-foot interval immediately above the groundwater interface are also located at 12- to 14-feet below sidewalk level.
- LSB-30: discrete soil samples will be collected from the two-foot interval immediately below the current basement slab (i.e. 13- to 15-feet below sidewalk level) and the two-foot interval immediately below the anticipated maximum excavation depth for the proposed remediation (i.e. 15- to 17-feet below sidewalk level).
- LSB-32: a discrete soil sample will be collected from the two-foot interval immediately below the current basement slab (i.e. 16.5- to 18.5-feet below sidewalk level). At this location, the proposed development would be shallower than current conditions.

In order to supplement the previous investigation soil samples, the following samples will be collected and submitted for laboratory analysis of herbicides, PFAS, and 1,4-dioxane:

- LSB-26: a discrete soil sample will be collected from 13- to 15-feet below sidewalk level to supplement previous borings LSB-1, LSB-2, LSB-2A, LSB-21, and LSB-21A;
- LSB-28: a discrete soil sample will be collected from 12- to 14-feet below sidewalk level to supplement previous borings LSB-5 and LSB-5A;
- LSB-29: a discrete soil sample will be collected from 12- to 14-feet below sidewalk level to supplement previous borings LSB-7, LSB-23, and LSB-23A and a discrete soil sample will be collected from 14.5- to 16.5-feet below sidewalk level to supplement previous boring LSB-23A; and
- LSB-31: discrete soil samples will be collected from 15- to 17-feet below sidewalk level, 18- to 20-feet below sidewalk level, and 20- to 22-feet below sidewalk level to supplement previous borings LSB-9, LSB-24, and LSB-24A.

Soil samples will be collected in laboratory-supplied containers and will be sealed, labeled, and placed in a cooler containing ice (to maintain a temperature of approximately 4 degrees Celsius) for delivery to York Analytical Laboratories, Inc. (York), a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified analytical laboratory.

QA/QC procedures are described in the QAPP provided as Appendix B.

3.3 Groundwater Investigation

3.3.1 Monitoring Well Installation

One of the soil boring locations will be converted into a permanent groundwater monitoring well. The groundwater monitoring well will be installed by a licensed well driller. During well installation, soil conditions will be screened, logged, and sampled as described above in Section 3.2.

The monitoring well will be constructed using 2-inch-diameter polyvinyl chloride (PVC) riser pipe attached to 10-foot long, schedule-40, 0.020-inch slotted, 2-inch-diameter PVC screen. The monitoring well will be installed so that the well screen straddles the observed water table. The well annulus around the screen will be backfilled with clean sand fill to about 2 feet above the top of the screen. A minimum 2-foot bentonite seal will be installed above the sand, and the borehole annulus will be backfilled with non-impacted soil cuttings, clean sand and/or a

bentonite/Portland Cement grout. The well will be finished with flush-mounted metal manhole covers set in concrete.

Following installation, the well will be developed by surging a surge block, a weighted bailer, or surge pumping techniques across the well screen to agitate and remove fine particles. The surge block, bailer, or submersible pump will be surged across the submerged well screen in 2- to 3-foot increments for approximately 2 minutes per increment. After surging, the well will be purged via pumping until the water becomes clear. The well will then be allowed to sit for a minimum of one week before sampling. Langan will survey the permanent monitoring wells as discussed in Section 3.3.3 in order to determine well casing elevations.

3.3.2 Groundwater Sampling and Analysis

Following the completion of groundwater sample collection, all monitoring wells will be gauged for the presence of LNAPL and DNAPL to prevent potential cross-contamination for PFAS.

At least one week following development of the newly installed groundwater monitoring well, groundwater samples will be collected from the newly installed monitoring well and the four existing permanent groundwater monitoring wells via USEPA low-flow sampling methods for analysis of the TCL/Part 375 list of VOCs, SVOCs, PCBs, pesticides, herbicides, TAL Metals, hexavalent chromium, PFAS, and 1,4-dioxane. Groundwater samples will be collected into laboratory-supplied containers and will be sealed, labeled, and placed in a cooler containing ice (to maintain a temperature of approximately 4 degrees Celsius) for delivery to a NYSDOH ELAP-certified analytical laboratory. QA/QC procedures are described in the QAPP provided as Appendix B.

3.3.3 Monitoring Well Survey and Synoptic Gauging

Langan will survey vertical location of the monitoring wells, including ground surface elevation, outer casing elevation, and inner casing elevation. This data will be used with the groundwater well gauging data to prepare a sample location plan and a groundwater contour map depicting the elevation of the water table across the Site. Vertical control will be established by surveying performed relative to North American Vertical Datum of 1988 (NAVD88) by a New York State-licensed land surveyor. Elevations of the top of monitoring well casings and protective well casings will be surveyed to the nearest 0.01 foot. A synoptic gauging event will be performed to document static water levels. All accessible wells will be gauged during this event.

QA/QC procedures to be followed are described in the QAPP provided as Appendix B.

3.4 Soil Vapor Intrusion Evaluation

3.4.1 Soil Vapor Point Installation

One soil vapor point will be installed at the Site in the existing at-grade asphalt paved parking area. The vapor probe will be installed by a licensed well driller using direct-push drilling methods and will consist of a new, dedicated stainless steel screen implant connected to polyethylene or Teflon™-lined tubing extended to the target depth of approximately 13-feet bgs. Quartz filter media will be used to backfill the screened interval followed by No. 2 sand to approximately 0.5 feet above the screened interval followed by a hydrated granular bentonite clay to the ground surface. The soil vapor sampling location will be sealed at the surface with hydrated bentonite clay.

3.4.2 Sub-Slab Soil Vapor Point Installation

Six sub-slab soil vapor point will be installed at the Site within the basement level of the existing building. The sub-slab soil vapor sampling points will be installed using a portable hammer drill and will consist of Teflon™-lined tubing which will extend approximately 6-inches beneath the bottom of the basement concrete floor slab.

3.4.3 Indoor Air and Soil Vapor Sampling and Analysis

Each of six soil vapor sampling points will be tightness tested using the helium tracer gas method and purged at a flow-rate of <200-ml per minute for 5 minutes into a 1-liter tedlar bag to obtain a PID reading. Helium concentrations below 5% must be observed prior to sample collection.

Collocated indoor air samples will also be collected for each of the sub-slab soil vapor samples in order to complete the soil vapor intrusion evaluation required per the NYSDOH October 2006/May 2017 Vapor Intrusion Guidance prior to building demolition. Indoor air and soil vapor samples will be laboratory analyzed for VOCs via the USEPA TO-15 Method. Samples will be collected in laboratory-cleaned and certified evacuated 6-Liter stainless steel summa canisters with regulators supplied by York. The regulators will be set to collect each soil vapor and indoor air sample over a 24-hour sampling period (a flow rate of <200-ml per minute). Samples will be transferred to the laboratory immediately after field sampling is completed, and stored at a maximum room temperature of 30° Celsius. QA/QC procedures to be followed are described in the QAPP provided as Appendix B.

3.5 Data Management and Validation

York, a NYSDOH ELAP-approved laboratory, will analyze soil, groundwater, soil vapor and indoor air samples. Laboratory analyses will be conducted in accordance with USEPA SW-846 methods and NYSDEC Analytical Services Protocol (ASP) B deliverable format. Environmental data will be reported electronically using the database software application EQuIS as part of NYSDEC's Environmental Information Management System (EIMS).

Table 1 summarizes the anticipated samples and analytical methodology. QA/QC procedures required by the NYSDEC ASP and SW-846 methods, including initial and continuing instrument calibrations, surrogate compound spikes, and analysis of other samples (blanks, laboratory control samples, and matrix spikes/matrix spike duplicates) will be followed in accordance with the QAPP (Appendix B). The laboratory will provide pre-cleaned and preserved sample bottles in accordance with the SW-846 methods. Where there are differences in the SW-846 and NYSDEC ASP requirements, the NYSDEC ASP shall take precedence.

Data validation will be performed in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:

- Verification of QC sample results (both qualitative and quantitative).
- Verification of sample results (both positive hits and non-detects).
- Recalculation of 10 percent of all investigative sample results.
- Preparation of Data Usability Summary Reports (DUSR).

The DUSRs will be prepared and then reviewed by the Program Quality Assurance Monitor before issuance. The DUSRs will provide a detailed assessment of each sample delivery group (SDG) and present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and Chain of Custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. DUSRs will also be prepared for all of the historical soil, groundwater, and soil vapor samples collected as part of the May 2021 RIR. Additional details on the DUSRs are provided in the QAPP in Appendix B.

3.6 Management of Investigation-Derived Waste

Investigation-derived wastes (IDW) (i.e., grossly-contaminated soil cuttings and purge water) will be containerized and staged on-site, pending proper disposal at an off-site facility. Soil cuttings with no apparent staining, odors, or elevated PID readings will be used to backfill boring holes. Soil to be disposed off-Site will be placed in 55-gallon, United Nations/Department of Transportation (UN/DOT)-approved drums. Decontamination fluids, if necessary, will be placed in UN/DOT-approved fluid drums with closed tops. All drums will be properly labeled, sealed, and characterized as necessary. If RI analytical data is insufficient to gain disposal facility acceptance, waste characterization samples will be analyzed for parameters that are typically required by disposal facilities, such as TCL VOCs, SVOCs, metals, PCBs, pesticides, herbicides, Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, Resource Conservation and Recovery Act (RCRA) characteristics including ignitability, corrosivity and reactivity, and paint filter. Additional sampling and analyses may be required based on the selected disposal facility. Waste characterization samples will be submitted to York for analysis in accordance with the QAPP provided in Appendix B. Management of IDW will comply with NYSDEC DER-10 3.3(e).

3.7 Air Monitoring

Air monitoring will be conducted for site personnel and the community (Community Air Monitoring Program [CAMP]). Fugitive particulate (dust) generation that could affect site personnel or the public is not expected because intrusive work is limited to boring, monitoring well, and soil vapor point installation, which does not disturb large volumes of soil.

Dust emissions will be monitored using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10). Organic odors will be monitored with a PID. Dust and odor suppression measures (e.g., water misting, odor suppressant) will be implemented as required. All PIDs used will be equipped with a 10.6 eV bulb.

3.7.1 Personnel Air Monitoring

Langan will conduct air monitoring of the breathing zone periodically during drilling and sampling activities to evaluate health and safety protection for the field personnel. Initially, ambient air monitoring will be performed within the work area. Langan will monitor VOCs with a PID (MultiRAE 3000 or similar) in accordance with the HASP (Appendix A). If air monitoring during intrusive operations identifies the presence of VOCs, on-site personnel will follow the guidelines outlined in the HASP regarding action levels, permissible exposure, engineering controls, and

personal protective equipment. If the VOC action level is exceeded, work will cease and the work location will be evacuated. Monitoring will be continued until the levels drop to safe limits. At that time, work can resume with continued monitoring. If high levels persist, field activities will be halted and the work relocated to another area. If dust emissions are observed, work will stop and dust suppression measures will be used.

3.7.2 Community Air Monitoring Plan (CAMP)

In addition to air monitoring in the worker breathing zone, Langan will conduct community air monitoring in compliance with the NYSDOH Generic CAMP. CAMP deployment will comply with NYSDEC DER-10 Appendix 1A and Appendix 1B.

Langan will conduct periodic monitoring for VOCs during non-intrusive work such as the collection of groundwater samples. Periodic monitoring may include obtaining measurements upon arrival at a location, when opening a monitoring well cap, when bailing/purging a well, and upon departure from a location.

Langan will also conduct monitoring for VOCs during ground-intrusive work (i.e., soil boring advancement and monitoring well installation). Langan will measure upwind concentrations at the start of each workday to establish background concentrations. Langan will monitor VOCs at the downwind perimeter of the work zone, which will be established at a point on the Site where the general public or site employees may be present. Monitoring for VOCs will be conducted with a PID. Dust emissions will be monitored using real-time monitoring equipment capable of measuring PM-10 (e.g., DustTrak). If dust emissions are observed, work will stop and dust suppression measures will be used.

3.8 Qualitative Human Health Exposure Assessment

A Qualitative Human Health Exposure Assessment (QHHEA) will be conducted in accordance with Appendix 3B of the NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation. The assessment will be submitted in the Remedial Investigation Report (RIR).

4.0 REMEDIAL INVESTIGATION REPORT

4.1 Daily Field Reports

Daily reports will be prepared and submitted to the assigned NYSDEC, and NYSDOH project managers by the end of the next business day following the reporting period and will include:

- An update of progress made during the reporting day
- Photographic documentation of the activities completed during the reporting day
- Identification of samples collected during the reporting day
- Locations and references to a site map for completed activities
- A summary of any and all complaints with relevant details, including contact information
- A summary of CAMP findings, including elevated concentrations and response actions, if any
- An explanation of notable site conditions
- A list of anticipated work for the following reporting day

Daily reports are not intended to notify the NYSDEC of emergencies (e.g., accidents, spills), request changes to the RIWP, or communicate other sensitive or time-critical information. However, such conditions will also be included in the daily reports. Emergency conditions and changes to the RIWP will be communicated directly to the NYSDEC Project Manager.

4.2 Remedial Investigation Report

Following completion of the RI and receipt of analytical data, a RIR will be prepared in accordance with the applicable requirements of DER-10 Section 3.14. The report will include:

- A summary of the site history and previous investigations
- A description of site conditions
- Sampling methodology and field observations
- An evaluation of the results and findings
- Conclusions and recommendations for any further assessment (if warranted)

The report will summarize the nature and extent of contamination at each area of concern and identify unacceptable exposure pathways (as determined through a Qualitative Human Health Exposure Assessment).

The report will include soil boring and well construction logs, sampling logs, tabulated analytical results, figures, and laboratory data packages. The tabulated analytical results will be organized in table format and include sample location, media sampled, sample depth, field/laboratory identification numbers, analytical results and the applicable Standards, Criteria, and Guidance (SCGs) pertaining to the Site and contaminants of concern for comparison. The report will include scaled figures showing the locations of soil borings and monitoring wells, sample concentrations above SCGs for each media, groundwater elevation contours and flow direction, and, if appropriate, groundwater contaminant concentration contours.

The RIR will be provided in an electronic format to the NYSDEC.

5.0 SCHEDULE

The table below presents an estimated schedule for the proposed RI and reporting. If the schedule changes, it will be updated and submitted to NYSDEC.

Activity	Weeks (following approval of RIWP)											
	1	2	3	4	5	6	7	8	9	10	11	12
Coordinate Geophysical Survey, Driller and Laboratory												
Perform Geophysical Survey												
Advance Soil Borings, Install Monitoring Wells and Soil Vapor Sample Points, and Collect Soil, Groundwater, and Soil Vapor Samples												
Receipt of Laboratory Results												
Data Validation												
EQuIS™ Electronic Data Deliverable												
Preparation and Submission of RIR												

TABLES

Table 1
PROPOSED SAMPLING SUMMARY
550 TENTH AVENUE REDEVELOPMENT
New York, New York

Matrix	Sample Location	Sample Depth (ft bsl)	Analysis
Soil	LSB-25	0-2 10-12 12-14	TCL/Part 375 list of VOCs & SVOCs, Part 375 PCBs & Pesticides, TAL/Part 375 Metals, PFAS and 1,4 Dioxane
	LSB-26	0-2 10-12	TCL/Part 375 list of VOCs & SVOCs, Part 375 PCBs & Pesticides, TAL/Part 375 Metals, PFAS and 1,4 Dioxane
		13-15	Herbicides, PFAS, 1,4-dioxane
	LSB-27	12-14	TCL/Part 375 list of VOCs & SVOCs, Part 375 PCBs & Pesticides, TAL/Part 375 Metals, PFAS and 1,4 Dioxane
	LSB-28	12-14	Herbicides, PFAS, 1,4-dioxane
	LSB-29	12-14 14.5-16.5	Herbicides, PFAS, 1,4-dioxane
	LSB-30	13-15 15-17	TCL/Part 375 list of VOCs & SVOCs, Part 375 PCBs & Pesticides, TAL/Part 375 Metals, PFAS and 1,4 Dioxane
	LSB-31	15-17 18-20 20-22	Herbicides, PFAS, 1,4-dioxane
	LSB-32	16.5-18.5	TCL/Part 375 list of VOCs & SVOCs, Part 375 PCBs & Pesticides, TAL/Part 375 Metals, PFAS and 1,4 Dioxane
Groundwater	LMW-8 LMW-9 LMW-10 LMW-11 LMW-12	---	TCL/Part 375 list of VOCs & SVOCs, Part 375 PCBs & Pesticides, TAL/Part 375 Metals (Total and Dissolved), PFAS and 1,4 Dioxane
Soil Vapor	LSV-13	1-foot interval above the groundwater interface	VOCs
Collocated Indoor Air and Sub-Slab Soil Vapor	IA-1 / LSV-14 IA-2 / LSV-15 IA-3 / LSV-16 IA-4 / LSV-17 IA-5 / LSV-18 IA-6 / LSV-19	Interval immediately below current building basement slab	VOCs

Notes:
1 - ft bsl = feet below sidewalk level
2 - The groundwater inferface is located approximately 12 to 15.5-feet below sidewalk level.

Table 2A
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date Sample Depth (feet bsl)	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	LSB-1 LSB-1 (15-17) 17K0876-03 11/20/2017 15-17		LSB-2 LSB-2 (15-17) 17K0876-04 11/20/2017 15-17		LSB-2A LSB-2A_0-2_20210211 21B0426-01 2/11/2021 0-2		LSB-2A LSB-2A_0-2_20210211 21B0426-01RE1 2/11/2021 0-2		LSB-2A LSB-2A_11-13_20210211 21B0426-02 2/11/2021 11-13		LSB-2A DUP01_20210211 21B0426-10 2/11/2021 11-13		LSB-5 LSB-5 (1-3) 17K0876-08 11/21/2017 11.5-13.5		LSB-5 DUP-1_112117 17K0876-09 11/21/2017 11.5-13.5		LSB-5A LSB-5A_2-4_20210210 21B0347-02 2/10/2021 12.5-14.5		LSB-6 LSB-6 (1-3) 17K0876-10 11/21/2017 12.5-14.5		LSB-7 LSB-7 (0-2) 17K0876-07 11/20/2017 11.5-13.5		LSB-8 LSB-8 (0-2) 17K0876-06 11/20/2017 11.5-13.5		LSB-8A LSB-8A_0-2_20210211 21B0426-03 2/11/2021 11.5-13.5	
Volatile Organic Compounds (mg/kg)																												
1,1,1,2-Tetrachloroethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,1,1-Trichloroethane	0.68	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,1,2,2-Tetrachloroethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,1,2-Trichloro-1,2,2-Trifluoroethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,1,2-Trichloroethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,1-Dichloroethane	0.27	26	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,1-Dichloroethene	0.33	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,1-Dichloropropene	~	~	NA		NA		0.0024	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
1,2,3-Trichlorobenzene	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,2,3-Trichloropropane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,2,4-Trichlorobenzene	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,2,4-Trimethylbenzene	3.6	52	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,2-Dibromo-3-Chloropropane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,2-Dibromoethane (Ethylene Dibromide)	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,2-Dichlorobenzene	1.1	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,2-Dichloroethane	0.02	3.1	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,2-Dichloropropane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,3,5-Trimethylbenzene (Mesitylene)	8.4	52	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,3-Dichlorobenzene	2.4	49	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,3-Dichloropropane	~	~	NA		NA		0.0024	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
1,4-Dichlorobenzene	1.8	13	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
1,4-Dioxane (P-Dioxane)	0.1	13	0.042	U	0.056	U	0.047	U	NA		NA		NA		0.048	U	0.046	U	NA		0.046	U	0.059	U	0.051	U	NA	
2,2-Dichloropropane	~	~	NA		NA		0.0024	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
2-Chlorotoluene	~	~	NA		NA		0.0024	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
2-Hexanone	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
4-Chlorotoluene	~	~	NA		NA		0.0024	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
Acetone	0.05	100	0.0073	J	0.013		0.0074	J	NA		NA		NA		0.0048	U	0.0046	U	NA		0.01		0.0061	J	0.0072	J	NA	
Acrolein	~	~	0.0042	U	0.0056	U	0.0047	U	NA		NA		NA		0.0048	U	0.0046	U	NA		0.0046	U	0.0059	U	0.0051	U	NA	
Acrylonitrile	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Benzene	0.06	4.8	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Bromobenzene	~	~	NA		NA		0.0024	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
Bromochloromethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Bromodichloromethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Bromoform	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Bromomethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Carbon Disulfide	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Carbon Tetrachloride	0.76	2.4	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Chlorobenzene	1.1	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Chloroethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Chloroform	0.37	49	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Chloromethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Cis-1,2-Dichloroethene	0.25	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Cis-1,3-Dichloropropene	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Cyclohexane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Dibromochloromethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Dibromomethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Dichlorodifluoromethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Ethylbenzene	1	41	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Hexachlorobutadiene	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Isopropylbenzene (Cumene)	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
M,P-Xylene	~	~	0.0042	U	0.0056	U	0.0047	U	NA		NA		NA		0.0048	U	0.0046	U	NA		0.0046	U	0.0059	U	0.0051	U	NA	
Methyl Acetate	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Methyl Ethyl Ketone (2-Butanone)	0.12	100	0.0021	U	0.0074		0.0048		NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0028	J	NA	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Methylcyclohexane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Methylene Chloride	0.05	100	0.0042	U	0.0056	U	0.0047	U	NA		NA		NA		0.0048	U	0.0046	U	NA		0.0046	U	0.0059	U	0.0051	U	NA	
n-Butylbenzene	12	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
n-Propylbenzene	3.9	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
o-Xylene (1,2-Dimethylbenzene)	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
p-Cymene (p-Isopropyltoluene)	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Sec-Butylbenzene	11	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Styrene	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
T-Butylbenzene	5.9	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Tert-Butyl Alcohol	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Tert-Butyl Methyl Ether	0.93	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Tetrachloroethene (PCE)	1.3	19	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Toluene	0.7	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Total Xylenes	0.26	100	0.0062	U	0.0084	U	0.0071	U	NA		NA		NA		0.0072	U	0.0069	U	NA		0.0069	U	0.0088	U	0.0077	U	NA	
Trans-1,2-Dichloroethene	0.19	100	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Trans-1,3-Dichloropropene	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Trichloroethene (TCE)	0.47	21	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Trichlorofluoromethane	~	~	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Vinyl Acetate	~	~	NA		NA		0.0024	U	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
Vinyl Chloride	0.02	0.9	0.0021	U	0.0028	U	0.0024	U	NA		NA		NA		0.0024	U	0.0023	U	NA		0.0023	U	0.0029	U	0.0026	U	NA	
Total BTEX	~	~	ND		ND		ND		NA		NA		NA		ND		ND		NA		ND		ND		ND		NA	
Total CVOCs	~	~	ND		D		ND		NA		NA		NA		ND		ND		NA		ND		ND		ND		NA	
Total VOCs	~	~	0.0073		0.0204		0.0122		NA		NA		NA		ND		ND		NA		0.01		0.0061		0.01		NA	

Notes provided on Page 7.
Concentrations above Unrestricted Use SCOs are bolded.
Concentrations above Restricted Use Restricted-Residential SCOs are shaded.

Table 2A
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date Sample Depth (feet bsl)	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	LSB-1 LSB-1 (15-17) 17K0876-03 11/20/2017 15-17	LSB-2 LSB-2 (15-17) 17K0876-04 11/20/2017 15-17	LSB-2A LSB-2A_0-2_20210211 21B0426-01 2/11/2021 0-2	LSB-2A LSB-2A_0-2_20210211 21B0426-01RE1 2/11/2021 0-2	LSB-2A LSB-2A_11-13_20210211 21B0426-02 2/11/2021 11-13	LSB-2A DUP01_20210211 21B0426-10 2/11/2021 11-13	LSB-5 LSB-5 (1-3) 17K0876-08 11/21/2017 11.5-13.5	LSB-5 DUP-1_112117 17K0876-09 11/21/2017 11.5-13.5	LSB-5A LSB-5A_2-4_20210210 21B0347-02 2/10/2021 12.5-14.5	LSB-6 LSB-6 (1-3) 17K0876-10 11/21/2017 12.5-14.5	LSB-7 LSB-7 (0-2) 17K0876-07 11/20/2017 11.5-13.5	LSB-8 LSB-8 (0-2) 17K0876-06 11/20/2017 11.5-13.5	LSB-8A LSB-8A_0-2_20210211 21B0426-03 2/11/2021 11.5-13.5
Semivolatile Organic Compounds (mg/kg)															
1,2,4,5-Tetrachlorobenzene	~	~	0.102 U	0.0997 U	0.0991 U	NA	NA	NA	0.103 U	0.103 U	NA	0.0964 U	0.0919 U	0.0947 U	NA
1,2,4-Trichlorobenzene	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
1,2-Dichlorobenzene	1.1	100	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
1,2-Diphenylhydrazine	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
1,3-Dichlorobenzene	2.4	49	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
1,4-Dichlorobenzene	1.8	13	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
1,4-Dioxane (P-Dioxane)	0.1	13	NA	NA	0.0099 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	~	~	0.102 U	0.0997 U	0.0991 U	NA	NA	NA	0.103 U	0.103 U	NA	0.0964 U	0.0919 U	0.0947 U	NA
2,4,5-Trichlorophenol	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
2,4,6-Trichlorophenol	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
2,4-Dichlorophenol	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
2,4-Dimethylphenol	~	~	0.0512 U	0.05 U	0.148 D	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
2,4-Dinitrophenol	~	~	0.102 U	0.0997 U	0.0991 U	NA	NA	NA	0.103 U	0.103 U	NA	0.0964 U	0.0919 U	0.0947 U	NA
2,4-Dinitrotoluene	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
2,6-Dinitrotoluene	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
2-Chloronaphthalene	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
2-Chlorophenol	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
2-Methylnaphthalene	~	~	0.0512 U	0.05 U	NA	4.12 D	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
2-Methylphenol (o-Cresol)	0.33	100	0.0512 U	0.05 U	0.0935 JD	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
2-Nitroaniline	~	~	0.102 U	0.0997 U	0.0991 U	NA	NA	NA	0.103 U	0.103 U	NA	0.0964 U	0.0919 U	0.0947 U	NA
2-Nitrophenol	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
3 & 4 Methylphenol (m&p Cresol)	0.33	100	0.0512 U	0.05 U	0.19 D	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
3,3'-Dichlorobenzidine	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
3-Nitroaniline	~	~	0.102 U	0.0997 U	0.0991 U	NA	NA	NA	0.103 U	0.103 U	NA	0.0964 U	0.0919 U	0.0947 U	NA
4,6-Dinitro-2-Methylphenol	~	~	0.102 U	0.0997 U	0.0991 U	NA	NA	NA	0.103 U	0.103 U	NA	0.0964 U	0.0919 U	0.0947 U	NA
4-Bromophenyl Phenyl Ether	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
4-Chloro-3-Methylphenol	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
4-Chloroaniline	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
4-Chlorophenyl Phenyl Ether	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
4-Nitroaniline	~	~	0.102 U	0.0997 U	0.0991 U	NA	NA	NA	0.103 U	0.103 U	NA	0.0964 U	0.0919 U	0.0947 U	NA
4-Nitrophenol	~	~	0.102 U	0.0997 U	0.0991 U	NA	NA	NA	0.103 U	0.103 U	NA	0.0964 U	0.0919 U	0.0947 U	NA
Acenaphthene	20	100	0.0512 U	0.05 U	NA	4.05 D	NA	NA	0.0517 U	0.0519 U	NA	0.0879 JD	0.046 U	0.0475 U	NA
Acenaphthylene	100	100	0.0512 U	0.05 U	0.614 D	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Acetophenone	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Aniline (Phenylamine, Aminobenzene)	~	~	0.204 U	0.2 U	0.199 U	NA	NA	NA	0.206 U	0.207 U	NA	0.193 U	0.184 U	0.19 U	NA
Anthracene	100	100	0.0512 U	0.05 U	NA	5.71 D	NA	NA	0.0517 U	0.0519 U	NA	0.0817 JD	0.046 U	0.0475 U	NA
Atrazine	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Benzaldehyde	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Benzidine	~	~	0.204 U	0.2 U	0.199 U	NA	NA	NA	0.206 U	0.207 U	NA	0.193 U	0.184 U	0.19 U	NA
Benzo(a)anthracene	1	1	0.0512 U	0.05 U	NA	**10.8** D	NA	NA	0.0517 U	0.0519 U	NA	0.0909 JD	0.046 U	0.0475 U	NA
Benzo(a)pyrene	1	1	0.0512 U	0.05 U	NA	**9** D	NA	NA	0.0517 U	0.0519 U	NA	0.0948 JD	0.046 U	0.0475 U	NA
Benzo(b)fluoranthene	1	1	0.0512 U	0.05 U	NA	**8.44** D	NA	NA	0.0517 U	0.0519 U	NA	0.103 D	0.046 U	0.0475 U	NA
Benzo(g,h,i)Perylene	100	100	0.0512 U	0.05 U	NA	5.37 D	NA	NA	0.0517 U	0.0519 U	NA	0.0578 JD	0.046 U	0.0475 U	NA
Benzo(k)fluoranthene	0.8	3.9	0.0512 U	0.05 U	NA	**7.34** D	NA	NA	0.0517 U	0.0519 U	NA	0.0709 JD	0.046 U	0.0475 U	NA
Benzoic Acid	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Benzyl Alcohol	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Benzyl Butyl Phthalate	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.572 D	0.0519 U	NA	0.0987 D	0.046 U	0.0475 U	NA
Biphenyl (Diphenyl)	~	~	0.0512 U	0.05 U	0.598 D	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Bis(2-chloroethoxy) methane	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Bis(2-chloroethyl) ether (2-chloroethyl ether)	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Bis(2-chloroisopropyl) ether	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Bis(2-ethylhexyl) phthalate	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0778 JD	0.046 U	0.0475 U	NA
Caprolactam	~	~	0.102 U	0.0997 U	0.0991 U	NA	NA	NA	0.103 U	0.103 U	NA	0.0964 U	0.0919 U	0.0947 U	NA
Carbazole	~	~	0.0512 U	0.05 U	NA	3.5 D	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Chrysene	1	3.9	0.0512 U	0.05 U	NA	**9.67** D	NA	NA	0.0517 U	0.0519 U	NA	0.084 JD	0.046 U	0.0475 U	NA
Dibenz(a,h)anthracene	0.33	0.33	0.0512 U	0.05 U	**2.49** D	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Dibenzofuran	7	59	0.0512 U	0.05 U	3.02 D	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Dibutyl phthalate	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Diethyl phthalate	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Dimethyl phthalate	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Dioctyl phthalate	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Fluoranthene	100	100	0.0512 U	0.05 U	NA	26 D	NA	NA	0.0544 JD	0.0519 U	NA	0.193 D	0.046 U	0.0689 JD	NA
Fluorene	30	100	0.0512 U	0.05 U	NA	4.76 D	NA	NA	0.0517 U	0.0519 U	NA	0.0971 D	0.046 U	0.0475 U	NA
Hexachlorobenzene	0.33	1.2	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Hexachlorobutadiene	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Hexachlorocyclopentadiene	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Hexachloroethane	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.0512 U	0.05 U	NA	**5.46** D	NA	NA	0.0517 U	0.0519 U	NA	0.0524 JD	0.046 U	0.0475 U	NA
Isophorone	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Naphthalene	12	100	0.0512 U	0.05 U	NA	8.2 D	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Nitrobenzene	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
n-Nitrosodimethylamine	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
n-Nitrosodi-N-Propylamine	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
n-Nitrosodiphenylamine	~	~	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Pentachlorophenol	0.8	6.7	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Phenanthrene	100	100	0.0512 U	0.05 U	NA	28.7 D	NA	NA	0.0517 U	0.0519 U	NA	0.199 D	0.046 U	0.0475 U	NA
Phenol	0.33	100	0.0512 U	0.05 U	0.0497 U	NA	NA	NA	0.0517 U	0.0519 U	NA	0.0483 U	0.046 U	0.0475 U	NA
Pyrene	100	100	0.0512 U	0.05 U	NA	19.1 D	NA	NA	0.0569 JD	0.0519 U	NA	0.187 D	0.0492 JD	0.0696 JD	NA
Pyridine	~	~	NA	NA	0.199 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes provided on Page 7.
Concentrations above Unrestricted Use SCOs are bolded.
Concentrations above Restricted Use Restricted-Residential SCOs are shaded.

Table 2A
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date Sample Depth (feet bsl)	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	LSB-1 LSB-1 (15-17) 17K0876-03 11/20/2017 15-17	LSB-2 LSB-2 (15-17) 17K0876-04 11/20/2017 15-17	LSB-2A LSB-2A_0-2_20210211 21B0426-01 2/11/2021 0-2	LSB-2A LSB-2A_0-2_20210211 21B0426-01RE1 2/11/2021 0-2	LSB-2A LSB-2A_11-13_20210211 21B0426-02 2/11/2021 11-13	LSB-2A DUP01_20210211 21B0426-10 2/11/2021 11-13	LSB-5 LSB-5 (1-3) 17K0876-08 11/21/2017 11.5-13.5	LSB-5 DUP-1_112117 17K0876-09 11/21/2017 11.5-13.5	LSB-5A LSB-5A_2-4_20210210 21B0347-02 2/10/2021 12.5-14.5	LSB-6 LSB-6 (1-3) 17K0876-10 11/21/2017 12.5-14.5	LSB-7 LSB-7 (0-2) 17K0876-07 11/20/2017 11.5-13.5	LSB-8 LSB-8 (0-2) 17K0876-06 11/20/2017 11.5-13.5	LSB-8A LSB-8A_0-2_20210211 21B0426-03 2/11/2021 11.5-13.5
Pesticides (mg/kg)															
4,4'-DDD	0.0033	13	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
4,4'-DDE	0.0033	8.9	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
4,4'-DDT	0.0033	7.9	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Aldrin	0.005	0.097	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Alpha BHC (Alpha Hexachlorocyclohexane)	0.02	0.48	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Alpha Chlordane	0.094	4.2	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Alpha Endosulfan	2.4	24	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.36	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Beta Endosulfan	2.4	24	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Chlordane (alpha and gamma)	~	~	NA	NA	0.039 U	NA	0.0401 U	0.0403 U	NA	NA	0.0378 U	NA	NA	NA	0.0414 U
Delta Bhc (Delta Hexachlorocyclohexane)	0.04	100	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Dieldrin	0.005	0.2	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Endosulfan Sulfate	2.4	24	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Endrin	0.014	11	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Endrin Aldehyde	~	~	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Endrin Ketone	~	~	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Gamma Bhc (Lindane)	0.1	1.3	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Gamma-Chlordane	~	~	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Heptachlor	0.042	2.1	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Heptachlor Epoxide	~	~	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Methoxychlor	~	~	NA	NA	0.00195 U	NA	0.00201 U	0.00202 U	NA	NA	0.00189 U	NA	NA	NA	0.00207 U
Toxaphene	~	~	NA	NA	0.195 U	NA	0.201 U	0.202 U	NA	NA	0.189 U	NA	NA	NA	0.207 U
Polychlorinated Biphenyls (mg/kg)															
PCB-1016 (Aroclor 1016)	~	~	NA	NA	0.0197 U	NA	0.0202 U	0.0203 U	NA	NA	0.0191 U	NA	NA	NA	0.0209 U
PCB-1221 (Aroclor 1221)	~	~	NA	NA	0.0197 U	NA	0.0202 U	0.0203 U	NA	NA	0.0191 U	NA	NA	NA	0.0209 U
PCB-1232 (Aroclor 1232)	~	~	NA	NA	0.0197 U	NA	0.0202 U	0.0203 U	NA	NA	0.0191 U	NA	NA	NA	0.0209 U
PCB-1242 (Aroclor 1242)	~	~	NA	NA	0.0197 U	NA	0.0202 U	0.0203 U	NA	NA	0.0191 U	NA	NA	NA	0.0209 U
PCB-1248 (Aroclor 1248)	~	~	NA	NA	0.0197 U	NA	0.0202 U	0.0203 U	NA	NA	0.0191 U	NA	NA	NA	0.0209 U
PCB-1254 (Aroclor 1254)	~	~	NA	NA	0.0197 U	NA	0.0202 U	0.0203 U	NA	NA	0.0191 U	NA	NA	NA	0.0209 U
PCB-1260 (Aroclor 1260)	~	~	NA	NA	0.0197 U	NA	0.0202 U	0.0203 U	NA	NA	0.0191 U	NA	NA	NA	0.0209 U
Total PCBs	0.1	1	NA	NA	0.0197 U	NA	0.0202 U	0.0203 U	NA	NA	0.0191 U	NA	NA	NA	0.0209 U
Inorganics (mg/kg)															
Aluminum	~	~	12,500	8,180	10,800	NA	NA	NA	10,700	9,940	NA	9,460	6,810	10,400	NA
Antimony	~	~	1.76	1.71	2.99 U	NA	NA	NA	1.9	1.76	NA	1.47	2.24	1.4	NA
Arsenic	13	16	2.15	1.44	1.79 U	NA	NA	NA	3.08	1.91	NA	1.16 U	1.13	1.14 U	NA
Barium	350	400	92	71.6	93.9	NA	NA	NA	100	97.7	NA	63.8	49.4	84.6	NA
Beryllium	7.2	72	0.122 U	0.12 U	0.06 U	NA	NA	NA	0.124 U	0.124 U	NA	0.116 U	0.11 U	0.114 U	NA
Cadmium	2.5	4.3	0.367 U	0.36 U	0.955	NA	NA	NA	0.371 U	0.373 U	NA	0.347 U	0.33 U	0.341 U	NA
Calcium	~	~	1,270	23,700	5,060 B	NA	NA	NA	42,300	10,200	NA	2,200	71,600	13,000	NA
Chromium, Hexavalent	1	110	0.612 U	0.6 U	0.598 U	NA	NA	NA	0.618 U	0.622 U	NA	0.578 U	0.551 U	0.568 U	NA
Chromium, Total	~	~	16.3	11.1	15.9	NA	NA	NA	21.5	19.4	NA	13.5	38.2	15.1	NA
Chromium, Trivalent	30	180	NA	NA	15.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	~	~	9.59	6.15	7.17	NA	NA	NA	7.53	8.42	NA	6.29	3.36	8.98	NA
Copper	50	270	22.6 B	15.8 B	17.3	NA	NA	NA	37.4 B	30.9 B	NA	21.1 B	19.4 B	34.5 B	NA
Cyanide	27	27	NA	NA	0.598 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	~	~	19,500	24,900	19,100	NA	NA	NA	13,600	15,900	NA	13,500	9,100	16,200	NA
Lead	63	400	16.6 B	**119** B	**105**	NA	NA	NA	**153** B	**123** B	NA	**89.4** B	12.8 B	43.3 B	NA
Magnesium	~	~	3,490	2,530	3,050	NA	NA	NA	5,320	3,090	NA	2,610	3,210	3,900	NA
Manganese	1,600	2,000	253	**1,660**	209	NA	NA	NA	277	256	NA	170	157	298	NA
Mercury	0.18	0.81	0.0439	0.0816	0.0395 U	NA	NA	NA	**0.255**	**0.218**	NA	**0.345**	0.033 U	**0.207**	NA
Nickel	30	310	0.612 U	0.6 U	17.9	NA	NA	NA	0.618 U	0.622 U	NA	0.578 U	1.29	0.568 U	NA
Potassium	~	~	1,220	718	1,260 B	NA	NA	NA	1,730	1,570	NA	893	936	2,290	NA
Selenium	3.9	180	**15.5** B	**19.3** B	2.99 U	NA	NA	NA	**11.2** B	**13.1** B	NA	**10.9** B	**7.96** B	**12.8** B	NA
Silver	2	180	0.612 U	0.6 U	0.598 U	NA	NA	NA	0.618 U	0.622 U	NA	0.578 U	0.551 U	0.568 U	NA
Sodium	~	~	295	212	213	NA	NA	NA	663	455	NA	304	496	742	NA
Thallium	~	~	1.22 U	1.2 U	2.99 U	NA	NA	NA	1.24 U	1.24 U	NA	1.16 U	1.1 U	1.14 U	NA
Vanadium	~	~	24.5	15.1	20.4	NA	NA	NA	20	20.9	NA	17.5	13.1	19.6	NA
Zinc	109	10,000	39.5	29.7	**350** B	NA	NA	NA	76	66.6	NA	45.4	34.9	47.2	NA
General Chemistry (%)															
Solids, Percent	~	~	81.7	83.3	83.6	NA	82	81.6	80.9	80.3	86.4	86.5	90.8	88.1	78.8

Notes provided on Page 7.
Concentrations above Unrestricted Use SCOs are bolded.
Concentrations above Restricted Use Restricted-Residential SCOs are shaded.

Table 2A
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date Sample Depth (feet bsl)	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	LSB-9 LSB-9 (0-2) 17K0876-05 11/20/2017 15-17	LSB-21 LSB-21_120518 18L0241-01 12/5/2018 13-15	LSB-21A LSB-21A_0-2_20210211 21B0426-04 2/11/2021 0-2	LSB-22 LSB-22_120618 18L0288-04 12/6/2018 12-14	LSB-22A LSB-22A_4-6_20210210 21B0347-01 2/10/2021 14.5-16.5	LSB-23 LSB-23_120618 18L0288-02 12/6/2018 12.5-14.5	LSB-23 DUP-6_120618 18L0288-03 12/6/2018 12.5-14.5	LSB-23A LSB-23A_0-2_20210211 21B0426-05 2/11/2021 11.5-13.5	LSB-23A LSB-23A_3-5_20210211 21B0426-06 2/11/2021 14.5-16.5	LSB-24 LSB-24_120618 18L0288-01 12/6/2018 16-18	LSB-24A LSB-24A_0-2_20210211 21B0426-07 2/11/2021 15-17	LSB-24A LSB-24A_3-5_20210211 21B0426-08 2/11/2021 18-20	LSB-24A LSB-24A_5-7_20210211 21B0426-09 2/11/2021 20-22
Volatile Organic Compounds (mg/kg)															
1,1,1,2-Tetrachloroethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,1,1-Trichloroethane	0.68	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,1,2,2-Tetrachloroethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,1,2-Trichloroethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,1-Dichloroethane	0.27	26	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,1-Dichloroethene	0.33	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,1-Dichloropropene	~	~	NA	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,2,3-Trichlorobenzene	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,2,3-Trichloropropane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,2,4-Trichlorobenzene	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,2,4-Trimethylbenzene	3.6	52	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,2-Dibromo-3-Chloropropane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,2-Dibromoethane (Ethylene Dibromide)	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,2-Dichlorobenzene	1.1	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,2-Dichloroethane	0.02	3.1	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,2-Dichloropropane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,3,5-Trimethylbenzene (Mesitylene)	8.4	52	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,3-Dichlorobenzene	2.4	49	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,3-Dichloropropane	~	~	NA	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,4-Dichlorobenzene	1.8	13	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
1,4-Dioxane (P-Dioxane)	0.1	13	0.05 U	0.036 U	0.053 U	0.045 U	0.046 U	0.047 U	0.048 U	NA	0.038 U	0.057 U	NA	0.044 U	0.04 U
2,2-Dichloropropane	~	~	NA	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
2-Chlorotoluene	~	~	NA	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
2-Hexanone	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
4-Chlorotoluene	~	~	NA	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Acetone	0.05	100	0.011	0.013	0.0074 J	0.02	0.033	0.017	0.019	NA	0.034	0.011	NA	0.011	0.012
Acrolein	~	~	0.005 U	0.0036 U	0.0053 U	0.0045 U	0.0046 U	0.0047 U	0.0048 U	NA	0.0038 U	0.0057 U	NA	0.0044 U	0.004 U
Acrylonitrile	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Benzene	0.06	4.8	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Bromobenzene	~	~	NA	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Bromochloromethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Bromodichloromethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Bromoform	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Bromomethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Carbon Disulfide	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Carbon Tetrachloride	0.76	2.4	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Chlorobenzene	1.1	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Chloroethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Chloroform	0.37	49	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Chloromethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Cis-1,2-Dichloroethene	0.25	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Cis-1,3-Dichloropropene	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Cyclohexane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Dibromochloromethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Dibromomethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Dichlorodifluoromethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Ethylbenzene	1	41	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Hexachlorobutadiene	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Isopropylbenzene (Cumene)	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
M,P-Xylene	~	~	0.005 U	0.0036 U	0.0053 U	0.0045 U	0.0046 U	0.0047 U	0.0048 U	NA	0.0038 U	0.0057 U	NA	0.0044 U	0.004 U
Methyl Acetate	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Methyl Ethyl Ketone (2-Butanone)	0.12	100	0.005	0.0018 U	0.0026 U	0.0022 U	0.0075	0.0024 U	0.0024 U	NA	0.0071	0.0028 U	NA	0.0039 J	0.0032 J
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Methylcyclohexane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Methylene Chloride	0.05	100	0.005 U	0.015	0.0053 U	0.014	0.0046 U	0.017	0.017	NA	0.0038 U	0.023	NA	0.0044 U	0.004 U
n-Butylbenzene	12	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
n-Propylbenzene	3.9	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
o-Xylene (1,2-Dimethylbenzene)	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
p-Cymene (p-Isopropyltoluene)	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Sec-Butylbenzene	11	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Styrene	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
T-Butylbenzene	5.9	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Tert-Butyl Alcohol	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Tert-Butyl Methyl Ether	0.93	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Tetrachloroethene (PCE)	1.3	19	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Toluene	0.7	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0028 J	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Total Xylenes	0.26	100	0.0075 U	0.0054 U	0.0079 U	0.0067 U	0.0069 U	0.0071 U	0.0072 U	NA	0.0057 U	0.0085 U	NA	0.0066 U	0.006 U
Trans-1,2-Dichloroethene	0.19	100	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Trans-1,3-Dichloropropene	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Trichloroethene (TCE)	0.47	21	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Trichlorofluoromethane	~	~	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Vinyl Acetate	~	~	NA	NA	0.0026 U	NA	0.0023 U	NA	NA	NA	0.0019 U	NA	NA	0.0022 U	0.002 U
Vinyl Chloride	0.02	0.9	0.0025 U	0.0018 U	0.0026 U	0.0022 U	0.0023 U	0.0024 U	0.0024 U	NA	0.0019 U	0.0028 U	NA	0.0022 U	0.002 U
Total BTEX	~	~	ND	ND	ND	ND	ND	ND	0.0028	NA	ND	ND	NA	ND	ND
Total CVOCs	~	~	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	NA	ND	ND
Total VOCs	~	~	0.016	0.028	0.0074	0.034	0.0405	0.034	0.0388	NA	0.0411	0.034	NA	0.0149	0.0152

Notes provided on Page 7.
Concentrations above Unrestricted Use SCOs are bolded.
Concentrations above Restricted Use Restricted-Residential SCOs are shaded.

Table 2A
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date Sample Depth (feet bsl)	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	LSB-9 LSB-9 (0-2) 17K0876-05 11/20/2017 15-17		LSB-21 LSB-21_120518 18L0241-01 12/5/2018 13-15		LSB-21A LSB-21A_0-2_20210211 21B0426-04 2/11/2021 0-2		LSB-22 LSB-22_120618 18L0288-04 12/6/2018 12-14		LSB-22A LSB-22A_4-6_20210210 21B0347-01 2/10/2021 14.5-16.5		LSB-23 LSB-23_120618 18L0288-02 12/6/2018 12.5-14.5		LSB-23 DUP-6_120618 18L0288-03 12/6/2018 12.5-14.5		LSB-23A LSB-23A_0-2_20210211 21B0426-05 2/11/2021 11.5-13.5		LSB-23A LSB-23A_3-5_20210211 21B0426-06 2/11/2021 14.5-16.5		LSB-24 LSB-24_120618 18L0288-01 12/6/2018 16-18		LSB-24A LSB-24A_0-2_20210211 21B0426-07 2/11/2021 15-17		LSB-24A LSB-24A_3-5_20210211 21B0426-08 2/11/2021 18-20		LSB-24A LSB-24A_5-7_20210211 21B0426-09 2/11/2021 20-22	
Semivolatile Organic Compounds (mg/kg)																														
1,2,4,5-Tetrachlorobenzene	~	~	0.102	U	0.0871	U	0.0948	U	0.099	U	0.108	U	0.101	U	0.104	U	NA		0.0988	U	0.1	U	NA		0.105	U	0.0969	U
1,2,4-Trichlorobenzene	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
1,2-Dichlorobenzene	1.1	100	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
1,2-Diphenylhydrazine	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
1,3-Dichlorobenzene	2.4	49	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
1,4-Dichlorobenzene	1.8	13	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
1,4-Dioxane (P-Dioxane)	0.1	13	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
2,3,4,6-Tetrachlorophenol	~	~	0.102	U	0.0871	U	0.0948	U	0.099	U	0.108	U	0.101	U	0.104	U	NA		0.0988	U	0.1	U	NA		0.105	U	0.0969	U
2,4,5-Trichlorophenol	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
2,4,6-Trichlorophenol	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
2,4-Dichlorophenol	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
2,4-Dimethylphenol	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
2,4-Dinitrophenol	~	~	0.102	U	0.0871	U	0.0948	U	0.099	U	0.108	U	0.101	U	0.104	U	NA		0.0988	U	0.1	U	NA		0.105	U	0.0969	U
2,4-Dinitrotoluene	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
2,6-Dinitrotoluene	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
2-Chloronaphthalene	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
2-Chlorophenol	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
2-Methylnaphthalene	~	~	0.051	U	0.0436	U	0.149	D	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
2-Methylphenol (o-Cresol)	0.33	100	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
2-Nitroaniline	~	~	0.102	U	0.0871	U	0.0948	U	0.099	U	0.108	U	0.101	U	0.104	U	NA		0.0988	U	0.1	U	NA		0.105	U	0.0969	U
2-Nitrophenol	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
3 & 4 Methylphenol (m&p Cresol)	0.33	100	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
3,3'-Dichlorobenzidine	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
3-Nitroaniline	~	~	0.102	U	0.0871	U	0.0948	U	0.099	U	0.108	U	0.101	U	0.104	U	NA		0.0988	U	0.1	U	NA		0.105	U	0.0969	U
4,6-Dinitro-2-Methylphenol	~	~	0.102	U	0.0871	U	0.0948	U	0.099	U	0.108	U	0.101	U	0.104	U	NA		0.0988	U	0.1	U	NA		0.105	U	0.0969	U
4-Bromophenyl Phenyl Ether	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
4-Chloro-3-Methylphenol	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
4-Chloroaniline	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
4-Chlorophenyl Phenyl Ether	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
4-Nitroaniline	~	~	0.102	U	0.0871	U	0.0948	U	0.099	U	0.108	U	0.101	U	0.104	U	NA		0.0988	U	0.1	U	NA		0.105	U	0.0969	U
4-Nitrophenol	~	~	0.102	U	0.0871	U	0.0948	U	0.099	U	0.108	U	0.101	U	0.104	U	NA		0.0988	U	0.1	U	NA		0.105	U	0.0969	U
Acenaphthene	20	100	0.0789	JD	0.0436	U	0.184	D	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Acenaphthylene	100	100	0.051	U	0.0436	U	0.18	D	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Acetophenone	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Aniline (Phenylamine, Aminobenzene)	~	~	0.204	U	0.174	U	0.19	U	0.198	U	0.216	U	0.203	U	0.209	U	NA		0.198	U	0.2	U	NA		0.211	U	0.194	U
Anthracene	100	100	0.152	D	0.0436	U	0.405	D	0.072	JD	0.0542	U	0.0818	JD	0.109	D	NA		0.0495	U	0.0501	U	NA		0.0977	JD	0.0486	U
Atrazine	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Benzaldehyde	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0587	JD	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Benzidine	~	~	0.204	U	0.174	U	0.19	U	0.198	U	0.216	U	0.203	U	0.209	U	NA		0.198	U	0.2	U	NA		0.211	U	0.194	U
Benzo(a)anthracene	1	1	0.286	D	0.0436	U	**1.37**	D	0.236	D	0.0542	U	0.246	D	0.251	D	NA		0.0495	U	0.0501	U	NA		0.0927	JD	0.0486	U
Benzo(a)pyrene	1	1	0.251	D	0.0436	U	**1.61**	D	0.227	D	0.0544	JD	0.268	D	0.24	D	NA		0.0495	U	0.0501	U	NA		0.0885	JD	0.0486	U
Benzo(b)fluoranthene	1	1	0.126	D	0.0436	U	**1.41**	D	0.196	D	0.0542	U	0.213	D	0.19	D	NA		0.0495	U	0.0501	U	NA		0.0657	JD	0.0486	U
Benzo(g,h,i)Perylene	100	100	0.141	D	0.0436	U	0.928	D	0.118	D	0.0542	U	0.155	D	0.124	D	NA		0.0495	U	0.0501	U	NA		0.0632	JD	0.0486	U
Benzo(k)fluoranthene	0.8	3.9	0.143	D	0.0436	U	**1.22**	D	0.192	D	0.0542	U	0.195	D	0.179	D	NA		0.0495	U	0.0501	U	NA		0.0632	JD	0.0486	U
Benzoic Acid	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Benzyl Alcohol	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Benzyl Butyl Phthalate	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.336	D
Biphenyl (Diphenyl)	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Bis(2-chloroethoxy) methane	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Bis(2-chloroisopropyl) ether	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Bis(2-ethylhexyl) phthalate	~	~	0.051	U	0.0436	U	0.132	D	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0863	JD	NA		0.0528	U	0.0486	U
Caprolactam	~	~	0.102	U	0.0871	U	0.0948	U	0.099	U	0.108	U	0.101	U	0.104	U	NA		0.0988	U	0.1	U	NA		0.105	U	0.0969	U
Carbazole	~	~	0.051	U	0.0436	U	0.181	D	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Chrysene	1	3.9	0.344	D	0.0436	U	**1.27**	D	0.245	D	0.0542	U	0.231	D	0.231	D	NA		0.0495	U	0.0501	U	NA		0.091	JD	0.0486	U
Dibenz(a,h)anthracene	0.33	0.33	0.051	U	0.0436	U	**0.341**	D	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Dibenzofuran	7	59	0.051	U	0.0436	U	0.12	D	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Dibutyl phthalate	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Diethyl phthalate	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Dimethyl phthalate	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Dioctyl phthalate	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Fluoranthene	100	100	0.44	D	0.0436	U	2.33	D	0.544	D	0.104	JD	0.547	D	0.645	D	NA		0.0577	JD	0.0501	U	NA		0.174	D	0.0736	JD
Fluorene	30	100	0.051	U	0.0436	U	0.206	D	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0598	JD	0.0486	U
Hexachlorobenzene	0.33	1.2	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Hexachlorobutadiene	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Hexachlorocyclopentadiene	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Hexachloroethane	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.0902	JD	0.0436	U	**0.909**	D	0.119	D	0.0542	U	0.137	D	0.119	D	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Isophorone	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Naphthalene	12	100	0.051	U	0.0436	U	0.314	D	0.0681	JD	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Nitrobenzene	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
n-Nitrosodimethylamine	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
n-Nitrosodi-N-Propylamine	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
n-Nitrosodiphenylamine	~	~	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Pentachlorophenol	0.8	6.7	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Phenanthrene	100	100	0.444	D	0.0436	U	1.48	D	0.373	D	0.0542	U	0.22	D	0.352	D	NA		0.0495	U	0.0501	U	NA		0.319	D	0.116	D
Phenol	0.33	100	0.051	U	0.0436	U	0.0475	U	0.0496	U	0.0542	U	0.0508	U	0.0522	U	NA		0.0495	U	0.0501	U	NA		0.0528	U	0.0486	U
Pyrene	100	100	0.795	D	0.0436	U	2.5	D	0.389	D	0.0786	JD	0.451	D	0.471	D	NA		0.0664	JD	0.0501	U	NA		0.216	D	0.0806	JD
Pyridine	~	~	NA		0.174	U	0.19	U	0.198	U	0.216	U	0.203	U	0.209	U	NA		0.198	U	0.2	U	NA		0.211	U	0.194	U

Notes provided on Page 7.
Concentrations above Unrestricted Use SCOs are bolded.
Concentrations above Restricted Use Restricted-Residential SCOs are shaded.

Table 2A
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	LSB-9		LSB-21		LSB-21A		LSB-22		LSB-22A		LSB-23		LSB-23		LSB-23A		LSB-23A		LSB-24		LSB-24A		LSB-24A		LSB-24A	
Sample ID			LSB-9 (0-2)		LSB-21_120518		LSB-21A_0-2_20210211		LSB-22_120618		LSB-22A_4-6_20210210		LSB-23_120618		DUP-6_120618		LSB-23A_0-2_20210211		LSB-23A_3-5_20210211		LSB-24_120618		LSB-24A_0-2_20210211		LSB-24A_3-5_20210211		LSB-24A_5-7_20210211	
Laboratory ID			17K0876-05		18L0241-01		21B0426-04		18L0288-04		21B0347-01		18L0288-02		18L0288-03		21B0426-05		21B0426-06		18L0288-01		21B0426-07		21B0426-08		21B0426-09	
Sample Date			11/20/2017		12/5/2018		2/11/2021		12/6/2018		2/10/2021		12/6/2018		12/6/2018		2/11/2021		2/11/2021		12/6/2018		2/11/2021		2/11/2021		2/11/2021	
Sample Depth (feet bsl)			15-17		13-15		0-2		12-14		14.5-16.5		12.5-14.5		12.5-14.5		11.5-13.5		14.5-16.5		16-18		15-17		18-20		20-22	
Pesticides (mg/kg)																												
4,4'-DDD	0.0033	13	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
4,4'-DDE	0.0033	8.9	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
4,4'-DDT	0.0033	7.9	NA		0.00172	U	**0.0187**	D	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Aldrin	0.005	0.097	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Alpha BHC (Alpha Hexachlorocyclohexane)	0.02	0.48	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Alpha Chlordane	0.094	4.2	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Alpha Endosulfan	2.4	24	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.36	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Beta Endosulfan	2.4	24	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Chlordane (alpha and gamma)	~	~	NA		0.0344	U	0.0376	U	0.0392	U	0.043	U	0.0401	U	0.0411	U	0.0373	U	0.0382	U	0.0396	U	0.0379	U	0.0412	U	0.039	U
Delta Bhc (Delta Hexachlorocyclohexane)	0.04	100	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Dieldrin	0.005	0.2	NA		0.00172	U	0.00445	D	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Endosulfan Sulfate	2.4	24	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Endrin	0.014	11	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Endrin Aldehyde	~	~	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Endrin Ketone	~	~	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Gamma Bhc (Lindane)	0.1	1.3	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Gamma-Chlordane	~	~	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Heptachlor	0.042	2.1	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Heptachlor Epoxide	~	~	NA		0.00172	U	0.00188	U	0.00196	U	0.00215	U	0.00201	U	0.00206	U	0.00186	U	0.00191	U	0.00198	U	0.00189	U	0.00206	U	0.00195	U
Methoxychlor	~	~	NA		0.00861	U	0.00188	U	0.0098	U	0.00215	U	0.01	U	0.0103	U	0.00186	U	0.00191	U	0.00989	U	0.00189	U	0.00206	U	0.00195	U
Toxaphene	~	~	NA		0.0871	U	0.188	U	0.0992	U	0.215	U	0.102	U	0.104	U	0.186	U	0.191	U	0.1	U	0.189	U	0.206	U	0.195	U
Polychlorinated Biphenyls (mg/kg)																												
PCB-1016 (Aroclor 1016)	~	~	NA		0.0174	U	0.019	U	0.0198	U	0.0217	U	0.0203	U	0.0208	U	0.0188	U	0.0193	U	0.02	U	0.0191	U	0.0208	U	0.0197	U
PCB-1221 (Aroclor 1221)	~	~	NA		0.0174	U	0.019	U	0.0198	U	0.0217	U	0.0203	U	0.0208	U	0.0188	U	0.0193	U	0.02	U	0.0191	U	0.0208	U	0.0197	U
PCB-1232 (Aroclor 1232)	~	~	NA		0.0174	U	0.019	U	0.0198	U	0.0217	U	0.0203	U	0.0208	U	0.0188	U	0.0193	U	0.02	U	0.0191	U	0.0208	U	0.0197	U
PCB-1242 (Aroclor 1242)	~	~	NA		0.0174	U	0.019	U	0.0198	U	0.0217	U	0.0203	U	0.0208	U	0.0188	U	0.0193	U	0.02	U	0.0191	U	0.0208	U	0.0197	U
PCB-1248 (Aroclor 1248)	~	~	NA		0.0174	U	0.019	U	0.0198	U	0.0217	U	0.0203	U	0.0208	U	0.0188	U	0.0193	U	0.02	U	0.0191	U	0.0208	U	0.0197	U
PCB-1254 (Aroclor 1254)	~	~	NA		0.0174	U	0.019	U	0.0198	U	0.0217	U	0.0203	U	0.0208	U	0.0188	U	0.0193	U	0.02	U	0.0191	U	0.0208	U	0.0197	U
PCB-1260 (Aroclor 1260)	~	~	NA		0.0174	U	0.0363		0.0198	U	0.0217	U	0.0203	U	0.0208	U	0.0188	U	0.0193	U	0.02	U	0.0191	U	0.0208	U	0.0197	U
Total PCBs	0.1	1	NA		0.0174	U	0.0363		0.0198	U	0.0217	U	0.0203	U	0.0208	U	0.0188	U	0.0193	U	0.02	U	0.0191	U	0.0208	U	0.0197	U
Inorganics (mg/kg)																												
Aluminum	~	~	10,300		12,200	B	8,170		8,530	B	10,100		10,000	B	9,250	B	NA		13,100		8,120	B	NA		11,900		4,750	
Antimony	~	~	2.09		2.61	U	17.4		2.99	U	3.28	U	3.04	U	3.13	U	NA		2.98	U	3	U	NA		3.2	U	2.96	U
Arsenic	13	16	1.79		1.57	U	1.84		1.79	U	2.27		1.82	U	1.88	U	NA		1.79	U	1.8	U	NA		1.92	U	1.78	U
Barium	350	400	86.7		107		**562**		215		111		49.5		69.5		NA		53		79.1		NA		72.1		44.2	
Beryllium	7.2	72	0.122	U	0.052	U	0.057	U	0.06	U	0.066	U	0.07		0.063	U	NA		0.06	U	0.06	U	NA		0.064	U	0.059	U
Cadmium	2.5	4.3	0.366	U	0.313	U	**3.93**		0.358	U	0.394	U	0.365	U	0.376	U	NA		0.358	U	0.36	U	NA		0.384	U	0.356	U
Calcium	~	~	6,020		1,680		52,200	B	9,940		9,890	B	4,240		11,100		NA		1,090	B	17,900		NA		37,000	B	26,800	B
Chromium, Hexavalent	1	110	0.61	U	0.522	U	0.574	U	0.597	U	0.657	U	0.608	U	0.627	U	NA		0.596	U	0.601	U	NA		0.64	U	0.593	U
Chromium, Total	~	~	14.4		15.9		25.8		16.4		18.8		15.8		14.2		NA		15.7		12.3		NA		13.6		7.1	
Chromium, Trivalent	30	180	NA		15.9		25.8		16.4		18.8		15.8		14.2		NA		15.7		12.3		NA		13.6		7.1	
Cobalt	~	~	7.52		18.7		6.19		6.71		8.21		6.58		6.28		NA		6.25		6.77		NA		8.68		3.14	
Copper	50	270	16.3	B	34.7		49.1		24.7		30.2		25.5		24.7		NA		15		19.5		NA		**50.8**		14.4	
Cyanide	27	27	NA		NA		0.792		NA		0.657	U	NA		NA		NA		0.596	U	NA		NA		0.64	U	0.593	U
Iron	~	~	20,500		17,100		22,100		14,100		16,600		16,200		15,200		NA		15,900		14,000		NA		19,200		8,980	
Lead	63	400	49.4	B	5.19	B	**3,050**		**285**	B	**136**		**64.3**	B	60.3	B	NA		18.9		50.9	B	NA		46.5		28.3	
Magnesium	~	~	2,880		8,350		6,290		2,690		3,260		2,800		2,690		NA		3,070		2,760		NA		3,820		2,090	
Manganese	1,600	2,000	988		142		310		216		188		166		191		NA		130		190		NA		332		250	
Mercury	0.18	0.81	0.0794		0.0313	U	**0.533**		**0.412**		0.0433	U	**0.198**		**0.263**		NA		0.0407		0.14		NA		**0.414**		**0.473**	
Nickel	30	310	0.61	U	**31.4**		29.3		14.5		18.2		15.5		14.1		NA		15.4		13.1		NA		13.8		7.67	
Potassium	~	~	858		7,210	B	929	B	1,380	B	1,870		781	B	852	B	NA		1,060	B	1,790	B	NA		1,160	B	604	B
Selenium	3.9	180	**15.7**	B	2.61	U	2.87	U	2.99	U	3.28	U	3.04	U	3.13	U	NA		2.98	U	3	U	NA		3.2	U	2.96	U
Silver	2	180	0.61	U	0.522	U	0.574	U	0.597	U	0.657	U	0.608	U	0.627	U	NA		0.596	U	0.601	U	NA		0.64	U	0.593	U
Sodium	~	~	1,070		236		457		181		334		691		787		NA		765		885		NA		1,410		497	
Thallium	~	~	1.22	U	2.61	U	2.87	U	2.99	U	3.28	U	3.04	U	3.13	U	NA		2.98	U	3	U	NA		3.2	U	2.96	U
Vanadium	~	~	20.2		17.9		21.4		18.2		22.6		18.2		17.1		NA		24.4		16.7		NA		46.6		10.6	
Zinc	109	10,000	50.7		31.8		**463**	B	105		86	B	99.2		**114**		NA		43.2	B	52.7		NA		59.2	B	38.3	B
General Chemistry (%)																												
Solids, Percent	~	~	82		95.8		87.1		83.7		76.2		82.2		79.8		87.1		83.8		83.2		84.5		78.1		84.4	

Notes provided on Page 7.
Concentrations above Unrestricted Use SCOs are bolded.
Concentrations above Restricted Use Restricted-Residential SCOs are shaded.

Notes:

1. 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 and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCO).
2. Detected analytical results above Unrestricted Use SCOs are bolded.
3. Detected analytical results above Restricted Use Restricted-Residential SCOs are shaded.
4. Analytical results with reporting limits (RL) above the lowest applicable criteria are italicized.
5. Sample DUP-1_112117 is a duplicate sample of LSB-5 (1-3); sample DUP-6_120618 is a duplicate sample of LSB-23_120618 and sample DUP01_20210211 is a duplicate sample of LSB-2A_11-13_20210211.
6. ~ = Regulatory limit for this analyte does not exist
7. bsl = below sidewalk level
8. mg/kg = milligrams per kilogram
9. % = percent
10. NA = Not analyzed
11. ND = Not detected

Qualifiers:

D = The concentration reported is a result of a diluted sample.
J = The analyte was detected above the Method Detection Limit (MDL), but below the RL; therefore, the result is an estimated concentration.
U = The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.
B = The analyte was found in the associated analysis batch blank.

Table 2B
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results - PFAS

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date Sample Depth (feet bsl)	NYSDEC Part 375 Unrestricted Use Guidance Values	NYSDEC Part 375 Restricted Use Restricted-Residential Guidance Values	LSB-2A LSB-2A_0-2_20210211 21B0426-01 2/11/2021 0-2	
Per and Polyfluoroalkyl Substances (µg/kg)				
N-ethyl perfluorooctane- sulfonamidoacetic Acid (NEtFOSAA)	~	~	0.55	U
N-methyl perfluorooctane- sulfonamidoacetic Acid (NMeFOSAA)	~	~	0.55	U
Perfluorobutanesulfonic Acid (PFBS)	~	~	0.55	U
Perfluorobutanoic acid (PFBA)	~	~	0.55	U
Perfluorodecanesulfonic Acid (PFDS)	~	~	0.55	U
Perfluorodecanoic Acid (PFDA)	~	~	0.55	U
Perfluorododecanoic Acid (PFDoA)	~	~	0.55	U
Perfluoroheptanesulfonic Acid (PFHpS)	~	~	0.55	U
Perfluoroheptanoic acid (PFHpA)	~	~	0.55	U
Perfluorohexanesulfonic Acid (PFHxS)	~	~	0.55	U
Perfluorohexanoic Acid (PFHxA)	~	~	0.55	U
Perfluorononanoic Acid (PFNA)	~	~	0.55	U
Perfluorooctanesulfonamide (FOSA)	~	~	0.55	U
Perfluorooctanesulfonic Acid (PFOS)	0.88	44	**10.7**	
Perfluorooctanoic Acid (PFOA)	0.66	33	0.55	U
Perfluoropentanoic Acid (PFPeA)	~	~	0.55	U
Perfluorotetradecanoic Acid (PFTA)	~	~	0.55	U
Perfluorotridecanoic Acid (PFTrDA)	~	~	0.55	U
Perfluoroundecanoic Acid (PFUnA)	~	~	0.55	U
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2) (8:2FTS)	~	~	0.55	U
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2) (6:2FTS)	~	~	0.55	U

Notes:
1. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Remedial Programs Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Unrestricted Use and Restricted Use Restricted-Residential Guidance Values (January 2021).
2. Detected analytical results above Unrestricted Use Guidance Values are bolded.
3. ~ = Regulatory limit for this analyte does not exist
4. bsl = below sidewalk level
5. µg/kg = microgram per kilogram

Qualifiers:
U = The analyte was analyzed for, but was not detected at a level greater than or equal to the Reporting Limit (RL); the value shown in the table is

Table 3A
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results - NY

550 10th Avenue Redevelopment
New York, New York
Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date Sample Depth (VOC Sample Depth) (feet bgs)	NYSDEC Part 375 Unrestricted Use SCOs	Lower of NYSDEC Part 375 Restricted Use Residential and Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	WC-1A WC-1A_021121 21B0416-01 2/11/2021 0-9 (0-0.5)		WC-1B WC-1B_021121 21B0416-02 2/11/2021 9-18 (14-14.5)		WC-1B DUP01_021121 21B0416-07 2/11/2021 9-18 (14-14.5)		WC-2 WC-2_021121 21B0416-03 2/11/2021 10.5-18 (10.5-11)		WC-3 WC-3_021021 / WC-3_021121 21B0345-02 / 21B0416-04 2/10/2021 / 2/11/2021 10.5-18 (12.5-13)		WC-4 WC-4_021121 21B0416-05 2/11/2021 15-21.5 (19.5-20)		WC-5 WC-5_021121 21B0416-06 2/11/2021 18-27.5 (24-24.5)	
Volatile Organic Compounds (mg/kg)																	
1,1,1,2-Tetrachloroethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,1,1-Trichloroethane	0.68	0.68	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,1,2,2-Tetrachloroethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,1,2-Trichloroethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,1-Dichloroethane	0.27	0.27	26	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,1-Dichloroethene	0.33	0.33	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,1-Dichloropropene	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,2,3-Trichlorobenzene	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,2,3-Trichloropropane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,2,4-Trichlorobenzene	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,2,4-Trimethylbenzene	3.6	3.6	52	0.0022	U	0.0057		0.0039	J	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,2-Dibromo-3-Chloropropane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,2-Dibromoethane (Ethylene Dibromide)	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,2-Dichlorobenzene	1.1	1.1	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,2-Dichloroethane	0.02	0.02	3.1	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0053	J
1,2-Dichloropropane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,3,5-Trimethylbenzene (Mesitylene)	8.4	8.4	52	0.0022	U	0.0025	J	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,3-Dichlorobenzene	2.4	2.4	49	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,3-Dichloropropane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,4-Dichlorobenzene	1.8	1.8	13	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
1,4-Dioxane (P-Dioxane)	0.1	0.1	13	0.043	U	0.043	U	0.058	U	0.042	U	0.042	U	0.044	U	0.085	U
2,2-Dichloropropane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
2-Chlorotoluene	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
2-Hexanone	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
4-Chlorotoluene	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Acetone	0.05	0.05	100	0.0043	U	0.016		0.035		0.027		0.035		0.018		**0.06**	
Acrolein	~	~	~	0.0043	U	0.0043	U	0.0058	U	0.0042	U	0.0042	U	0.0044	U	0.0085	U
Acrylonitrile	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Benzene	0.06	0.06	4.8	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Bromobenzene	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Bromochloromethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Bromodichloromethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Bromoform	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Bromomethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Carbon Disulfide	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	J	0.0021	U	0.0022	U	0.0043	U
Carbon Tetrachloride	0.76	0.76	2.4	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Chlorobenzene	1.1	1.1	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Chloroethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Chloroform	0.37	0.37	49	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Chloromethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Cis-1,2-Dichloroethene	0.25	0.25	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Cis-1,3-Dichloropropene	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Cyclohexane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Dibromochloromethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Dibromomethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Dichlorodifluoromethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Ethylbenzene	1	1	41	0.0022	U	0.0032	J	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Hexachlorobutadiene	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Isopropylbenzene (Cumene)	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
M,P-Xylene	~	~	~	0.0043	U	0.0054	J	0.0058	U	0.0042	U	0.0042	U	0.0044	U	0.0085	U
Methyl Acetate	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Methyl Ethyl Ketone (2-Butanone)	0.12	0.12	100	0.0027	J	0.0046		0.0089		0.0031	J	0.0074		0.0049		0.017	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Methylcyclohexane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Methylene Chloride	0.05	0.05	100	0.0043	U	0.0043	U	0.0058	U	0.0042	U	0.0042	U	0.0044	U	0.0085	U
n-Butylbenzene	12	12	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
n-Propylbenzene	3.9	3.9	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
o-Xylene (1,2-Dimethylbenzene)	~	~	~	0.0022	U	0.0033	J	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
p-Cymene (p-Isopropyltoluene)	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Sec-Butylbenzene	11	11	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Styrene	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
T-Butylbenzene	5.9	5.9	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Tert-Butyl Alcohol	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Tert-Butyl Methyl Ether	0.93	0.93	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Tetrachloroethene (PCE)	1.3	1.3	19	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Toluene	0.7	0.7	100	0.0022	U	0.0023	J	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Total Xylenes	0.26	1.6	100	0.0065	U	0.0088	J	0.0087	U	0.0063	U	0.0063	U	0.0066	U	0.013	U
Trans-1,2-Dichloroethene	0.19	0.19	100	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Trans-1,3-Dichloropropene	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Trichloroethene (TCE)	0.47	0.47	21	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Trichlorofluoromethane	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Vinyl Acetate	~	~	~	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U
Vinyl Chloride	0.02	0.02	0.9	0.0022	U	0.0021	U	0.0029	U	0.0021	U	0.0021	U	0.0022	U	0.0043	U

Notes provided on Page 4.
Concentrations above Unrestricted Use SCOs are bolded.
Concentrations above Lower of RUR and PGW SCOs are underlined.
Concentrations above Restricted Use Restricted-Residential SCOs are shaded.

Table 3A
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results - NY

550 10th Avenue Redevelopment
New York, New York
Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date Sample Depth (VOC Sample Depth) (feet bgs)	NYSDEC Part 375 Unrestricted Use SCOs	Lower of NYSDEC Part 375 Restricted Use Residential and Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	WC-1A WC-1A_021121 21B0416-01 2/11/2021 0-9 (0-0.5)		WC-1B WC-1B_021121 21B0416-02 2/11/2021 9-18 (14-14.5)		WC-1B DUP01_021121 21B0416-07 2/11/2021 9-18 (14-14.5)		WC-2 WC-2_021121 21B0416-03 2/11/2021 10.5-18 (10.5-11)		WC-3 WC-3_021021 / WC-3_021121 21B0345-02 / 21B0416-04 2/10/2021 / 2/11/2021 10.5-18 (12.5-13)		WC-4 WC-4_021121 21B0416-05 2/11/2021 15-21.5 (19.5-20)		WC-5 WC-5_021121 21B0416-06 2/11/2021 18-27.5 (24-24.5)	
Semivolatile Organic Compounds (mg/kg)																	
1,2,4,5-Tetrachlorobenzene	~	~	~	0.0979	U	0.098	U	0.099	U	0.106	U	0.1	U	0.0987	U	0.101	U
1,2,4-Trichlorobenzene	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
1,2-Dichlorobenzene	1.1	1.1	100	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
1,2-Diphenylhydrazine	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
1,3-Dichlorobenzene	2.4	2.4	49	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
1,4-Dichlorobenzene	1.8	1.8	13	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
2,3,4,6-Tetrachlorophenol	~	~	~	0.0979	U	0.098	U	0.099	U	0.106	U	0.1	U	0.0987	U	0.101	U
2,4,5-Trichlorophenol	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
2,4,6-Trichlorophenol	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
2,4-Dichlorophenol	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
2,4-Dimethylphenol	~	~	~	0.113	D	0.268	D	0.115	D	0.0529	U	0.0503	U	0.0495	U	0.0507	U
2,4-Dinitrophenol	~	~	~	0.0979	U	0.098	U	0.099	U	0.106	U	0.1	U	0.0987	U	0.101	U
2,4-Dinitrotoluene	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
2,6-Dinitrotoluene	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
2-Chloronaphthalene	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
2-Chlorophenol	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
2-Methylnaphthalene	~	~	~	2.93	D	9.68	D	4.16	D	0.0734	JD	0.0503	U	0.0495	U	0.0507	U
2-Methylphenol (o-Cresol)	0.33	0.33	100	0.0642	JD	0.187	D	0.0799	JD	0.0529	U	0.0503	U	0.0495	U	0.0507	U
2-Nitroaniline	~	~	~	0.0979	U	0.098	U	0.099	U	0.106	U	0.1	U	0.0987	U	0.101	U
2-Nitrophenol	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
3 & 4 Methylphenol (m&p Cresol)	0.33	0.33	100	0.142	D	**0.396**	D	0.175	D	0.0529	U	0.0674	JD	0.0495	U	0.0507	U
3,3'-Dichlorobenzidine	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
3-Nitroaniline	~	~	~	0.0979	U	0.098	U	0.099	U	0.106	U	0.1	U	0.0987	U	0.101	U
4,6-Dinitro-2-Methylphenol	~	~	~	0.0979	U	0.098	U	0.099	U	0.106	U	0.1	U	0.0987	U	0.101	U
4-Bromophenyl Phenyl Ether	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
4-Chloro-3-Methylphenol	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
4-Chloroaniline	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
4-Chlorophenyl Phenyl Ether	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
4-Nitroaniline	~	~	~	0.0979	U	0.098	U	0.099	U	0.106	U	0.1	U	0.0987	U	0.101	U
4-Nitrophenol	~	~	~	0.0979	U	0.098	U	0.099	U	0.106	U	0.1	U	0.0987	U	0.101	U
Acenaphthene	20	98	100	3.1	D	10.7	D	4.51	D	0.0751	JD	0.0503	U	0.0495	U	0.0507	U
Acenaphthylene	100	100	100	0.683	D	1.17	D	0.64	D	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Acetophenone	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Aniline (Phenylamine, Aminobenzene)	~	~	~	0.196	U	0.196	U	0.198	U	0.211	U	0.201	U	0.198	U	0.203	U
Anthracene	100	100	100	5.82	D	14.1	D	6.05	D	0.116	D	0.0503	U	0.0495	U	0.0507	U
Atrazine	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Benzaldehyde	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Benzidine	~	~	~	0.196	U	0.196	U	0.198	U	0.211	U	0.201	U	0.198	U	0.203	U
Benzo(a)anthracene	1	1	1	**10.6**	D	**25.9**	D	**10.8**	D	0.219	D	0.0503	U	0.0495	U	0.0507	U
Benzo(a)pyrene	1	1	1	**8.44**	D	**22.5**	D	**9.45**	D	0.214	D	0.0503	U	0.0495	U	0.0582	JD
Benzo(b)fluoranthene	1	1	1	**7.66**	D	**21.4**	D	**8.95**	D	0.187	D	0.0503	U	0.0495	U	0.0507	U
Benzo(g,h,i)Perylene	100	100	100	4.81	D	13.7	D	5.83	D	0.154	D	0.0503	U	0.0495	U	0.0507	U
Benzo(k)fluoranthene	0.8	1	3.9	**6.6**	D	**16.9**	D	**7.34**	D	0.161	D	0.0503	U	0.0495	U	0.0507	U
Benzoic Acid	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Benzyl Alcohol	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Benzyl Butyl Phthalate	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.595	D	0.0495	U	0.0507	U
Biphenyl (Diphenyl)	~	~	~	0.559	D	1.4	D	0.634	D	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Bis(2-chloroethoxy) methane	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Bis(2-chloroisopropyl) ether	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Bis(2-ethylhexyl) phthalate	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Caprolactam	~	~	~	0.0979	U	0.098	U	0.099	U	0.106	U	0.1	U	0.0987	U	0.101	U
Carbazole	~	~	~	2.23	D	8.81	D	2.74	D	0.0667	JD	0.0503	U	0.0495	U	0.0507	U
Chrysene	1	1	3.9	**10.1**	D	**23.6**	D	**10.3**	D	0.206	D	0.0503	U	0.0495	U	0.0507	U
Dibenz(a,h)anthracene	0.33	0.33	0.33	**1.78**	D	**5.54**	D	**2.35**	D	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Dibenzofuran	7	14	59	2.3	D	**7.97**	D	2.62	D	0.0574	JD	0.0503	U	0.0495	U	0.0507	U
Dibutyl phthalate	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Diethyl phthalate	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Dimethyl phthalate	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Dioctyl phthalate	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Fluoranthene	100	100	100	24.2	D	59.4	D	23.7	D	0.52	D	0.0503	U	0.106	D	0.0507	U
Fluorene	30	100	100	4.89	D	12.6	D	5.09	D	0.0928	JD	0.0503	U	0.0495	U	0.0507	U
Hexachlorobenzene	0.33	0.33	1.2	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Hexachlorobutadiene	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Hexachlorocyclopentadiene	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Hexachloroethane	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	**4.43**	D	**12.6**	D	**5.48**	D	0.128	D	0.0503	U	0.0495	U	0.0507	U
Isophorone	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Naphthalene	12	12	100	5.59	D	**16.9**	D	7.43	D	0.137	D	0.0503	U	0.0495	U	0.0507	U
Nitrobenzene	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
n-Nitrosodimethylamine	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
n-Nitrosodi-N-Propylamine	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
n-Nitrosodiphenylamine	~	~	~	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Pentachlorophenol	0.8	0.8	6.7	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Phenanthrene	100	100	100	26.1	D	58.3	D	24.4	D	0.526	D	0.0503	U	0.118	D	0.0507	U
Phenol	0.33	0.33	100	0.0491	U	0.0491	U	0.0496	U	0.0529	U	0.0503	U	0.0495	U	0.0507	U
Pyrene	100	100	100	20.7	D	46.7	D	20.6	D	0.409	D	0.0503	U	0.11	D	0.0507	U
Pyridine	~	~	~	0.196	U	0.196	U	0.198	U	0.211	U	0.201	U	0.198	U	0.203	U

Notes provided on Page 4.
Concentrations above Unrestricted Use SCOs are bolded.
Concentrations above Lower of RUR and PGW SCOs are underlined.
Concentrations above Restricted Use Restricted-Residential SCOs are shaded.

Table 3A
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results - NY

550 10th Avenue Redevelopment
New York, New York
Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date Sample Depth (VOC Sample Depth) (feet bgs)	NYSDEC Part 375 Unrestricted Use SCOs	Lower of NYSDEC Part 375 Restricted Use Residential and Protection of Groundwater SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	WC-1A WC-1A_021121 21B0416-01 2/11/2021 0-9 (0-0.5)	WC-1B WC-1B_021121 21B0416-02 2/11/2021 9-18 (14-14.5)	WC-1B DUP01_021121 21B0416-07 2/11/2021 9-18 (14-14.5)	WC-2 WC-2_021121 21B0416-03 2/11/2021 10.5-18 (10.5-11)	WC-3 WC-3_021021 / WC-3_021121 21B0345-02 / 21B0416-04 2/10/2021 / 2/11/2021 10.5-18 (12.5-13)	WC-4 WC-4_021121 21B0416-05 2/11/2021 15-21.5 (19.5-20)	WC-5 WC-5_021121 21B0416-06 2/11/2021 18-27.5 (24-24.5)
Petroleum Hydrocarbons (mg/kg)										
EPA Total Extractable Petroleum Hydrocarbons Range 9 To 40	~	~	~	103	278	876 D	62.3 U	77.9	133	60.7 U
Pesticides (mg/kg)										
4,4'-DDD	0.0033	2.6	13	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
4,4'-DDE	0.0033	1.8	8.9	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
4,4'-DDT	0.0033	1.7	7.9	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Aldrin	0.005	0.019	0.097	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Alpha BHC (Alpha Hexachlorocyclohexane)	0.02	0.02	0.48	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Alpha Chlordane	0.094	0.91	4.2	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Alpha Endosulfan	2.4	4.8	24	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.036	0.072	0.36	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Beta Endosulfan	2.4	4.8	24	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Chlordane (alpha and gamma)	~	~	~	0.0387 U	0.0387 U	0.0395 U	0.0414 U	0.0393 U	0.0387 U	0.0396 U
Delta Bhc (Delta Hexachlorocyclohexane)	0.04	0.25	100	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Dieldrin	0.005	0.039	0.2	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Endosulfan Sulfate	2.4	4.8	24	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Endrin	0.014	0.06	11	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Endrin Aldehyde	~	~	~	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Endrin Ketone	~	~	~	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Gamma Bhc (Lindane)	0.1	0.1	1.3	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Gamma-Chlordane	~	~	~	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Heptachlor	0.042	0.38	2.1	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Heptachlor Epoxide	~	~	~	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Methoxychlor	~	~	~	0.00194 U	0.00193 U	0.00198 U	0.00207 U	0.00197 U	0.00193 U	0.00198 U
Toxaphene	~	~	~	0.194 U	0.193 U	0.198 U	0.207 U	0.197 U	0.193 U	0.198 U
Herbicides (mg/kg)										
2,4,5-T (Trichlorophenoxyacetic Acid)	~	~	~	0.0195 U	0.0197 U	0.02 U	0.021 U	0.0199 U	0.0199 U	0.0202 U
2,4-D (Dichlorophenoxyacetic Acid)	~	~	~	0.0195 U	0.0197 U	0.02 U	0.021 U	0.0199 U	0.0199 U	0.0202 U
Silvex (2,4,5-Tp)	3.8	3.8	100	0.0195 U	0.0197 U	0.02 U	0.021 U	0.0199 U	0.0199 U	0.0202 U
Polychlorinated Biphenyls (mg/kg)										
PCB-1016 (Aroclor 1016)	~	~	~	0.0196 U	0.0195 U	0.02 U	0.0209 U	0.0199 U	0.0195 U	0.02 U
PCB-1221 (Aroclor 1221)	~	~	~	0.0196 U	0.0195 U	0.02 U	0.0209 U	0.0199 U	0.0195 U	0.02 U
PCB-1232 (Aroclor 1232)	~	~	~	0.0196 U	0.0195 U	0.02 U	0.0209 U	0.0199 U	0.0195 U	0.02 U
PCB-1242 (Aroclor 1242)	~	~	~	0.0196 U	0.0195 U	0.02 U	0.0209 U	0.0199 U	0.0195 U	0.02 U
PCB-1248 (Aroclor 1248)	~	~	~	0.0196 U	0.0195 U	0.02 U	0.0209 U	0.0199 U	0.0195 U	0.02 U
PCB-1254 (Aroclor 1254)	~	~	~	0.0196 U	0.0195 U	0.02 U	0.0209 U	0.0199 U	0.0195 U	0.02 U
PCB-1260 (Aroclor 1260)	~	~	~	0.0196 U	0.0195 U	0.02 U	0.0209 U	0.0199 U	0.0195 U	0.02 U
Total PCBs	0.1	1	1	0.0196 U	0.0195 U	0.02 U	0.0209 U	0.0199 U	0.0195 U	0.02 U
Inorganics (mg/kg)										
Aluminum	~	~	~	9,800	9,450	6,560	14,900	11,100	9,180	9,030
Antimony	~	~	~	2.96 U	2.98 U	3.03 U	3.18 U	3.03 U	3.01 U	3.06 U
Arsenic	13	16	16	2.28	3.05	1.82 U	1.91 U	2.04	1.81 U	1.84 U
Barium	350	350	400	89.7	78.6	283	116	71.4	66	57.2
Beryllium	7.2	14	72	0.059 U	0.06 U	0.061 U	0.064 U	0.061 U	0.06 U	0.061 U
Cadmium	2.5	2.5	4.3	0.356 U	0.357 U	**20.9**	0.381 U	0.363 U	0.361 U	0.368 U
Calcium	~	~	~	3,770 B	2,090 B	7,380 B	7,470 B	1,840 B	13,200 B	1,710 B
Chromium, Hexavalent	1	19	110	0.593 U	0.596 U	0.605 U	0.635 U	0.606 U	0.602 U	0.613 U
Chromium, Total	~	~	~	21.3	13.5	14.6	21.5	16.6	14.2	13.1
Chromium, Trivalent	30	36	180	21.3	13.5	14.6	21.5	16.6	14.2	13.1
Cobalt	~	~	~	7.51	5.99	6.45	11.3	7.34	6.63	7.86
Copper	50	270	270	28.3	25.4	40.2	27.8	14.7	15.2	16.5
Cyanide	27	27	27	0.593 U	0.596 U	0.605 U	0.635 U	0.606 U	0.602 U	0.613 U
Iron	~	~	~	15,300	16,100	154,000 D	23,900	16,700	15,900	14,200
Lead	63	400	400	**128**	**9,340**	**488**	**81.6**	31.8	36.6	23.8
Magnesium	~	~	~	3,070	2,370	2,300	4,580	3,170	2,860	3,230
Manganese	1,600	2,000	2,000	215	185	303	522	248	264	172
Mercury	0.18	0.73	0.81	**0.717**	**0.251**	**0.505**	**0.214**	0.124	0.15	0.0478
Nickel	30	130	310	18.2	14.2	19.5	22.9	17	14.3	15
Potassium	~	~	~	1,740 B	910 B	985 B	2,780 B	1,380 B	1,190 B	2,070 B
Selenium	3.9	4	180	2.96 U	2.98 U	3.03 U	3.18 U	3.03 U	3.01 U	3.06 U
Silver	2	8.3	180	0.593 U	0.596 U	0.605 U	0.635 U	0.606 U	0.602 U	0.613 U
Sodium	~	~	~	292	163	188	637	504	641	567
Thallium	~	~	~	2.96 U	2.98 U	7.45	3.18 U	3.03 U	3.01 U	3.06 U
Vanadium	~	~	~	20.1	21.7	20.8	30.9	22.4	20	18.8
Zinc	109	2,200	10,000	80.1 B	44.4 B	**9,690** BD	75.4 B	44.8 B	61 B	37.7 B

Notes provided on Page 4.
Concentrations above Unrestricted Use SCOs are bolded.
Concentrations above Lower of RUR and PGW SCOs are underlined.
Concentrations above Restricted Use Restricted-Residential SCOs are shaded.

Table 3A
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results - NY

550 10th Avenue Redevelopment
New York, New York
Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Notes:
1. Soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Title 6 of the Official Compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use Soil Cleanup Objectives (SCO), to the lower of Restricted Use Residential and Protection of Groundwater SCOs, and to Restricted Use Restricted-Residential SCOs.
2. Detected analytical results above Unrestricted Use SCOs are bolded.
3. Detected analytical results above the Lower of Restricted Use Residential and Protection of Groundwater SCOs are underlined.
4. Detected analytical results above Restricted Use Restricted-Residential SCOs are shaded.
5. Analytical results with reporting limits (RL) above the lowest applicable criteria are italicized.
6. Sample DUP01_021121 is a duplicate sample of WC-1B_021121.
7. ~ = Regulatory limit for this analyte does not exist
8. bgs = below grade surface
9. mg/kg = milligrams per kilogram
10. NA = Not analyzed

Qualifiers:
D = The concentration reported is a result of a diluted sample.
J = The analyte was detected above the Method Detection Limit (MDL), but below the RL; therefore, the result is an estimated concentration.
U = The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.
B = The analyte was found in the associated analysis batch blank.

Table 3B
Remedial Investigation Work Plan
Historical Soil Sample Analytical Results - USEPA

550 10th Avenue Redevelopment
New York, New York
Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date Sample Depth (VOC Sample Depth) (feet bgs)	RCRA Characteristics for Hazardous Waste	WC-1A WC-1A_021121 21B0416-01 2/11/2021 0'-9' (0'-0.5')		WC-1B WC-1B_021121 21B0416-02 2/11/2021 9'-18' (14'-14.5')		WC-1B DUP01_021121 21B0416-07 2/11/2021 9'-18' (14'-14.5')		WC-2 WC-2_021121 21B0416-03 2/11/2021 10.5'-18' (10.5'-11')		WC-3 WC-3_021121 21B0416-04 2/11/2021 10.5'-18' (12.5'-13')		WC-4 WC-4_021121 21B0416-05 2/11/2021 15'-21.5' (19.5'-20')		WC-5 WC-5_021121 21B0416-06 2/11/2021 18'-27.5' (24'-24.5')	
TCLP - Volatile Organic Compounds (mg/L)															
1,1-Dichloroethene	0.7	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
1,2-Dichloroethane	0.5	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
1,4-Dichlorobenzene	7.5	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
Benzene	0.5	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
Carbon Tetrachloride	0.5	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
Chlorobenzene	100	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
Chloroform	6	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
Methyl Ethyl Ketone (2-Butanone)	200	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
Tetrachloroethene (PCE)	0.7	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
Trichloroethene (TCE)	0.5	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
Vinyl Chloride	0.2	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U	0.025	U
TCLP - Semivolatile Organic Compounds (mg/L)															
1,4-Dichlorobenzene	7.5	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
2,4,5-Trichlorophenol	400	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
2,4,6-Trichlorophenol	2	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
2,4-Dinitrotoluene	0.13	0.0025	U	0.0025	U	0.0135		0.0025	U	0.0025	U	0.0025	U	0.0025	U
2-Methylphenol (o-Cresol)	200	0.0025	U	0.0025	U	0.00855		0.0025	U	0.0025	U	0.0025	U	0.0025	U
3 & 4 Methylphenol (m&p Cresol)	~	0.0025	U	0.00425	J	0.0192		0.0025	U	0.0025	U	0.0025	U	0.0025	U
Cresols, Total	200	0.01	U	0.01	U	0.0277		0.01	U	0.01	U	0.01	U	0.01	U
Hexachlorobenzene	0.13	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
Hexachlorobutadiene	0.5	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
Hexachloroethane	3	0.00125	U	0.00125	U	0.00125	U	0.00125	U	0.00125	U	0.00125	U	0.00125	U
Nitrobenzene	2	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
Pentachlorophenol	100	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
Pyridine	5	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U	0.0025	U
TCLP - Pesticides (mg/L)															
Endrin	0.02	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U
Gamma Bhc (Lindane)	0.4	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U
Heptachlor	0.008	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U
Heptachlor Epoxide	0.008	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U
Methoxychlor	10	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U	0.0000444	U
Toxaphene	0.5	0.00111	U	0.00111	U	0.00111	U	0.00111	U	0.00111	U	0.00111	U	0.00111	U
TCLP - Herbicides (mg/L)															
2,4-D (Dichlorophenoxyacetic Acid)	10	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Silvex (2,4,5-Tp)	1	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
TCLP - Inorganics (mg/L)															
Arsenic	5	0.375	U	0.375	U	0.375	U	0.375	U	0.375	U	0.375	U	0.375	U
Barium	100	0.679		0.881		0.721		0.719		0.625	U	0.625	U	0.625	U
Cadmium	1	0.075	U	0.075	U	0.075	U	0.075	U	0.075	U	0.075	U	0.075	U
Chromium, Total	5	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U
Lead	5	0.693		**20.8**		2.81		1.39		0.358		0.125	U	0.626	
Mercury	0.2	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U
Selenium	1	0.625	U	0.625	U	0.625	U	0.625	U	0.625	U	0.625	U	0.625	U
Silver	5	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U
General Chemistry															
Ignitability	IGNITABLE	NI		NI		NI		NI		NI		NI		NI	
Ph (pH Units)	<2 or >12.5	7.61		7.85		8.24		8.82		8.08		9.09		7.61	
Reactive Cyanide (mg/kg)	~	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Sulfide Reactive (mg/kg)	~	15	U	15	U	15	U	15	U	15	U	15	U	15	U
Temperature (°C)	~	23.2		22.6		22		22.3		22.5		22		22.2	

Notes:
1. Soil sample analytical results are compared to the 6 New York Codes, Rules and Regulations (NYCRR) Part 371.3 and 40 CFR 261 Subpart C and Table 1 of 40 CFR 261.24 - Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) Characteristics of Hazardous Waste.
2. Detected analytical results above RCRA Maximum Concentration of Contaminants for the Toxicity Characteristic are shaded and bolded.
3. Sample DUP01_021121 is a duplicate sample of WC-1B_021121.
4. ~ = Criterion does not exist
5. mg/l = milligrams per liter
6. mg/kg = milligrams per kilogram
7. bgs = below grade surface
8. TCLP = Toxicity Characteristic Leaching Procedure
9. NI = Not Ignitable

Qualifiers:
J = The analyte was detected above the Method Detection Limit (MDL), but below the Reporting Limit (RL); therefore, the result is an estimated concentration.
U = The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.

Table 4A
Remedial Investigation Work Plan
Historical Groundwater Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location	NYSDEC	TW-2		TW-2		TW-3		LMW-8		LMW-9		LMW-9		LMW-9		LMW-10		LMW-10		LMW-10		LMW-11		LMW-11	
Sample ID	SGVs	TW-2_112117		DUP-2_112117		TW-3_112117		LMW-8_120718		LMW-9_120718		DUP-7_120718		LMW-9_20210212		LMW-10_120718		LMW-10_120718		LMW-10_20210212		LMW-11_20210212		DUP-1_20210212_GW	
Laboratory ID		17K0877-01		17K0877-05		17K0877-06		18L0348-01		18L0348-02		18L0348-03		21B0473-03		18L0348-04		18L0348-04RE1		21B0473-04		21B0473-01		21B0473-05	
Sample Date		11/21/2017		11/21/2017		11/21/2017		12/7/2018		12/7/2018		12/7/2018		2/12/2021		12/7/2018		12/7/2018		2/12/2021		2/12/2021		2/12/2021	
Volatile Organic Compounds (µg/L)																									
1,1,1,2-Tetrachloroethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,1,1-Trichloroethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,1,2,2-Tetrachloroethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,1,2-Trichloroethane	1	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,1-Dichloroethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,1-Dichloroethene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,1-Dichloropropene	5	NA		NA		NA		0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,2,3-Trichlorobenzene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,2,3-Trichloropropane	0.04	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	NA		*0.2*	U	*0.2*	U	*0.2*	U
1,2,4-Trichlorobenzene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,2,4-Trimethylbenzene	5	0.2	U	0.2	U	0.2	U	0.66		0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,2-Dibromo-3-Chloropropane	0.04	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	NA		*0.2*	U	*0.2*	U	*0.2*	U
1,2-Dibromoethane (Ethylene Dibromide)	0.0006	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	*0.2*	U	NA		*0.2*	U	*0.2*	U	*0.2*	U
1,2-Dichlorobenzene	3	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,2-Dichloroethane	0.6	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,2-Dichloropropane	1	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,3,5-Trimethylbenzene (Mesitylene)	5	0.2	U	0.2	U	0.2	U	0.31	J	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,3-Dichlorobenzene	3	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,3-Dichloropropane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,4-Dichlorobenzene	3	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
1,4-Diethyl Benzene	~	0.2	U	0.2	U	0.2	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
1,4-Dioxane (P-Dioxane)	~	40	U	40	U	40	U	40	U	40	U	40	U	40	U	40	U	NA		40	U	40	U	40	U
2,2-Dichloropropane	5	NA		NA		NA		0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
2-Chlorotoluene	5	NA		NA		NA		0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
2-Hexanone	50	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
4-Chlorotoluene	5	NA		NA		NA		0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
4-Ethyltoluene	~	0.2	U	0.2	U	0.2	U	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Acetone	50	1.92	J	2.41		NA		1.57	J	1	U	1	U	1	U	1	U	NA		1	U	4.83		4.37	
Acrolein	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Acrylonitrile	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Benzene	1	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Bromobenzene	5	NA		NA		NA		0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Bromochloromethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Bromodichloromethane	50	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Bromoform	50	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Bromomethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Carbon Disulfide	60	0.2	U	0.2	U	0.26	J	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.3	J	0.25	J
Carbon Tetrachloride	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Chlorobenzene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Chloroethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Chloroform	7	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Chloromethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Cis-1,2-Dichloroethene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Cis-1,3-Dichloropropene	0.4	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Cyclohexane	~	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Dibromochloromethane	50	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Dibromomethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Dichlorodifluoromethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Ethylbenzene	5	NA		NA		NA		0.33	J	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Hexachlorobutadiene	0.5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Isopropylbenzene (Cumene)	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
M,P-Xylene	5	0.5	U	0.5	U	0.5	U	1.81		0.5	U	0.5	U	0.5	U	0.5	U	NA		0.5	U	0.5	U	0.5	U
Methyl Acetate	~	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Methyl Ethyl Ketone (2-Butanone)	50	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.41	JB	0.2	U	NA		0.77	JB	1.37	JB	0.61	B
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	~	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Methylcyclohexane	~	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Methylene Chloride	5	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	NA		1	U	1	U	1	U
n-Butylbenzene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
n-Propylbenzene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
o-Xylene (1,2-Dimethylbenzene)	5	0.2	U	0.2	U	0.2	U	0.94		0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
p-Cymene (p-Isopropyltoluene)	~	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Sec-Butylbenzene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Styrene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
T-Butylbenzene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Tert-Butyl Alcohol	~	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA		0.5	U	0.5	U	0.5	U
Tert-Butyl Methyl Ether	10	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.43	J	0.37	J
Tetrachloroethene (PCE)	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Toluene	5	0.2	U	0.2	U	0.2	U	4.21		0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Total Xylenes	5	0.6	U	0.6	U	0.6	U	2.75		0.6	U	0.6	U	0.6	U	0.6	U	NA		0.6	U	0.6	U	0.6	U
Trans-1,2-Dichloroethene	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Trans-1,3-Dichloropropene	0.4	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Trichloroethene (TCE)	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Trichlorofluoromethane	5	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Vinyl Acetate	~	NA		NA		NA		NA		NA		NA		0.2	U	NA		NA		0.2	U	0.2	U	0.2	U
Vinyl Chloride	2	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Total BTEX	~	ND		ND		ND		7.29		ND		ND		ND		ND		NA		ND		ND		ND	
Total CVOCs	~	ND		ND		ND		ND		ND		ND		ND		ND		NA		ND		ND		ND	
Total VOCs	~	1.92		2.41		0.26		9.83		ND		ND		0.41		ND		NA		0.77		6.93		5.6	

Notes provided on Page 5.

Table 4A
Remedial Investigation Work Plan
Historical Groundwater Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location	NYSDEC	TW-2	TW-2	TW-3	LMW-8	LMW-9	LMW-9	LMW-9	LMW-10	LMW-10	LMW-10	LMW-11	LMW-11
Sample ID	SGVs	TW-2_112117	DUP-2_112117	TW-3_112117	LMW-8_120718	LMW-9_120718	DUP-7_120718	LMW-9_20210212	LMW-10_120718	LMW-10_120718	LMW-10_20210212	LMW-11_20210212	DUP-1_20210212_GW
Laboratory ID		17K0877-01	17K0877-05	17K0877-06	18L0348-01	18L0348-02	18L0348-03	21B0473-03	18L0348-04	18L0348-04RE1	21B0473-04	21B0473-01	21B0473-05
Sample Date		11/21/2017	11/21/2017	11/21/2017	12/7/2018	12/7/2018	12/7/2018	2/12/2021	12/7/2018	12/7/2018	2/12/2021	2/12/2021	2/12/2021
Semivolatile Organic Compounds (µg/L)													
1,2,4,5-Tetrachlorobenzene	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
1,2,4-Trichlorobenzene	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
1,2-Dichlorobenzene	3	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	*3.03* U	2.78 U
1,2-Diphenylhydrazine	0	*1.92* U	*1.92* U	NA	*2.78* U	*2.63* U	2.7 U	*2.7* U	*2.7* U	NA	*2.5* U	*3.03* U	*2.78* U
1,3-Dichlorobenzene	3	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	*3.03* U	2.78 U
1,4-Dichlorobenzene	3	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	*3.03* U	2.78 U
2,3,4,6-Tetrachlorophenol	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
2,4,5-Trichlorophenol	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
2,4,6-Trichlorophenol	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
2,4-Dichlorophenol	1	*1.92* U	*1.92* U	NA	*2.78* U	*2.63* U	*2.7* U	*2.7* U	*2.7* U	NA	*2.5* U	*3.03* U	*2.78* U
2,4-Dimethylphenol	1	*1.92* U	*1.92* U	NA	*2.78* U	*2.63* U	*2.7* U	*2.7* U	*2.7* U	NA	*2.5* U	*3.03* U	*2.78* U
2,4-Dinitrophenol	1	*1.92* U	*1.92* U	NA	*2.78* U	*2.63* U	*2.7* U	*2.7* U	*2.7* U	NA	*2.5* U	*3.03* U	*2.78* U
2,4-Dinitrotoluene	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
2,6-Dinitrotoluene	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
2-Chloronaphthalene	10	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
2-Chlorophenol	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
2-Methylnaphthalene	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
2-Methylphenol (o-Cresol)	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
2-Nitroaniline	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
2-Nitrophenol	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
3 & 4 Methylphenol (m&p Cresol)	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
3,3'-Dichlorobenzidine	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
3-Nitroaniline	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
4,6-Dinitro-2-Methylphenol	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
4-Bromophenyl Phenyl Ether	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
4-Chloro-3-Methylphenol	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
4-Chloroaniline	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
4-Chlorophenyl Phenyl Ether	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
4-Nitroaniline	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
4-Nitrophenol	~	3.85 U	3.85 U	NA	5.56 U	5.26 U	5.41 U	5.41 U	5.41 U	NA	5 U	6.06 U	5.56 U
Acenaphthene	20	1.17	1.22	NA	0.0556 U	0.0737	0.0973	0.108	0.195	NA	0.58	0.0606 U	0.0556 U
Acenaphthylene	~	0.0385	0.0385	NA	0.0556 U	0.0526 U	0.0541	0.0541 U	0.0541 U	NA	0.05 U	0.0606 U	0.0556 U
Acetophenone	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Alpha-Terpineol	~	3.85 U	3.85 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aniline (Phenylamine, Aminobenzene)	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Anthracene	50	0.338	0.346	NA	0.0556 U	0.0947	0.141	0.0541 U	0.119	NA	0.11	0.0606 U	0.0556 U
Atrazine	7.5	0.385 U	0.385 U	NA	0.556 U	0.526 U	0.541 U	0.541 U	0.541 U	NA	0.5 U	0.606 U	0.556 U
Benzaldehyde	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Benzidine	5	3.85 U	3.85 U	NA	*5.56* U	*5.26* U	*5.41* U	*5.41* U	*5.41* U	NA	5 U	*6.06* U	*5.56* U
Benzo(a)anthracene	0.002	**0.115**	**0.0615**	NA	**0.0556**	**0.0947**	**0.227**	*0.0541* U	*0.0541* U	NA	*0.05* U	*0.0606* U	*0.0556* U
Benzo(a)pyrene	0	**0.0615**	*0.0385* U	NA	*0.0556* U	**0.0842**	**0.238**	*0.0541* U	*0.0541* U	NA	*0.05* U	*0.0606* U	*0.0556* U
Benzo(b)fluoranthene	0.002	**0.0385**	*0.0385* U	NA	*0.0556* U	**0.0842**	**0.162**	*0.0541* U	*0.0541* U	NA	*0.05* U	*0.0606* U	*0.0556* U
Benzo(g,h,i)Perylene	~	0.0385	0.0385 U	NA	0.0556 U	0.0526	0.162	0.0541 U	0.0541 U	NA	0.05 U	0.0606 U	0.0556 U
Benzo(k)fluoranthene	0.002	**0.0385**	*0.0385* U	NA	*0.0556* U	**0.0737**	**0.205**	*0.0541* U	*0.0541* U	NA	*0.05* U	*0.0606* U	*0.0556* U
Benzoic Acid	~	19.2 U	19.2 U	NA	27.8 U	26.3 U	27 U	2.7 U	27 U	NA	2.5 U	3.03 U	2.78 U
Benzyl Alcohol	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.99 J	3.47 J
Benzyl Butyl Phthalate	50	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Biphenyl (Diphenyl)	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Bis(2-chloroethoxy) methane	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Bis(2-chloroethyl) ether (2-chloroethyl ether)	1	0.769 U	0.769 U	NA	*1.11* U	*1.05* U	*1.08* U	*1.08* U	*1.08* U	NA	1 U	*1.21* U	*1.11* U
Bis(2-chloroisopropyl) ether	5	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Bis(2-ethylhexyl) phthalate	5	0.385 U	0.477	NA	0.556 U	0.526 U	0.541 U	1.41 B	0.541 U	NA	4.9 B	4.17 B	1.17 B
Caprolactam	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Carbazole	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Chrysene	0.002	**0.108**	**0.0538**	NA	*0.0556* U	**0.0947**	**0.27**	*0.0541* U	*0.0541* U	NA	*0.05* U	*0.0606* U	*0.0556* U
Dibenz(a,h)anthracene	~	0.0385 U	0.0385 U	NA	0.0556 U	0.0526 U	0.0649	0.0541 U	0.0541 U	NA	0.05 U	0.0606 U	0.0556 U
Dibenzofuran	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Dibutyl phthalate	50	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	3.09 J	3.03 U	2.78 U
Diethyl phthalate	50	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Dimethyl phthalate	50	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Dioctyl phthalate	50	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Fluoranthene	50	0.623	0.538	NA	0.0778	0.305	0.735	0.0865	0.476	NA	0.36	0.0606 U	0.0556 U
Fluorene	50	0.292	0.323	NA	0.0556 U	0.0632	0.0757	0.0541 U	0.0649	NA	0.05 U	0.0606 U	0.0556 U
Hexachlorobenzene	0.04	0.0154 U	0.0154 U	NA	0.0222 U	0.0211 U	0.0216 U	0.0216 U	0.0216 U	NA	0.02 U	0.0242	0.0222 U
Hexachlorobutadiene	0.5	0.385 U	0.385 U	NA	*0.556* U	*0.526* U	*0.541* U	*0.541* U	*0.541* U	NA	0.5 U	*0.606* U	*0.556* U
Hexachlorocyclopentadiene	5	3.85 U	3.85 U	NA	*5.56* U	*5.26* U	*5.41* U	*5.41* U	*5.41* U	NA	5 U	*6.06* U	*5.56* U
Hexachloroethane	5	0.385 U	0.385 U	NA	0.556 U	0.526 U	0.541 U	0.541 U	0.541 U	NA	0.5 U	0.606 U	0.556 U
Indeno(1,2,3-cd)pyrene	0.002	*0.0385* U	*0.0385* U	NA	*0.0556* U	**0.0526**	**0.141**	*0.0541* U	*0.0541* U	NA	*0.05* U	*0.0606* U	*0.0556* U
Isophorone	50	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Naphthalene	10	0.115	0.1	NA	0.211	0.0526 U	0.0649	0.0541 U	0.0757	NA	0.07	0.0606 U	0.0556 U
Nitrobenzene	0.4	0.192 U	0.192 U	NA	0.278 U	0.263 U	0.27 U	0.27 U	0.27 U	NA	0.25 U	0.303 U	0.278 U
n-Nitrosodimethylamine	~	0.385 U	0.385 U	NA	0.556 U	0.526 U	0.541 U	0.541 U	0.541 U	NA	0.5 U	0.606 U	0.556 U
n-Nitrosodi-N-Propylamine	~	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
n-Nitrosodiphenylamine	50	1.92 U	1.92 U	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U
Pentachlorophenol	1	0.192 U	0.192 U	NA	0.278 U	0.263 U	0.27 U	0.27 U	0.27 U	NA	0.25 U	0.303 U	0.278 U
Phenanthrene	50	1.02	1.1	NA	0.111	0.263	0.324	0.0541 U	0.238	NA	0.14	0.0606 U	0.0556
Phenol	1	*1.92* U	*1.92* U	NA	*2.78* U	*2.63* U	*2.7* U	*2.7* U	*2.7* U	NA	*2.5* U	*3.03* U	*2.78* U
Pyrene	50	0.731	0.623	NA	0.0667	0.284	0.778	0.0649	0.389	NA	0.28	0.0727	0.0556 U
Pyridine	50	NA	NA	NA	2.78 U	2.63 U	2.7 U	2.7 U	2.7 U	NA	2.5 U	3.03 U	2.78 U

Notes provided on Page 5.

Table 4A
Remedial Investigation Work Plan
Historical Groundwater Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location	NYSDEC	TW-2	TW-2	TW-3	LMW-8	LMW-9	LMW-9	LMW-9	LMW-10	LMW-10	LMW-10	LMW-11	LMW-11
Sample ID	SGVs	TW-2_112117	DUP-2_112117	TW-3_112117	LMW-8_120718	LMW-9_120718	DUP-7_120718	LMW-9_20210212	LMW-10_120718	LMW-10_120718	LMW-10_20210212	LMW-11_20210212	DUP-1_20210212_GW
Laboratory ID		17K0877-01	17K0877-05	17K0877-06	18L0348-01	18L0348-02	18L0348-03	21B0473-03	18L0348-04	18L0348-04RE1	21B0473-04	21B0473-01	21B0473-05
Sample Date		11/21/2017	11/21/2017	11/21/2017	12/7/2018	12/7/2018	12/7/2018	2/12/2021	12/7/2018	12/7/2018	2/12/2021	2/12/2021	2/12/2021
Pesticides (µg/L)													
4,4'-DDD	0.3	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
4,4'-DDE	0.2	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
4,4'-DDT	0.2	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Aldrin	0	NA	NA	NA	*0.00444* U	*0.00471* U	*0.00432* U	*0.00432* U	*0.00471* U	NA	*0.00432* U	*0.00435* U	*0.00444* U
Alpha BHC (Alpha Hexachlorocyclohexane)	0.01	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Alpha Chlordane	~	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Alpha Endosulfan	~	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Beta Bhc (Beta Hexachlorocyclohexane)	0.04	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Beta Endosulfan	~	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Chlordane (alpha and gamma)	0.05	NA	NA	NA	0.0222 U	0.0235 U	0.0216 U	*0.216* U	0.0235 U	NA	*0.216* U	*0.217* U	*0.222* U
Delta Bhc (Delta Hexachlorocyclohexane)	0.04	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Dieldrin	0.004	NA	NA	NA	0.00222 U	0.00235 U	0.00216 U	0.00216 U	0.00235 U	NA	0.00216 U	0.00217 U	0.00222 U
Endosulfan Sulfate	~	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Endrin	0	NA	NA	NA	*0.00444* U	*0.00471* U	*0.00432* U	*0.00432* U	*0.00471* U	NA	*0.00432* U	*0.00435* U	*0.00444* U
Endrin Aldehyde	5	NA	NA	NA	0.0111 U	0.0118 U	0.0108 U	0.0108 U	0.0118 U	NA	0.0108 U	0.0109 U	0.0111 U
Endrin Ketone	5	NA	NA	NA	0.0111 U	0.0118 U	0.0108 U	0.0108 U	0.0118 U	NA	0.0108 U	0.0109 U	0.0111 U
Gamma Bhc (Lindane)	0.05	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Gamma-Chlordane	~	NA	NA	NA	0.0111 U	0.0118 U	0.0108 U	0.0108 U	0.0118 U	NA	0.0108 U	0.0109 U	0.0111 U
Heptachlor	0.04	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Heptachlor Epoxide	0.03	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Methoxychlor	35	NA	NA	NA	0.00444 U	0.00471 U	0.00432 U	0.00432 U	0.00471 U	NA	0.00432 U	0.00435 U	0.00444 U
Toxaphene	0.06	NA	NA	NA	*0.111* U	*0.118* U	*0.108* U	*0.108* U	*0.118* U	NA	*0.108* U	*0.109* U	*0.111* U
Polychlorinated Biphenyls (µg/L)													
PCB-1016 (Aroclor 1016)	~	NA	NA	NA	0.0556 U	0.0588 U	0.0541 U	0.0541 U	0.0588 U	NA	0.0541 U	0.0543 U	0.0556 U
PCB-1221 (Aroclor 1221)	~	NA	NA	NA	0.0556 U	0.0588 U	0.0541 U	0.0541 U	0.0588 U	NA	0.0541 U	0.0543 U	0.0556 U
PCB-1232 (Aroclor 1232)	~	NA	NA	NA	0.0556 U	0.0588 U	0.0541 U	0.0541 U	0.0588 U	NA	0.0541 U	0.0543 U	0.0556 U
PCB-1242 (Aroclor 1242)	~	NA	NA	NA	0.0556 U	0.0588 U	0.0541 U	0.0541 U	0.0588 U	NA	0.0541 U	0.0543 U	0.0556 U
PCB-1248 (Aroclor 1248)	~	NA	NA	NA	0.0556 U	0.0588 U	0.0541 U	0.0541 U	0.0588 U	NA	0.0541 U	0.0543 U	0.0556 U
PCB-1254 (Aroclor 1254)	~	NA	NA	NA	0.0556 U	0.0588 U	0.0541 U	0.0541 U	0.0588 U	NA	0.0541 U	0.0543 U	0.0556 U
PCB-1260 (Aroclor 1260)	~	NA	NA	NA	0.0556 U	0.0588 U	0.0541 U	0.0541 U	0.0588 U	NA	0.0541 U	0.0543 U	0.0556 U
Total PCBs	0.09	NA	NA	NA	0.0556 U	0.0588 U	0.0541 U	0.0541 U	0.0588 U	NA	0.0541 U	0.0543 U	0.0556 U

Notes provided on Page 5.

Table 4A
Remedial Investigation Work Plan
Historical Groundwater Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location		TW-2		TW-2		TW-3	LMW-8		LMW-9		LMW-9		LMW-9		LMW-10		LMW-10		LMW-10		LMW-11		LMW-11	
Sample ID	NYSDEC	TW-2_112117		DUP-2_112117		TW-3_112117	LMW-8_120718		LMW-9_120718		DUP-7_120718		LMW-9_20210212		LMW-10_120718		LMW-10_120718		LMW-10_20210212		LMW-11_20210212		DUP-1_20210212_GW	
Laboratory ID	SGVs	17K0877-01		17K0877-05		17K0877-06	18L0348-01		18L0348-02		18L0348-03		21B0473-03		18L0348-04		18L0348-04RE1		21B0473-04		21B0473-01		21B0473-05	
Sample Date		11/21/2017		11/21/2017		11/21/2017	12/7/2018		12/7/2018		12/7/2018		2/12/2021		12/7/2018		12/7/2018		2/12/2021		2/12/2021		2/12/2021	
Inorganics (µg/L)																								
Aluminum	~	23,600	D	20,600	D	NA	506		40,100		51,100		55.6	U	276		NA		55.6	U	2,560		21,700	
Aluminum (Dissolved)	~	NA		NA		NA	55.6	U	55.6	U	55.6	U	55.6	U	55.6	U	NA		55.6	U	71.1		60.8	
Antimony	3	1.11	U	1.11	U	NA	1.24		2.97		2.84		1.11	U	1.11	U	NA		1.11	U	1.11	U	1.38	
Antimony (Dissolved)	3	NA		NA		NA	1.36		1.88		2.01		1.11	U	1.11	U	NA		1.11	U	1.11	U	1.11	U
Arsenic	25	10.7		9.57		NA	9.13		15.1		18.7		3.61		1.24		NA		1.11	U	7.92		15	
Arsenic (Dissolved)	25	NA		NA		NA	6.3		1.79		1.52		2.29		1.11	U	NA		1.11	U	3.99		4.66	
Barium	1,000	**1,930**	D	**1,700**	D	NA	132		471		523		207		314		NA		463		274		526	
Barium (Dissolved)	1,000	NA		NA		NA	104		204		204		188		285		NA		425		217		208	
Beryllium	3	**4.81**		**4.54**		NA	0.333	U	0.718		0.718		0.333	U	0.333	U	NA		0.333	U	0.333	U	0.423	
Beryllium (Dissolved)	3	NA		NA		NA	0.333	U	0.333	U	0.333	U	0.333	U	0.333	U	NA		0.333	U	0.333	U	0.333	U
Cadmium	5	0.556	U	0.556	U	NA	0.556	U	0.556	U	0.556	U	0.556	U	0.556	U	NA		0.556	U	0.556	U	0.556	U
Cadmium (Dissolved)	5	NA		NA		NA	0.556	U	0.556	U	0.556	U	0.556	U	0.556	U	NA		0.556	U	0.556	U	0.556	U
Calcium	~	400,000	D	346,000	D	NA	159,000		213,000		214,000		206,000		188,000		NA		276,000		169,000		195,000	
Calcium (Dissolved)	~	NA		NA		NA	178,000		203,000		206,000		212,000		193,000		NA		282,000		160,000		161,000	
Chromium, Hexavalent	50	10	U	10	U	NA	10	U	10	U	10	U	10	U	10	U	NA		10	U	10	U	10	U
Chromium, Total	50	*55.6*	U	*55.6*	U	NA	5.56	U	**56.2**		**72.9**		5.56	U	5.56	U	NA		5.56	U	6.54		43.3	
Chromium, Total (Dissolved)	50	NA		NA		NA	5.56	U	5.56	U	5.56	U	5.56	U	5.56	U	NA		5.56	U	5.56	U	5.56	U
Chromium, Trivalent	~	NA		NA		NA	10	U	56.2		72.9		10	U	10	U	NA		10	U	10	U	43.3	
Cobalt	~	NA		NA		NA	4.44	U	23.8		30.6		4.44	U	4.44	U	NA		4.44	U	4.44	U	17.6	
Cobalt (Dissolved)	~	NA		NA		NA	4.44	U	4.44	U	4.44	U	4.44	U	4.44	U	NA		4.44	U	4.44	U	4.44	U
Copper	200	33.3	U	33.3	U	NA	22.2	U	95		119		22.2	U	22.2	U	NA		22.2	U	22.2	U	86.4	
Copper (Dissolved)	200	NA		NA		NA	22.2	U	22.2	U	22.2	U	22.2	U	22.2	U	NA		22.2	U	22.2	U	22.2	U
Cyanide	200	NA		NA		NA	NA		NA		NA		10	U	NA		NA		10	U	10	U	10	U
Iron	300	**93,100**	D	**80,100**	D	NA	**2,440**		**51,000**		**64,400**		**1,280**		**1,630**		NA		**2,500**		**6,790**		**40,400**	
Iron (Dissolved)	300	NA		NA		NA	278	U	278	U	278	U	278	U	278	U	NA		278	U	278	U	278	U
Lead	25	**92.8**	D	**78.9**	D	NA	**151**		**313**		**335**		5.56	U	5.56	U	NA		5.56	U	**49.7**		**472**	
Lead (Dissolved)	25	NA		NA		NA	5.56	U	5.56	U	5.56	U	5.56	U	5.56	U	NA		5.56	U	5.56	U	5.56	U
Magnesium	35,000	27,100	D	23,200	D	NA	11,900		20,100		22,300		16,500		17,500		NA		28,700		18,300		22,900	
Magnesium (Dissolved)	35,000	NA		NA		NA	13,500		15,200		15,600		16,100		17,000		NA		28,400		17,100		16,200	
Manganese	300	**7,470**	D	**6,490**	D	NA	**726**		**1,050**		**1,190**		**455**		**808**		NA		**1,710**		**1,210**		**1,590**	
Manganese (Dissolved)	300	NA		NA		NA	**745**		191		232		**441**		**684**		NA		**1,660**		**938**		**786**	
Mercury	0.7	0.2	U	0.2	U	NA	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	**1**	
Mercury (Dissolved)	0.7	NA		NA		NA	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	NA		0.2	U	0.2	U	0.2	U
Molybdenum	~	1.13		1.29		NA	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Nickel	100	55.6	U	55.6	U	NA	11.1	U	36.4		51		11.1	U	11.1	U	NA		11.1	U	11.1	U	27.1	
Nickel (Dissolved)	100	NA		NA		NA	11.1	U	11.1	U	11.1	U	11.1	U	11.1	U	NA		11.1	U	11.1	U	11.1	U
Potassium	~	29,800	BD	28,400	BD	NA	25,300	B	45,700	B	46,200	B	36,800	B	34,800	B	NA		38,200	B	64,800	B	67,400	B
Potassium (Dissolved)	~	NA		NA		NA	27,200		39,900		39,400		39,700	B	34,200		NA		43,000	B	71,300	B	70,500	B
Selenium	10	**28.7**		**23.1**		NA	9.29		**60**		**71.4**		1.11	U	8.23		NA		3.34	B	1.14	B	3.19	B
Selenium (Dissolved)	10	NA		NA		NA	7.92		**10.2**		8.21		1.11	U	5.81		NA		1.11	U	1.11	U	1.11	U
Silver	50	*55.6*	U	*55.6*	U	NA	5.56	U	5.56	U	5.56	U	5.56	U	5.56	U	NA		5.56	U	5.56	U	5.56	U
Silver (Dissolved)	50	NA		NA		NA	5.56	U	5.56	U	5.56	U	5.56	U	5.56	U	NA		5.56	U	5.56	U	5.56	U
Sodium	20,000	**779,000**	BD	**718,000**	BD	NA	**299,000**		**1,320,000**		**1,310,000**		**717,000**		NA		NA		**988,000**		**282,000**		**277,000**	
Sodium (Dissolved)	20,000	NA		NA		NA	**312,000**		**1,380,000**		**1,370,000**		**678,000**		NA		**1,480,000**	D	**1,000,000**		**273,000**		**271,000**	
Thallium	0.5	*1.11*	U	*1.11*	U	NA	*1.11*	U	*1.11*	U	*1.11*	U	*1.11*	U	*1.11*	U	NA		*1.11*	U	*1.11*	U	*1.11*	U
Thallium (Dissolved)	0.5	NA		NA		NA	*1.11*	U	*1.11*	U	*1.11*	U	*1.11*	U	*1.11*	U	NA		*1.11*	U	*1.11*	U	*1.11*	U
Vanadium	~	217	D	182	D	NA	11.1	U	88.2		105		11.1	U	11.1	U	NA		11.1	U	11.1	U	52.9	
Vanadium (Dissolved)	~	NA		NA		NA	11.1	U	11.1	U	11.1	U	11.1	U	11.1	U	NA		11.1	U	11.1	U	11.1	U
Zinc	2,000	730	D	610	D	NA	27.8	U	315		364		27.8	U	27.8	U	NA		27.8	U	40.2		239	
Zinc (Dissolved)	2,000	NA		NA		NA	27.8	U	27.8	U	27.8	U	27.8	U	27.8	U	NA		27.8	U	27.8	U	27.8	U

Notes provided on Page 5.

Table 4A
Remedial Investigation Work Plan
Historical Groundwater Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Notes:

1. Groundwater 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 703.5 and the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values for Class GA Water (herein collectively referenced as "NYSDEC SGVs").
2. Criterion comparisons for total xylenes and m,p-xylene are provided for reference. Promulgated NYSDEC SGVs are for o-xylene, m-xylene, and p-xylene.
3. Detected analytical results above NYSDEC SGVs are bolded and shaded.
4. Analytical results with reporting limits (RL) above NYSDEC SGVs are italicized.
5. Sample DUP-7_120718 is a duplicate sample of LMW-9_20210212; sample DUP-2_112117 is a duplicate sample of TW-2_112117; and sample DUP-1_20210212_GW is a duplicate sample of LMW-11_20210212.
6. ~ = Regulatory limit for this analyte does not exist
7. µg/l = micrograms per liter
8. NA = Not analyzed
9. ND = Not detected

Qualifiers:

D = The concentration reported is a result of a diluted sample.
J = The analyte was detected above the Method Detection Limit (MDL), but below the RL; therefore, the result is an estimated concentration.
U = The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.
B = The analyte was found in the associated analysis batch blank.

Table 4B
Remedial Investigation Work Plan
Historical Groundwater Sample Analytical Results

550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location Sample ID Laboratory ID Sample Date	NYSDEC January 2021 Guidance Values	LMW-11 LMW-11_20210212 21B0473-01 2/12/2021	
Semivolatile Organic Compounds (ng/L)			
1,4-Dioxane (P-Dioxane)	1,000	300	U
Per and Polyfluoroalkyl Substances (ng/L)			
N-ethyl perfluorooctane- sulfonamidoacetic Acid (NEtFOSAA)	100	2	U
N-methyl perfluorooctane- sulfonamidoacetic Acid (NMeFOSAA)	100	2	U
Perfluorobutanesulfonic Acid (PFBS)	100	8.4	
Perfluorobutanoic acid (PFBA)	100	26.3	
Perfluorodecanesulfonic Acid (PFDS)	100	2	U
Perfluorodecanoic Acid (PFDA)	100	2	U
Perfluorododecanoic Acid (PFDoA)	100	2	U
Perfluoroheptanesulfonic Acid (PFHpS)	100	2	U
Perfluoroheptanoic acid (PFHpA)	100	17.5	
Perfluorohexanesulfonic Acid (PFHxS)	100	12.7	
Perfluorohexanoic Acid (PFHxA)	100	18.1	
Perfluorononanoic Acid (PFNA)	100	3.05	
Perfluorooctanesulfonamide (FOSA)	100	2	U
Perfluorooctanesulfonic Acid (PFOS)	10	**67.5**	
Perfluorooctanoic Acid (PFOA)	10	**45.4**	
Perfluoropentanoic Acid (PFPeA)	100	22	
Perfluorotetradecanoic Acid (PFTA)	100	2	U
Perfluorotridecanoic Acid (PFTrDA)	100	2	U
Perfluoroundecanoic Acid (PFUnA)	100	2	U
Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2) (8:2FTS)	100	2	U
Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2) (6:2FTS)	100	5	U
Total PFAS	500	221	

Notes:
1. Groundwater sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Remedial Programs Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) (January 2021) and the 1,4-Dioxane value reflects the drinking water maximum contaminant level (MCL) adopted by New York State for public water systems (July 2020). Pursuant to Part 375-1.7(f)(2), the NYSDEC will treat the MCL as relevant and appropriate and will consider this value in remedy selection.
2. Detected analytical results above NYSDEC January 2021 Guidance Values are bolded and shaded.
3. ng/l = nanograms per liter

Qualifiers:
U = The analyte was analyzed for, but was not detected at a level greater than or equal to the Reporting Limit (RL); the value shown in the table is the RL.

Table 5
Remedial Investigation Work Plan
Historical Soil Vapor Sample Analytical Results

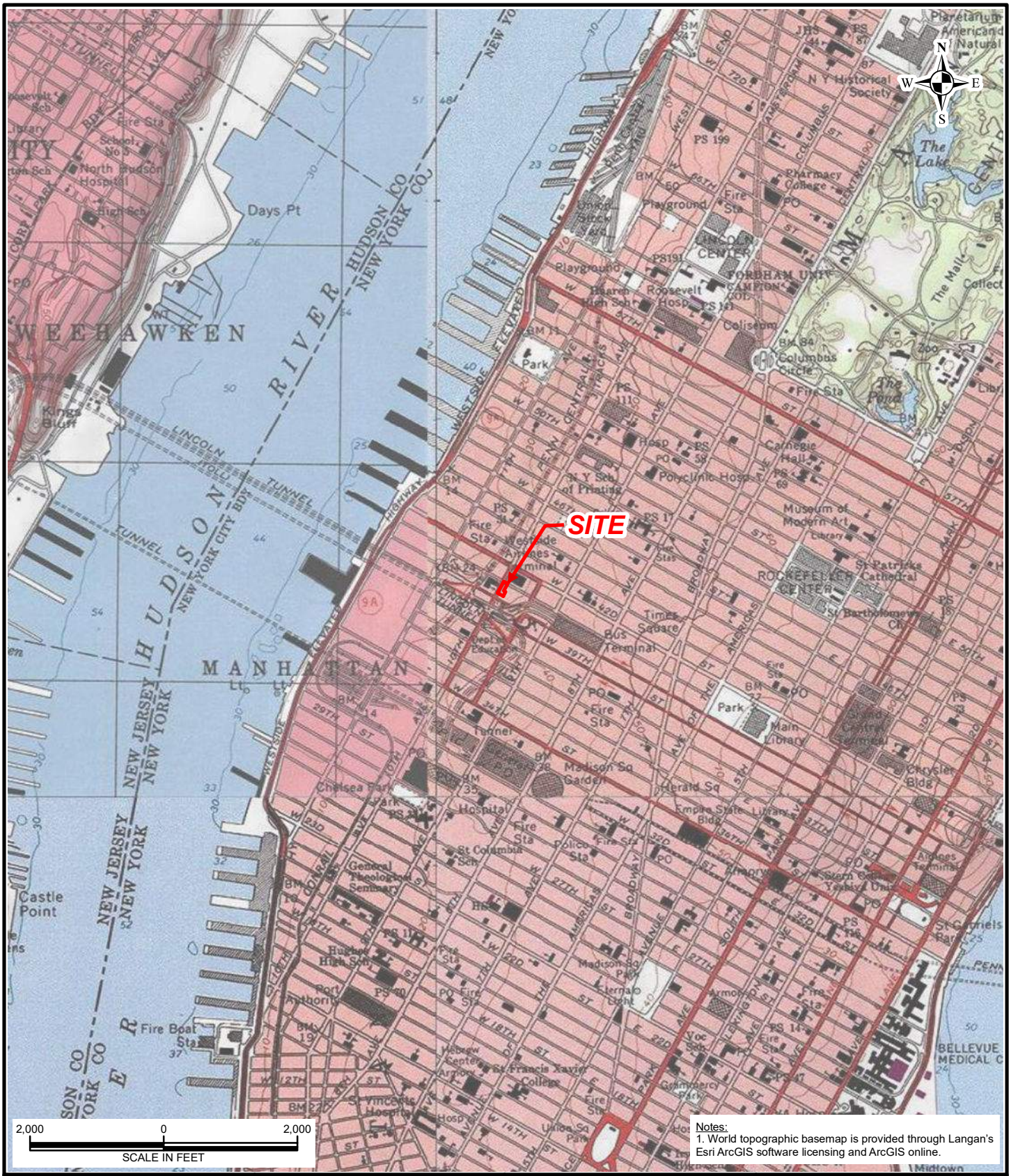
550 10th Avenue Redevelopment
New York, New York
OER Regulatory Site No.: 20TMP0490M, 20EH-N114M
Langan Project No.: 100674402

Location	NYSDOH Decision Matrices Minimum Concentrations	LSV-9		LSV-9		LSV-10		LSV-11		LSV-12		LSV-12	
Sample ID		002 LSV-9		005 DUP-1		003 LSV-10		004 LSV-11		LSV-12_20210212		DUP-1_20210212	
Laboratory ID		19E0458-01		19E0458-02		19E0497-02		19E0497-01		21B0479-01		21B0479-02	
Sample Date		5/9/2019		5/9/2019		5/8/2019		5/8/2019		2/12/2021		2/12/2021	
Sample Type		SV		SV		SV		SV		SV		SV	
Volatile Organic Compounds (µg/m³)													
1,1,1,2-Tetrachloroethane	~	0.99	U	1	U	10	U	2.2	U	1.04	U	2.35	U
1,1,1-Trichloroethane	100	0.79	U	0.82	U	8.2	U	1.8	U	0.827	U	1.87	U
1,1,2,2-Tetrachloroethane	~	0.99	U	1	U	10	U	2.2	U	1.04	U	2.35	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	~	1.1	U	1.2	U	11	U	2.5	U	1.16	U	2.62	U
1,1,2-Trichloroethane	~	0.79	U	0.82	U	8.2	U	1.8	U	0.827	U	1.87	U
1,1-Dichloroethane	~	0.58	U	0.61	U	6.1	U	1.3	U	0.613	U	1.38	U
1,1-Dichloroethene	6	0.14	U	0.15	U	1.5	U	0.32	U	0.3	U	0.678	U
1,2,4-Trichlorobenzene	~	1.1	U	1.1	U	11	U	2.4	U	1.12	U	2.54	U
1,2,4-Trimethylbenzene	~	4.2	D	1.9	D	72	D	2.1	D	0.745	U	1.68	U
1,2-Dibromoethane (Ethylene Dibromide)	~	1.1	U	1.2	U	12	U	2.5	U	1.16	U	2.63	U
1,2-Dichlorobenzene	~	0.87	U	0.91	U	9	U	1.9	U	0.911	U	2.06	U
1,2-Dichloroethane	~	0.58	U	0.61	U	6.1	U	1.3	U	0.613	U	1.38	U
1,2-Dichloropropane	~	0.67	U	0.7	U	6.9	U	1.5	U	0.7	U	1.58	U
1,2-Dichlorotetrafluoroethane	~	1	U	1.1	U	10	U	2.3	U	1.06	U	2.39	U
1,3,5-Trimethylbenzene (Mesitylene)	~	1.1	D	0.74	U	26	D	1.6	U	0.745	U	1.68	U
1,3-Butadiene	~	0.96	U	1	U	9.9	U	2.1	U	1.01	U	2.27	U
1,3-Dichlorobenzene	~	0.87	U	0.91	U	9	U	1.9	U	0.911	U	2.06	U
1,3-Dichloropropane	~	0.67	U	0.7	U	6.9	U	1.5	U	0.7	U	1.58	U
1,4-Dichlorobenzene	~	0.87	U	0.91	U	9	U	1.9	U	0.911	U	2.06	U
1,4-Dioxane (P-Dioxane)	~	1	U	1.1	U	11	U	2.3	U	1.09	U	2.46	U
2-Hexanone	~	1.2	U	1.2	U	19	D	2.6	U	1.24	U	2.8	U
4-Bromofluorobenzene	~	9.3	BD	8.8	BD	9.3	BD	9.1	BD	NA		NA	
4-Ethyltoluene	~	2.5	D	1.3	D	32	D	1.6	D	0.745	U	1.68	U
Acetone	~	18	D	4.2	D	1,500	D	560	D	3.49	D	9.34	D
Acrylonitrile	~	0.31	U	0.33	U	3.3	U	0.7	U	0.329	U	0.742	U
Allyl Chloride (3-Chloropropene)	~	2.3	U	2.4	U	23	U	5.1	U	2.37	U	5.35	U
Benzene	~	0.46	U	0.48	U	4.8	U	1	U	0.92	D	80.4	D
Benzyl Chloride	~	0.75	U	0.78	U	7.8	U	1.7	U	0.784	U	1.77	U
Bromodichloromethane	~	2.3	D	3.3	D	10	U	2.2	U	1.01	U	2.29	U
Bromoethene	~	0.63	U	0.66	U	6.6	U	1.4	U	0.663	U	1.5	U
Bromoform	~	1.5	U	1.6	U	15	U	3.3	U	1.57	U	3.54	U
Bromomethane	~	0.56	U	0.59	U	5.8	U	1.3	U	0.588	U	1.33	U
Carbon Disulfide	~	7.6	D	12	D	53	D	2.1	D	0.472	U	1.07	U
Carbon Tetrachloride	6	0.64	D	0.57	D	2.4	U	0.81	D	0.286	D	0.538	U
Chlorobenzene	~	0.66	U	0.7	U	6.9	U	1.5	U	0.697	U	1.57	U
Chloroethane	~	0.38	U	0.4	U	4	U	0.85	U	0.4	U	0.902	U
Chloroform	~	44	D	52	D	13	D	1.6	U	0.74	U	6.35	D
Chloromethane	~	0.51	D	0.31	U	3.1	U	1.7	D	1.06	D	0.706	U
Cis-1,2-Dichloroethene	6	0.14	U	0.15	U	1.5	U	0.32	U	0.3	U	0.678	U
Cis-1,3-Dichloropropene	~	0.65	U	0.69	U	6.8	U	1.5	U	0.688	U	1.55	U
Cyclohexane	~	0.5	U	0.52	U	6.2	D	3.3	D	0.521	U	12.2	D
Dibromochloromethane	~	1.2	U	1.3	U	13	U	2.8	U	1.29	U	2.91	U
Dichlorodifluoromethane	~	2.4	D	2.3	D	7.4	U	2.7	D	2.1	D	1.69	D
Ethyl Acetate	~	1	U	1.1	U	11	U	2.3	U	1.09	U	8.38	D
Ethylbenzene	~	1.4	D	0.72	D	6.5	U	1.4	U	0.658	U	1.49	U
Hexachlorobutadiene	~	1.5	U	1.6	U	16	U	3.4	U	1.62	U	3.65	U
Isopropanol	~	3.8	D	0.74	U	66	D	21	D	2.68	D	11.3	D
M,P-Xylene	~	5.9	D	3.1	D	13	U	3.2	D	1.32	U	2.97	U
Methyl Ethyl Ketone (2-Butanone)	~	1.6	D	0.45	U	45	D	3.7	D	0.491	D	1.21	D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	~	0.59	U	0.62	U	29	D	1.3	U	0.621	U	1.4	U
Methyl Methacrylate	~	0.59	U	0.62	U	6.1	U	1.3	U	0.62	U	1.4	U
Methylene Chloride	100	4.4	D	1	U	11	D	8.3	D	2.26	D	10.1	D
n-Heptane	~	0.77	D	0.62	U	6.1	U	1.3	U	0.621	U	25.5	D
n-Hexane	~	3.8	D	2	D	740	D	350	D	2.24	D	212	D
o-Xylene (1,2-Dimethylbenzene)	~	2.1	D	1.1	D	6.5	U	1.4	U	0.658	U	1.48	U
Propylene	~	0.25	U	0.26	U	2.6	U	0.56	U	0.261	U	0.589	U
Styrene	~	0.61	U	0.64	U	6.4	U	1.4	U	0.645	U	1.46	U
Tert-Butyl Methyl Ether	~	0.52	U	0.54	U	5.4	U	1.2	U	0.546	U	1.23	U
Tetrachloroethene (PCE)	100	6.2	D	6.1	D	4.1	D	1.8	D	1.03	U	2.32	U
Tetrahydrofuran	~	0.85	U	0.89	U	8.8	U	1.9	D	0.894	U	2.02	U
Toluene	~	2.9	D	1.7	D	11	D	3.7	D	0.913	D	41.1	D
Trans-1,2-Dichloroethene	~	0.57	U	0.6	U	5.9	U	1.3	U	0.601	U	1.36	U
Trans-1,3-Dichloropropene	~	0.65	U	0.69	U	6.8	U	1.5	U	0.688	U	1.55	U
Trichloroethene (TCE)	6	0.31	D	0.57	D	2	U	1.2	D	0.204	U	0.459	U
Trichlorofluoromethane	~	1.7	D	1.5	D	8.4	U	3.5	D	1.02	D	1.92	U
Vinyl Acetate	~	0.51	U	0.53	U	5.3	U	1.1	U	0.533	U	1.2	U
Vinyl Chloride	6	0.092	U	0.097	U	0.96	U	0.21	U	0.194	U	0.437	U
Total BTEX	~	12.3		6.62		11		6.9		1.83		122	
Total CVOCs	~	6.51		6.67		4.1		3		ND		ND	
Total VOCs	~	127		103		2,640		982		17.5		420	

Notes:
1. Soil vapor sample analytical results are compared to the minimum soil vapor concentrations at which mitigation is recommended as set forth in the New York State Department of Health (NYSDOH) October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York Decision Matrices for Sub-Slab Vapor and Indoor Air and subsequent updates (2017).
2. Sample DUP-1_20210212 is a duplicate of parent sample LSV-12_20210212.
3. ~ = Regulatory limit for this analyte does not exist
4. µg/m³ = micrograms per cubic meter
5. SV = Soil Vapor

Qualifiers:
D = The concentration reported is a result of a diluted sample.
J = The analyte was detected above the Method Detection Limit (MDL), but below the Reporting Limit (RL); therefore, the result is an estimated concentration.
U = The analyte was analyzed for, but was not detected at a level greater than or equal to the RL; the value shown in the table is the RL.
B = The analyte was found in the associated analysis batch blank.

FIGURES



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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
550 10TH AVENUE REDEVELOPMENT

BLOCK No. 1050
LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
SITE LOCATION MAP

Project No.	100674402
Date	4/12/2021
Scale	1"=2,000'
Drawn By	IHB
Submission Date	4/12/2021

Figure
1

Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\MXD\Environmental_Figures\2021-03 - Phase 2 RIR\Figure 1 - Site Location Map.mxd Date: 4/12/2021 User: ibaker Time: 11:38:22 AM

Sample ID	LSB-22_120618
Sample Date	12/6/2018
Sample Depth (feet bsl)	14-Dec
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE
Pesticides (mg/kg)	ND
PCBs (mg/kg)	ND
Inorganics (mg/kg)	
Lead	285 B
Mercury	0.412
PFAS (µg/kg)	NA

Sample ID	LSB-5 (1-3)	DUP-1_112117
Sample Date	11/21/2017	11/21/2017
Sample Depth (feet bsl)	11.5-13.5	11.5-13.5
VOCs (mg/kg)	ND	ND
SVOCs (mg/kg)	NE	ND
Pesticides (mg/kg)	NA	NA
PCBs (mg/kg)	NA	NA
Inorganics (mg/kg)		
Lead	153 B	123 B
Mercury	0.255	0.218
Selenium	11.2 B	13.1 B
PFAS (µg/kg)	NA	NA

Sample ID	LSB-8A_0-2_20210211
Sample Date	2/11/2021
Sample Depth (feet bsl)	11.5-13.5
VOCs (mg/kg)	NA
SVOCs (mg/kg)	NA
Pesticides (mg/kg)	ND
PCBs (mg/kg)	ND
Inorganics (mg/kg)	NA
PFAS (µg/kg)	NA

Sample ID	LSB-8 (0-2)
Sample Date	11/20/2017
Sample Depth (feet bsl)	11.5-13.5
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE
Pesticides (mg/kg)	NA
PCBs (mg/kg)	NA
Inorganics (mg/kg)	
Mercury	0.207
Selenium	12.8 B
PFAS (µg/kg)	NA

Sample ID	LSB-24_120618
Sample Date	12/6/2018
Sample Depth (feet bgs)	16-18
SVOCs (mg/kg)	
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Indeno(1,2,3-cd)pyrene	ND
Pesticides (mg/kg)	
4,4'-DDT	ND
Inorganics (mg/kg)	
Barium	79.1
Cadmium	ND
Copper	19.5
Lead	50.9 B
Manganese	190
Mercury	0.14
Nickel	13.1
Selenium	ND
Zinc	52.7

Sample ID	LSB-24A_0-2_20210211	LSB-24A_3-5_20210211	LSB-24A_5-7_20210211
Sample Date	2/11/2021	2/11/2021	2/11/2021
Sample Depth (feet bgs)	15-17	18-20	20-22
SVOCs (mg/kg)			
Benzo(a)anthracene	NA	0.0927 JD	ND
Benzo(a)pyrene	NA	0.0885 JD	ND
Benzo(b)fluoranthene	NA	0.0657 JD	ND
Benzo(k)fluoranthene	NA	0.0632 JD	ND
Chrysene	NA	0.091 JD	ND
Dibenz(a,h)anthracene	NA	ND	ND
Indeno(1,2,3-cd)pyrene	NA	ND	ND
Pesticides (mg/kg)			
4,4'-DDT	ND	ND	ND
Inorganics (mg/kg)			
Barium	NA	72.1	44.2
Cadmium	NA	ND	ND
Copper	NA	**50.8**	14.4
Lead	NA	46.5	28.3
Manganese	NA	332	250
Mercury	NA	**0.414**	**0.473**
Nickel	NA	13.8	7.67
Selenium	NA	ND	ND
Zinc	NA	59.2 B	38.3 B

Sample ID	LSB-22A_4-6_20210210
Sample Date	2/10/2021
Sample Depth (feet bsl)	14.5-16.5
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE
Pesticides (mg/kg)	ND
PCBs (mg/kg)	ND
Inorganics (mg/kg)	
Lead	136
PFAS (µg/kg)	NA

Sample ID	LSB-21A_0-2_20210211
Sample Date	2/11/2021
Sample Depth (feet bsl)	0-2
VOCs (mg/kg)	NE
SVOCs (mg/kg)	
Benzo(a)anthracene	1.37 D
Benzo(a)pyrene	1.61 D
Benzo(b)fluoranthene	1.41 D
Benzo(k)fluoranthene	1.22 D
Chrysene	1.27 D
Dibenz(a,h)anthracene	0.341 D
Indeno(1,2,3-cd)pyrene	0.909 D
Pesticides (mg/kg)	
4,4'-DDT	0.0187 D
PCBs (mg/kg)	NE
Inorganics (mg/kg)	
Barium	562
Cadmium	3.93
Lead	3,050
Mercury	0.533
Zinc	463 B
PFAS (µg/kg)	NA

Sample ID	LSB-9 (0-2)
Sample Date	11/20/2017
Sample Depth (feet bgs)	15-17
SVOCs (mg/kg)	
Benzo(a)anthracene	0.286 D
Benzo(a)pyrene	0.251 D
Benzo(b)fluoranthene	0.126 D
Benzo(k)fluoranthene	0.143 D
Chrysene	0.344 D
Dibenz(a,h)anthracene	ND
Indeno(1,2,3-cd)pyrene	0.0902 JD
Inorganics (mg/kg)	
Barium	86.7
Cadmium	ND
Copper	16.3 B
Lead	49.4 B
Manganese	988
Mercury	0.0794
Nickel	ND
Selenium	**15.7 B**
Zinc	50.7

Sample ID	LSB-6 (1-3)
Sample Date	11/21/2017
Sample Depth (feet bsl)	12.5-14.5
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE
Pesticides (mg/kg)	NA
PCBs (mg/kg)	NA
Inorganics (mg/kg)	
Lead	89.4 B
Mercury	0.345
Selenium	10.9 B
PFAS (µg/kg)	NA

Sample ID	LSB-21_120518
Sample Date	12/5/2018
Sample Depth (feet bsl)	13-15
VOCs (mg/kg)	NE
SVOCs (mg/kg)	ND
Pesticides (mg/kg)	ND
PCBs (mg/kg)	ND
Inorganics (mg/kg)	
Nickel	31.4
PFAS (µg/kg)	NA

Sample ID	LSB-23A_0-2_20210211	LSB-23A_3-5_20210211
Sample Date	2/11/2021	2/11/2021
Sample Depth (feet bsl)	11.5-13.5	14.5-16.5
VOCs (mg/kg)	NA	NE
SVOCs (mg/kg)	NA	NE
Pesticides (mg/kg)	ND	ND
PCBs (mg/kg)	ND	ND
Inorganics (mg/kg)	NA	NE
PFAS (µg/kg)	NA	NA

Sample ID	LSB-1 (15-17)
Sample Date	11/20/2017
Sample Depth (feet bsl)	15-17
VOCs (mg/kg)	NE
SVOCs (mg/kg)	ND
Pesticides (mg/kg)	NA
PCBs (mg/kg)	NA
Inorganics (mg/kg)	
Selenium	15.5 B
PFAS (µg/kg)	NA

Sample ID	LSB-23_120618	DUP-6_120618
Sample Date	12/6/2018	12/6/2018
Sample Depth (feet bsl)	12.5-14.5	12.5-14.5
VOCs (mg/kg)	NE	NE
SVOCs (mg/kg)	NE	NE
Pesticides (mg/kg)	ND	ND
PCBs (mg/kg)	ND	ND
Inorganics (mg/kg)		
Lead	64.3 B	60.3 B
Mercury	0.198	0.263
Zinc	99.2	114
PFAS (µg/kg)	NA	NA

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs
VOCs (mg/kg)		No Exceedances	No Exceedances
SVOCs (mg/kg)			
Benzo(a)anthracene	56-55-3	1	1
Benzo(a)pyrene	50-32-8	1	1
Benzo(b)fluoranthene	205-99-2	1	1
Benzo(k)fluoranthene	207-08-9	0.8	3.9
Chrysene	218-01-9	1	3.9
Dibenz(a,h)anthracene	53-70-3	0.33	0.33
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	0.5
Pesticides (mg/kg)			
4,4'-DDT	50-29-3	0.0033	7.9
PCBs (mg/kg)		No Exceedances	No Exceedances
Inorganics (mg/kg)			
Barium	7440-39-3	350	400
Cadmium	7440-43-9	2.5	4.3
Copper	7440-50-8	50	270
Lead	7439-92-1	63	400
Manganese	7439-96-5	1,600	2,000
Mercury	7439-97-6	0.18	0.81
Nickel	7440-02-0	30	310
Selenium	7782-49-2	3.9	180
Zinc	7440-66-6	109	10,000

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use Guidance Values	NYSDEC Part 375 Restricted Use Restricted-Residential Guidance Values
PFAS (ppb)			
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	0.88	44

Notes:
1. 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 and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCO). PFAS soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Part 375 Remedial Programs Guidelines for Sampling and Analysis of Per- and Polyfluoroalkyl Substances (PFAS) Unrestricted Use and Restricted Use Restricted-Residential Guidance Values (January 2021).
2. Detected analytical results above Unrestricted Use SCOs are bolded.
3. Detected analytical results above Restricted Use Restricted-Residential SCOs are shaded.
4. Sample DUP-1_112117 is a duplicate sample of LSB-5 (1-3); sample DUP-6_120618 is a duplicate sample of LSB-23_120618 and sample DUP01_20210211 is a duplicate sample of LSB-2A_11-13_20210211.
5. bsl = below sidewalk level
6. mg/kg = milligrams per kilogram
7. µg/kg = microgram per kilogram
8. NE = No exceedances
9. NA = Not analyzed
10. ND = Not detected

Qualifiers:
D = The concentration reported is a result of a diluted sample.
B = The analyte was found in the associated analysis batch blank.

Sample ID	LSB-2A_0-2_20210211	LSB-2A_11-13_20210211	DUP01_20210211
Sample Date	2/11/2021	2/11/2021	2/11/2021
Sample Depth (feet bsl)	0-2	11-13	11-13
VOCs (mg/kg)	NE	NA	NA
SVOCs (mg/kg)			
Benzo(a)anthracene	10.8 D	NA	NA
Benzo(a)pyrene	9 D	NA	NA
Benzo(b)fluoranthene	8.44 D	NA	NA
Benzo(k)fluoranthene	7.34 D	NA	NA
Chrysene	9.67 D	NA	NA
Dibenz(a,h)anthracene	2.49 D	NA	NA
Indeno(1,2,3-cd)pyrene	5.46 D	NA	NA
Pesticides (mg/kg)			
4,4'-DDT	ND	ND	ND
PCBs (mg/kg)	ND	ND	ND
Inorganics (mg/kg)			
Lead	105	NA	NA
Zinc	350 B	NA	NA
PFAS (µg/kg)			
Perfluorooctanesulfonic Acid (PFOS)	10.7	NA	NA

Sample ID	LSB-2 (15-17)
Sample Date	11/20/2017
Sample Depth (feet bsl)	15-17
VOCs (mg/kg)	NE
SVOCs (mg/kg)	ND
Pesticides (mg/kg)	NA
PCBs (mg/kg)	NA
Inorganics (mg/kg)	
Lead	119 B
Manganese	1,660
Selenium	19.3 B
PFAS (µg/kg)	NA

Sample ID	LSB-5A_2-4_20210210
Sample Date	2/10/2021
Sample Depth (feet bsl)	12.5-14.5
VOCs (mg/kg)	NA
SVOCs (mg/kg)	NA
Pesticides (mg/kg)	ND
PCBs (mg/kg)	ND
Inorganics (mg/kg)	NA
PFAS (µg/kg)	NA

Sample ID	LSB-7 (0-2)
Sample Date	11/20/2017
Sample Depth (feet bsl)	11.5-13.5
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE
Pesticides (mg/kg)	NA
PCBs (mg/kg)	NA
Inorganics (mg/kg)	
Selenium	7.96 B
PFAS (µg/kg)	NA

Adjacent Development Site
NYCOER No. 16EH-N056M

WEST 41ST STREET

WEST 40TH STREET

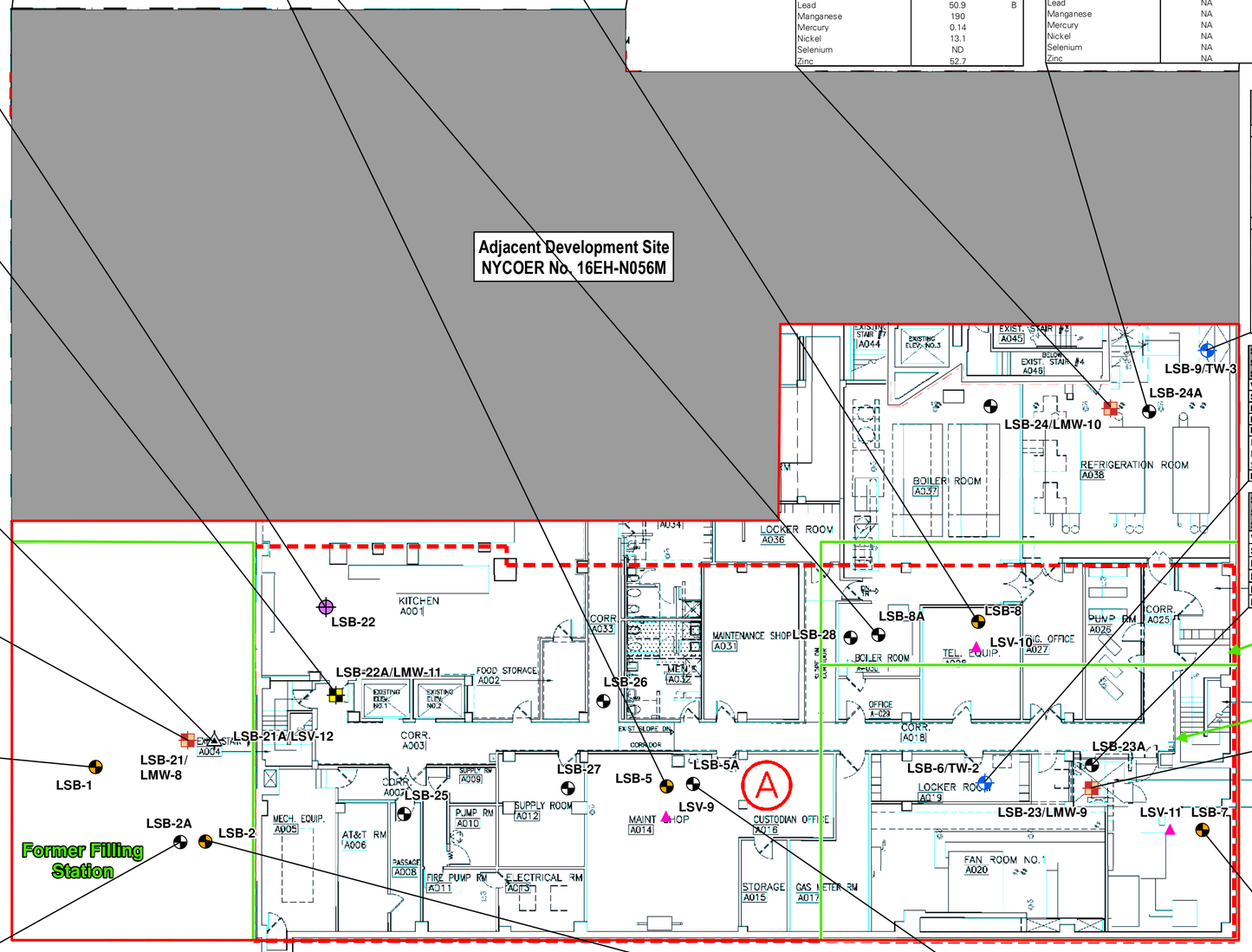
TENTH AVENUE

Former Auto Repair

Former Filling Station

Former Filling Station

LSB-1
LSB-2
LSB-2A
LSB-21/ LMW-8
LSB-21A/LSV-12
LSB-22
LSB-22A/LMW-11
LSB-23A
LSB-24/LMW-10
LSB-24A
LSB-25
LSB-26
LSB-27
LSB-28
LSB-5
LSB-5A
LSB-6/TW-2
LSB-7
LSB-8
LSB-8A
LSB-9/TW-3
LSB-23/LMW-9
LSV-1
LSV-9
LSV-10
LSV-11



0 15 30
SCALE IN FEET

Notes:
1. Property boundary digitized from basemap and measurements provided on the New York City Digital Tax Map maintained online by the Department of Finance
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LANGAN
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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

Project	
550 10TH AVENUE REDEVELOPMENT	
BLOCK No. 1050, LOT No. 61	
MANHATTAN	
NEW YORK COUNTY	NEW YORK

Drawing Title	
SOIL ANALYTICAL RESULTS	

Project No.	100674402
Date	5/18/2021
Scale	1 " = 15 '
Drawn By	IHB
Submission Date	5/18/2021
Figure	2A

Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\MXD\Environmental_Figures\2021-05 BCP RIWP\Figure 2A - Soil Analytical Results.mxd Date: 5/18/2021 User: ibaker Time: 4:29:25 PM

Sample ID	WC-2_021121
Sample Date	2/11/2021
Sample Depth (feet bsl)	10.5-18 (10.5-11)
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE
Petroleum Hydrocarbons (mg/kg)	ND
Pesticides (mg/kg)	ND
Herbicides (mg/kg)	ND
PCBs (mg/kg)	ND
Inorganics (mg/kg)	
Lead	**81.6**
Mercury	**0.214**
TCLP - Inorganics (mg/L)	NE

Sample ID	WC-5_021121
Sample Date	2/11/2021
Sample Depth (feet bsl)	18-27.5 (24-24.5)
VOCs (mg/kg)	
Acetone	**0.06**
SVOCs (mg/kg)	NE
Petroleum Hydrocarbons (mg/kg)	ND
Pesticides (mg/kg)	ND
Herbicides (mg/kg)	ND
PCBs (mg/kg)	ND
Inorganics (mg/kg)	NE
TCLP - Inorganics (mg/L)	NE

Sample ID	WC-1A_021121		WC-1B_021121		DUP01_021121	
Sample Date	2/11/2021		2/11/2021		2/11/2021	
Sample Depth (feet bsl)	0-9 (0-0.5)		9-18 (14-14.5)		9-18 (14-14.5)	
VOCs (mg/kg)	NE		NE		NE	
SVOCs (mg/kg)						
3 & 4 Methylphenol (m&p Cresol)	0.142	D	**0.396**	**D**	0.175	D
Benzo(a)anthracene	**10.6**	**D**	**25.9**	**D**	**10.8**	**D**
Benzo(a)pyrene	**8.44**	**D**	**22.5**	**D**	**9.45**	**D**
Benzo(b)fluoranthene	**7.66**	**D**	**21.4**	**D**	**8.95**	**D**
Benzo(k)fluoranthene	**6.6**	**D**	**16.9**	**D**	**7.34**	**D**
Chrysene	**10.1**	**D**	**23.6**	**D**	**10.3**	**D**
Dibenz(a,h)anthracene	**1.78**	**D**	**5.54**	**D**	**2.35**	**D**
Indeno(1,2,3-cd)pyrene	**4.43**	**D**	**12.6**	**D**	**5.48**	**D**
Naphthalene	5.59	D	**16.9**	**D**	7.43	D
Petroleum Hydrocarbons (mg/kg)	NE		NE		NE	
Pesticides (mg/kg)	ND		ND		ND	
Herbicides (mg/kg)	ND		ND		ND	
PCBs (mg/kg)	ND		ND		ND	
Inorganics (mg/kg)						
Cadmium	0.356	U	0.357	U	**20.9**	
Lead	**128**		**9,340**		**488**	
Mercury	**0.717**		**0.251**		**0.505**	
Zinc	80.1	B	44.4	B	**9,690**	**BD**
TCLP - Inorganics (mg/L)						
Lead	0.693		20.8		2.81	

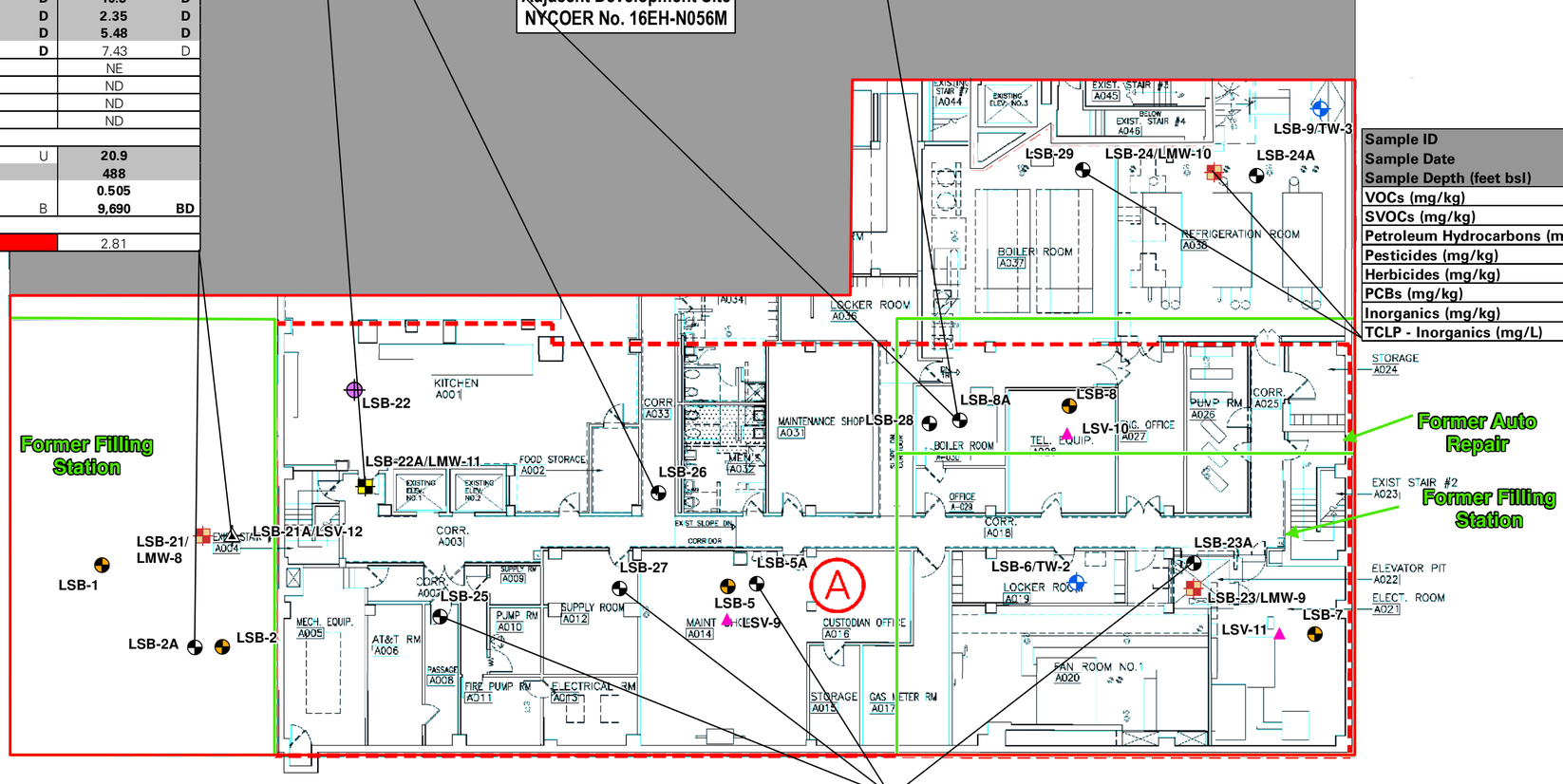
Sample ID	WC-4_021121
Sample Date	2/11/2021
Sample Depth (feet bsl)	15-21.5 (19.5-20)
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE
Petroleum Hydrocarbons (mg/kg)	NE
Pesticides (mg/kg)	ND
Herbicides (mg/kg)	ND
PCBs (mg/kg)	ND
Inorganics (mg/kg)	NE
TCLP - Inorganics (mg/L)	ND

Analyte	CAS Number	RCRA Characteristics for Hazardous Waste
TCLP - Inorganics (mg/L)		
Lead	7439-92-1	5

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs
VOCs (mg/kg)			
Acetone	67-64-1	0.05	100
SVOCs (mg/kg)			
3 & 4 Methylphenol (m&p Cresol)	65794-96-9	0.33	100
Benzo(a)anthracene	56-55-3	1	1
Benzo(a)pyrene	50-32-8	1	1
Benzo(b)fluoranthene	205-99-2	1	1
Benzo(k)fluoranthene	207-08-9	0.8	3.9
Chrysene	218-01-9	1	3.9
Dibenz(a,h)anthracene	53-70-3	0.33	0.33
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	0.5
Naphthalene	91-20-3	12	100
Petroleum Hydrocarbons (mg/kg)		No Exceedances	No Exceedances
Pesticides (mg/kg)			
4,4'-DDT	50-29-3	0.0033	7.9
Herbicides (mg/kg)		No Exceedances	No Exceedances
PCBs (mg/kg)		No Exceedances	No Exceedances
Inorganics (mg/kg)			
Cadmium	7440-43-9	2.5	4.3
Lead	7439-92-1	63	400
Mercury	7439-97-6	0.18	0.81
Zinc	7440-66-6	109	10,000

Notes:
1. 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 and Restricted Use Restricted-Residential Soil Cleanup Objectives (SCO).
2. Detected analytical results above Unrestricted Use SCOs are bolded.
3. Detected analytical results above Restricted Use Restricted-Residential SCOs are shaded grey.
4. Detected analytical results above RCRA Maximum Concentration of Contaminants for the Toxicity Characteristic are shaded red.
5. Sample DUP01_021121 is a duplicate sample of WC-1B_021121.
6. bsl = below sidewalk level
7. mg/kg = milligrams per kilogram
8. mg/L = milligrams per liter
9. NE = No exceedances
10. ND = Not detected

Qualifiers:
D = The concentration reported is a result of a diluted sample.
B = The analyte was found in the associated analysis batch blank.



Sample ID	WC-3_021021 / WC-3_021121
Sample Date	2/10/2021 / 2/11/2021
Sample Depth (feet bsl)	10.5-18 (12.5-13)
VOCs (mg/kg)	NE
SVOCs (mg/kg)	NE
Petroleum Hydrocarbons (mg/kg)	ND
Pesticides (mg/kg)	ND
Herbicides (mg/kg)	ND
PCBs (mg/kg)	ND
Inorganics (mg/kg)	NE
TCLP - Inorganics (mg/L)	NE

0 15 30
SCALE IN FEET

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Project
550 10TH AVENUE REDEVELOPMENT
BLOCK No. 1050, LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
WASTE CHARACTERIZATION SOIL ANALYTICAL RESULTS

Project No.	100674402
Date	5/18/2021
Scale	1 " = 15 '
Drawn By	IHB
Submission Date	5/18/2021
Figure	2B

Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\MXD\Environmental_Figures\2021-05 BCP RIWP\Figure 2B - Soil Analytical Results.mxd Date: 5/18/2021 User: ibaker Time: 4:51:24 PM

Sample ID Sample Date	LMW-11_20210212 2/12/2021	DUP-1_20210212_GW 2/12/2021
VOCs (µg/L)	NE	NE
SVOCs (µg/L)	NE	NE
Pesticides (µg/L)	ND	ND
PCBs (µg/L)	ND	ND
Inorganics (µg/L)		
Iron	**6,790**	**40,400**
Lead	**49.7**	**472**
Manganese	**1,210**	**1,590**
Manganese (Dissolved)	**938**	**786**
Mercury	ND	**1**
Sodium	**282,000**	**277,000**
Sodium (Dissolved)	**273,000**	**271,000**
PFAS (ng/L)		
Perfluorooctanesulfonic Acid (PFOS)	**67.5**	NA
Perfluorooctanoic Acid (PFOA)	**45.4**	NA

Sample ID Sample Date	LMW-10_120718 12/7/2018		LMW-10_20210212 2/12/2021
VOCs (µg/L)	ND		NE
SVOCs (µg/L)	NE		NE
Pesticides (µg/L)	ND		ND
PCBs (µg/L)	ND		ND
Inorganics (µg/L)			
Iron	**1,630**		**2,500**
Manganese	**808**		**1,710**
Manganese (Dissolved)	**684**		**1,660**
Sodium	NA		**988,000**
Sodium (Dissolved)	**1,480,000**	**D**	**1,000,000**
PFAS (ng/L)	NA		NA

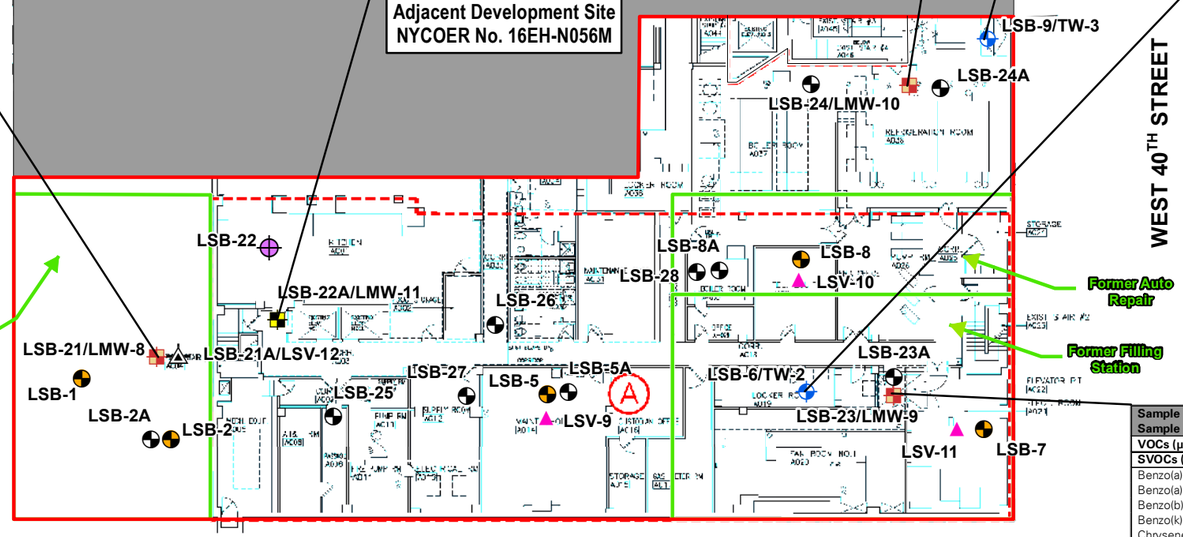
Sample ID Sample Date	TW-3_112117 11/21/2017
VOCs (µg/L)	NE
SVOCs (µg/L)	NA
Pesticides (µg/L)	NA
PCBs (µg/L)	NA
Inorganics (µg/L)	NA
PFAS (ng/L)	NA

Sample ID Sample Date	TW-2_112117 11/21/2017		DUP-2_112117 11/21/2017	
VOCs (µg/L)	NE		NE	
SVOCs (µg/L)				
Benzo(a)anthracene	**0.115**		**0.0615**	
Benzo(a)pyrene	**0.0615**		ND	
Benzo(b)fluoranthene	**0.0385**		ND	
Benzo(k)fluoranthene	**0.0385**		ND	
Chrysene	**0.108**		**0.0538**	
Pesticides (µg/L)	NA		NA	
PCBs (µg/L)	NA		NA	
Inorganics (µg/L)				
Barium	**1,930**	**D**	**1,700**	**D**
Beryllium	**4.81**		**4.54**	
Iron	**93,100**	**D**	**80,100**	**D**
Lead	**92.8**	**D**	**78.9**	**D**
Manganese	**7,470**	**D**	**6,490**	**D**
Selenium	**28.7**		**23.1**	
Sodium	**779,000**	**BD**	**718,000**	**BD**
PFAS (ng/L)	NA		NA	

Sample ID Sample Date	LMW-8_120718 12/7/2018
VOCs (µg/L)	NE
SVOCs (µg/L)	
Benzo(a)anthracene	**0.0556**
Pesticides (µg/L)	ND
PCBs (µg/L)	ND
Inorganics (µg/L)	
Iron	**2,440**
Lead	**151**
Manganese	**726**
Manganese (Dissolved)	**745**
Sodium	**299,000**
Sodium (Dissolved)	**312,000**
PFAS (ng/L)	NA

Analyte	CAS Number	NYSDEG SGVs
VOCs (µg/L)		No Exeedances
SVOCs (µg/L)		
Benzo(a)anthracene	56-55-3	0.002
Benzo(a)pyrene	50-32-8	ND
Benzo(b)fluoranthene	205-99-2	0.002
Benzo(k)fluoranthene	207-08-9	0.002
Chrysene	218-01-9	0.002
Indeno(1,2,3-cd)pyrene	193-39-5	0.002
Pesticides (µg/L)		Not Detected
PCBs (µg/L)		Not Detected
Inorganics (µg/L)		
Barium	7440-39-3	1,000
Beryllium	7440-41-7	3
Chromium, Total	7440-47-3	50
Iron	7439-89-6	300
Lead	7439-92-1	25
Manganese	7439-96-5	300
Mercury	7439-97-6	0.7
Selenium	7782-49-2	10
Sodium	7440-23-5	20,000
Analyte	**CAS Number**	**NYSDEC January 2021 Guidance Values**
PFAS (ng/L)		
Perfluorooctanesulfonic Acid (PFOS)	1763-23-1	10
Perfluorooctanoic Acid (PFOA)	335-67-1	10

Sample ID Sample Date	LMW-9_120718 12/7/2018		DUP-7_120718 12/7/2018		LMW-9_20210212 2/12/2021
VOCs (µg/L)	ND		ND		NE
SVOCs (µg/L)					
Benzo(a)anthracene	**0.0947**		**0.227**		ND
Benzo(a)pyrene	**0.0842**		**0.238**		ND
Benzo(b)fluoranthene	**0.0842**		**0.162**		ND
Benzo(k)fluoranthene	**0.0737**		**0.205**		ND
Chrysene	**0.0947**		**0.27**		ND
Indeno(1,2,3-cd)pyrene	**0.0526**		**0.141**		ND
Pesticides (µg/L)	ND		ND		ND
PCBs (µg/L)	ND		ND		ND
Inorganics (µg/L)					
Chromium, Total	**56.2**		**72.9**		ND
Iron	**51,000**		**64,400**		**1,280**
Lead	**313**		**335**		ND
Manganese	**1,050**		**1,190**		**455**
Manganese (Dissolved)	191		232		**441**
Selenium	**60**		**71.4**		ND
Selenium (Dissolved)	**10.2**		8.21		ND
Sodium	**1,320,000**		**1,310,000**		**717,000**
Sodium (Dissolved)	**1,380,000**		**1,370,000**		**678,000**
PFAS (ng/L)	NA		NA		NA



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Notes:
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2. Detected analytical results above NYSDEC SGVs are bolded and shaded.
3. Sample DUP-7_120718 is a duplicate sample of LMW-9_20210212; sample DUP-2_112117 is a duplicate sample of TW-2_112117; and sample DUP-1_20210212_GW is a duplicate sample of LMW-11_20210212.
4. µg/l = micrograms per liter
5. ng/l = nanograms per liter
6. NE = No exceedances
7. NA = Not analyzed
8. ND = Not detected

Qualifiers:
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B = The analyte was found in the associated analysis batch blank.

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30 0 30
SCALE IN FEET

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NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
550 10TH AVENUE REDEVELOPMENT
BLOCK No. 1050,
LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
GROUNDWATER ANALYTICAL RESULTS

Project No. 100674402	Figure 3
Date 3/30/2021	
Scale 1"=30'	
Drawn By ATR	
Last Revised 5/17/2021	

Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\MXD\Environmental_Figures\2021-05 BCP RIWP\Figure 3 - Groundwater Analytical Results.mxd

Sample ID	003 LSV-10	
Sample Date	5/8/2019	
Sample Type	SV	
VOCs (µg/m³)		
1,2,4-Trimethylbenzene	72	D
1,3,5-Trimethylbenzene (Mesitylene)	26	D
2-Hexanone	19	D
4-Bromofluorobenzene	9.3	BD
4-Ethyltoluene	32	D
Acetone	1,500	D
Benzene	ND	
Bromodichloromethane	ND	
Carbon Disulfide	53	D
Carbon Tetrachloride	ND	
Chloroform	13	D
Chloromethane	ND	
Cyclohexane	6.2	D
Dichlorodifluoromethane	ND	
Ethyl Acetate	ND	
Ethylbenzene	ND	
Isopropanol	66	D
M,P-Xylene	ND	
Methyl Ethyl Ketone (2-Butanone)	45	D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	29	D
Methylene Chloride	11	D
n-Heptane	ND	
n-Hexane	740	D
o-Xylene (1,2-Dimethylbenzene)	ND	
Tetrachloroethene (PCE)	4.1	D
Tetrahydrofuran	ND	
Toluene	11	D
Trichloroethene (TCE)	ND	
Trichlorofluoromethane	ND	
Total BTEX	11	
Total CVOCs	4.1	
Total VOCs	2,640	

Sample ID	004 LSV-11	
Sample Date	5/8/2019	
Sample Type	SV	
VOCs (µg/m³)		
1,2,4-Trimethylbenzene	2.1	D
1,3,5-Trimethylbenzene (Mesitylene)	ND	
2-Hexanone	ND	
4-Bromofluorobenzene	9.1	BD
4-Ethyltoluene	1.6	D
Acetone	560	D
Benzene	ND	
Bromodichloromethane	ND	
Carbon Disulfide	2.1	D
Carbon Tetrachloride	0.81	D
Chloroform	ND	
Chloromethane	1.7	D
Cyclohexane	3.3	D
Dichlorodifluoromethane	2.7	D
Ethyl Acetate	ND	
Ethylbenzene	ND	
Isopropanol	21	D
M,P-Xylene	3.2	D
Methyl Ethyl Ketone (2-Butanone)	3.7	D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	ND	
Methylene Chloride	8.3	D
n-Heptane	ND	
n-Hexane	350	D
o-Xylene (1,2-Dimethylbenzene)	ND	
Tetrachloroethene (PCE)	1.8	D
Tetrahydrofuran	1.9	D
Toluene	3.7	D
Trichloroethene (TCE)	1.2	D
Trichlorofluoromethane	3.5	D
Total BTEX	6.9	
Total CVOCs	3	
Total VOCs	982	

Sample ID	LSV-12_20210212		DUP-1_20210212	
Sample Date	2/12/2021		2/12/2021	
Sample Type	SV		SV	
VOCs (µg/m³)				
1,2,4-Trimethylbenzene	ND		ND	
1,3,5-Trimethylbenzene (Mesitylene)	ND		ND	
2-Hexanone	ND		ND	
4-Ethyltoluene	ND		ND	
Acetone	3.49	D	9.34	D
Benzene	0.92	D	80.4	D
Bromodichloromethane	ND		ND	
Carbon Disulfide	ND		ND	
Carbon Tetrachloride	0.286	D	ND	
Chloroform	ND		6.35	D
Chloromethane	1.06	D	ND	
Cyclohexane	ND		12.2	D
Dichlorodifluoromethane	2.1	D	1.69	D
Ethyl Acetate	ND		8.38	D
Ethylbenzene	ND		ND	
Isopropanol	2.68	D	11.3	D
M,P-Xylene	ND		ND	
Methyl Ethyl Ketone (2-Butanone)	0.491	D	1.21	D
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	ND		ND	
Methylene Chloride	2.26	D	10.1	D
n-Heptane	ND		25.5	D
n-Hexane	2.24	D	212	D
o-Xylene (1,2-Dimethylbenzene)	ND		ND	
Tetrachloroethene (PCE)	ND		ND	
Tetrahydrofuran	ND		ND	
Toluene	0.913	D	41.1	D
Trichloroethene (TCE)	ND		ND	
Trichlorofluoromethane	1.02	D	ND	
Total BTEX	1.83		122	
Total CVOCs	ND		ND	
Total VOCs	17.5		420	

Sample ID	002 LSV-9		005 DUP-1	
Sample Date	5/9/2019		5/9/2019	
Sample Type	SV		SV	
VOCs (µg/m³)				
1,2,4-Trimethylbenzene	4.2	D	1.9	D
1,3,5-Trimethylbenzene (Mesitylene)	1.1	D	ND	
2-Hexanone	ND		ND	
4-Bromofluorobenzene	9.3	BD	8.8	BD
4-Ethyltoluene	2.5	D	1.3	D
Acetone	18	D	4.2	D
Benzene	ND		ND	
Bromodichloromethane	2.3	D	3.3	D
Carbon Disulfide	7.6	D	12	D
Carbon Tetrachloride	0.64	D	0.57	D
Chloroform	44	D	52	D
Chloromethane	0.51	D	ND	
Cyclohexane	ND		ND	
Dichlorodifluoromethane	2.4	D	2.3	D
Ethyl Acetate	ND		ND	
Ethylbenzene	1.4	D	0.72	D
Isopropanol	3.8	D	ND	
M,P-Xylene	5.9	D	3.1	D
Methyl Ethyl Ketone (2-Butanone)	1.6	D	ND	
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	ND		ND	
Methylene Chloride	4.4	D	ND	
n-Heptane	0.77	D	ND	
n-Hexane	3.8	D	2	D
o-Xylene (1,2-Dimethylbenzene)	2.1	D	1.1	D
Tetrachloroethene (PCE)	6.2	D	6.1	D
Tetrahydrofuran	ND		ND	
Toluene	2.9	D	1.7	D
Trichloroethene (TCE)	0.31	D	0.57	D
Trichlorofluoromethane	1.7	D	1.5	D
Total BTEX	12.3		6.62	
Total CVOCs	6.51		6.67	
Total VOCs	127		103	

Analyte	CAS Number	NYSDOH Decision Matrices Minimum Concentrations
VOCs (µg/m³)		
1,2,4-Trimethylbenzene	95-63-6	~
1,3,5-Trimethylbenzene (Mesitylene)	108-67-8	~
2-Hexanone	591-78-6	~
4-Bromofluorobenzene	460-00-4	~
4-Ethyltoluene	622-96-8	~
Acetone	67-64-1	~
Benzene	71-43-2	~
Bromodichloromethane	75-27-4	~
Carbon Disulfide	75-15-0	~
Carbon Tetrachloride	56-23-5	6
Chloroform	67-66-3	~
Chloromethane	74-87-3	~
Cyclohexane	110-82-7	~
Dichlorodifluoromethane	75-71-8	~
Ethyl Acetate	141-78-6	~
Ethylbenzene	100-41-4	~
Isopropanol	67-63-0	~
M,P-Xylene	179601-23-1	~
Methyl Ethyl Ketone (2-Butanone)	78-93-3	~
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	108-10-1	~
Methylene Chloride	75-09-2	100
n-Heptane	142-82-5	~
n-Hexane	110-54-3	~
o-Xylene (1,2-Dimethylbenzene)	95-47-6	~
Tetrachloroethene (PCE)	127-18-4	100
Tetrahydrofuran	109-99-9	~
Toluene	108-88-3	~
Trichloroethene (TCE)	79-01-6	6
Trichlorofluoromethane	75-69-4	~
Total BTEX		~
Total CVOCs		~
Total VOCs		~

Notes:

1. Soil vapor sample analytical results are compared to the minimum soil vapor concentrations at which mitigation is recommended as set forth in the New York State Department of Health (NYSDOH) October 2006 Guidance for Evaluating Soil Vapor Intrusion in the State of New York Decision Matrices for Sub-Slab Vapor and Indoor Air and subsequent updates (2017).
2. Sample DUP-1_20210212 is a duplicate of parent sample LSV-12_20210212.
3. ~ = Regulatory limit for this analyte does not exist
4. µg/m³ = micrograms per cubic meter
5. SV = Soil Vapor
6. ND = Not detected

Qualifiers:

D = The concentration reported is a result of a diluted sample.
B = The analyte was found in the associated analysis batch blank.

Adjacent Development Site
NYCOER No. 16EH-N056M

WEST 41ST STREET

WEST 40TH STREET

TENTH AVENUE

LSB-9/TW-3
LSB-24A
LSB-24/LMW-10
LSB-8A
LSB-8
LSB-28
LSV-10
LSB-22
LSB-22A/LMW-11
LSB-26
LSB-21/LMW-8
LSB-21A/LSV-12
LSB-1
LSB-2A
LSB-2
LSB-27
LSB-5
LSB-5A
LSB-25
LSV-9
LSB-6/TW-2
LSB-23A
LSB-23/LMW-9
LSV-11
LSB-7
Former Auto Repair
Former Filling Station
Former Filling Station

0 20 40
SCALE IN FEET

Notes:
1. Property boundary digitized from basemap and measurements provided on the New York City Digital Tax Map maintained online by the Department of Finance
2. Building layout imagery provided in Covenant House Building Massing & Stacking, 8 May 2017, by F X Fowle, Denham, Wolf and CH Phase 2 plan, 14 July 2018, by Handel Architects, LLP.
3. Soil boring, monitoring well, and soil vapor sampling locations based on field measurements collected during November 2017, December 2018, May 2019, and February 2021 site investigations.
4. Historical filling station and automobile repair locations obtained from Sanborn Fire Insurance Maps provided in the Phase I Environmental Site Assessment prepared by TRC Engineers, Inc., dated September 2015.
5. Remediation of Tax Lot 1 (Phase 1) was completed in June 2020.

Legend

- Remedial Investigation Supplemental Soil Boring Location (2021)
- Remedial Investigation Supplemental Soil Boring/Permanent Monitoring Well Location (2021)
- Remedial Investigation Supplemental Soil Boring/Soil Vapor Location (2021)
- Langan Soil Vapor Location (2019)
- Langan Soil Boring Location (2018)
- Langan Soil Boring/Permanent Monitoring Well Location (2018)
- Langan Soil Boring Location (2017)
- Langan Soil Boring/Temporary Well Point Location (2017)
- Tax Lot 61 Proposed Redevelopment Extents (Phase 2)
- Tax Lot 1 Redevelopment Extents (Phase 1)
- Historical Use of Concern
- Existing Building Outline
- Tax Lot/Block Boundary

LANGAN
300 Kimball Drive, Parsippany, NJ 07054
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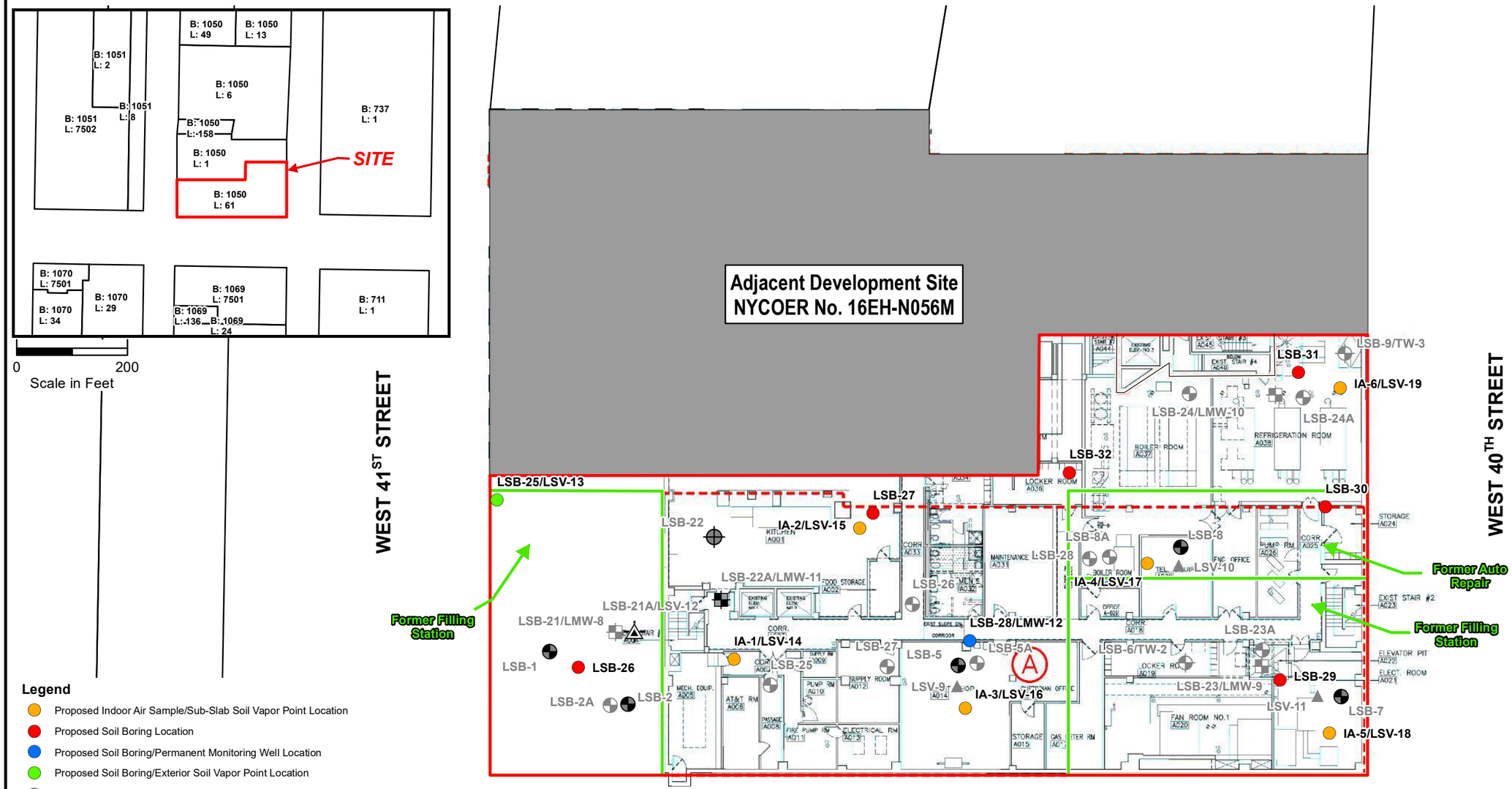
NEW JERSEY NEW YORK VIRGINIA CALIFORNIA PENNSYLVANIA CONNECTICUT FLORIDA
ABU DHABI ATHENS DOHA DUBAI ISTANBUL
Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

Project	550 10TH AVENUE REDEVELOPMENT BLOCK No. 1050, LOT No. 61 MANHATTAN NEW YORK COUNTY NEW YORK
Drawing Title	SOIL VAPOR ANALYTICAL RESULTS
Project No.	100674402
Date	5/17/2021
Scale	1 " = 20 '
Drawn By	IHB
Submission Date	5/17/2021
Figure	4

Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\MXD\Environmental_Figures\2021-05 BCP RIWP\Figure 4 - Soil Vapor Analytical Results.mxd Date: 5/17/2021 User: ibaker Time: 12:27:41 PM



Legend

- Proposed Indoor Air Sample/Sub-Slab Soil Vapor Point Location
- Proposed Soil Boring Location
- Proposed Soil Boring/Permanent Monitoring Well Location
- Proposed Soil Boring/Exterior Soil Vapor Point Location
- Remedial Investigation Supplemental Soil Boring Location (2021)
- Remedial Investigation Supplemental Soil Boring/Permanent Monitoring Well Location (2021)
- Remedial Investigation Supplemental Soil Boring/Soil Vapor Location (2021)
- Langan Soil Vapor Location (2019)
- Langan Soil Boring Location (2018)
- Langan Soil Boring/Permanent Monitoring Well Location (2018)
- Langan Soil Boring Location (2017)
- Langan Soil Boring/Temporary Well Point Location (2017)
- Tax Lot 61 Proposed Redevelopment Extents (Phase 2)
- Tax Lot 1 Redevelopment Extents (Phase 1)
- Historical Use of Concern
- Existing Building Outline

Notes:
1. Property boundary digitized from basemap and measurements provided on the New York City Digital Tax Map maintained online by the Department of Finance
2. Building layout imagery provided in Covenant House Building Massing & Stacking, 8 May 2017, by F X Fowle, Denham, Wolf and CH Phase 2 plan, 14 July 2018, by Handel Architects, LLP.
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Langan Engineering & Environmental Services, Inc.
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Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
550 10TH AVENUE REDEVELOPMENT
BLOCK No. 1050, LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
PROPOSED REMEDIAL INVESTIGATION LOCATIONS

Project No.	100674402
Date	5/17/2021
Scale	1"=25'
Drawn By	ATR
Last Revised	5/17/2021

Figure 5

Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\MXD\Environmental_Figures\2021-05 BCP RIWP\Figure 5 - Proposed Remedial Investigation Locations.mxd

APPENDIX A

Health and Safety Plan

HEALTH AND SAFETY PLAN

for

REMEDIAL INVESTIGATION

550 10th Avenue
New York, New York

Prepared For:

GO Covenant LLC
432 Park Avenue South, 2nd Floor
New York, New York 10016

Prepared By:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, New Jersey 07054

May 2021
100674402

ENVIRONMENTAL HEALTH AND SAFETY PLAN

Client:	**GO Covenant LLC**
Project:	**Remedial Investigation**
Location:	**550 Tenth Avenue, New York, NY**
Chemical Hazards:	**Volatile organic compounds (VOCs), Polycyclic aromatic hydrocarbons (PAHs), Metals, Pesticides, Perfluoroalkyl substances (PFAS)**
Prepared By:	**LANGAN ENGINEERING, ENVIRONMENTAL, SURVEYING, LANDSCAPE ARCHITECTURE AND GEOLOGY, D.P.C.**
Version:	**1**
Date:	**May 2021**

Client Contact:	**Bryan Kelly (212) 716-2502**
Langan Project Manager (PM):	**Amanda Forsburg (973) 560-4900**
Langan Health & Safety Manager (HSM):	**Tony Moffa, CHMM (215) 491-6545**
Langan Health and Safety Officer (HSO):	**Field Personnel**
WorkCare:	**1-888-449-7787**
Langan Incident/Injury Hotline:	**(973) 560-4699**

LANGAN ENGINEERING, ENVIRONMENTAL, SURVEYING, LANDSCAPE ARCHITECTURE AND GEOLOGY, D.P.C., (LANGAN), AND LANGAN SUBCONTRACTORS, DO NOT GUARANTEE THE HEALTH OR SAFETY OF ANY PERSON ENTERING THIS SITE. DUE TO THE NATURE OF THIS SITE AND THE ACTIVITY OCCURRING THEREON, IT IS NOT POSSIBLE TO DISCOVER, EVALUATE, AND PROVIDE PROTECTION FOR ALL POSSIBLE HAZARDS WHICH MAY BE ENCOUNTERED. STRICT ADHERENCE TO THE HEALTH AND SAFETY GUIDELINES SET FORTH HEREIN WILL REDUCE, BUT NOT ELIMINATE, THE POTENTIAL FOR INJURY AT THIS SITE. THE HEALTH AND SAFETY GUIDELINES IN THIS PLAN WERE PREPARED SPECIFICALLY FOR THIS SITE AND SHOULD NOT BE USED ON ANY OTHER SITE WITHOUT PRIOR RESEARCH AND EVALUATION BY A TRAINED HEALTH AND SAFETY SPECIALIST. THIS HASP HAS BEEN PREPARED FOR LANGAN EMPLOYEES ONLY. ALL OTHER PARTIES WORKING ON THE SITE THAT HAVE THE POTENTIAL TO BE EXPOSED TO HAZARDOUS MATERIALS MUST DEVELOP AND IMPLEMENT THEIR OWN HASP FOR USE BY THEIR EMPLOYEES.

APPROVALS

By signature, the personnel identified below hereby acknowledge that they have reviewed this Health and Safely Plan (HASP) and agree to comply with the requirements contained therein as well as the applicable provisions of 29 CFR Parts 1910 and 1926. Furthermore, in reviewing and accepting this HASP, as currently written, the undersigned agree that to the best of their knowledge, this HASP adequately identifies the activities and hazards associated with work at this site and describes the appropriate and necessary precautions and protections for site workers required by the applicable OSHA statutes and regulations.

Amanda M. Forsburg	5/25/21
LANGAN Project Manager - PM (Amanda Forsburg)	Date
LANGAN Health and Safety Manager (Tony Moffa, CHMM)	Date
LANGAN Health and Safety Officer – HSO	Date

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LANGAN

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TABLE OF CONTENTS
(Continued)

TABLES

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

1.1 Purpose and Policy

This Health and Safety Plan (HASP) has been developed to comply with the regulations under Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120(b)(4), Hazardous Waste Operations and Emergency Response. It addresses foreseeable activities associated with the site work activities to be conducted at 550 Tenth Avenue (see Figure 1). This HASP establishes personnel protection standards and mandatory safety practices and procedures. Additionally, it assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise while operations are being conducted at known or suspected hazardous waste sites.

Langan personnel involved with inspection of site work activities which involve the displacement of soil and/or material during the proposed soil, groundwater, indoor air, and soil vapor investigation activities in the identified Area of Concern (AOC) during the proposed investigation shall comply with the requirements of this HASP. All Langan personnel engaged in onsite activities will read this document carefully and complete the Safety Briefing Form (Attachment A), a copy of which will be provided to Langan's Project files. Contractors and subcontractors conducting investigation activities which will disturb or displace soil in the identified AOC are required to develop and follow their own HASP based on the identified hazards. All sampling data and environmental reports pertaining to the site that are available to Langan will be provided upon request to the Langan PM. Contractors and subcontractors are responsible for their own workers Health and Safety and providing a safe working environment in accordance with all applicable federal, state and local requirements. Each Subcontractor will have a designated Site Health and Safety Manager who will be responsible for ensuring that the designated procedures are implemented in the field. Personnel who have any questions or concerns regarding implementation of this plan are encouraged to request clarification from the Langan PM. Langan field personnel must follow the designated health and safety procedures, be alert to the hazards associated with working close to vehicles and equipment, and use common sense and exercise reasonable caution at all times.

This HASP covers investigation-related field activities which have the potential to disturb and/or displace potentially contaminated soil, soil vapor, and groundwater. These activities include, but are not limited to: the completion of soil borings and collection of soil samples, the installation of monitoring wells and the collection of groundwater samples, the installation of soil vapor sampling points, and the collection of indoor air and soil vapor samples.

This HASP was prepared in accordance with the following documents and/or guidelines:

- Occupational Safety and Health Administration (OSHA) regulations for hazardous site workers (29 CFR 1910.120 and 29 CFR 1926); and,
- NIOSH/OSHA/USCG/USEPA *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.*

Langan's Health and Safety Program and Safe Operating Procedures support this site-specific HASP.

The level of protection and the procedures specified in this HASP represent the minimum health and safety requirements to be observed by Langan site personnel engaged in the referenced investigation and inspection of investigation activities. Unknown conditions may exist, and known conditions may change. Should an employee find himself or herself in a potentially hazardous situation, the employee will immediately discontinue the hazardous procedure(s) and either personally effect appropriate preventative or corrective measures, or immediately notify the Health and Safety Officer or the Langan PM of the nature of the hazard. In the event of an immediately dangerous or life threatening situation, the employee always has "stop work" authority. Any necessary revision to the Health and Safety procedures will be recorded in the Field Procedure Change Authorization Form (Attachment B), and will require authorization from the Langan Health and Safety Manager and Langan PM.

The provisions of this HASP address worker health and safety within defined contaminant zones and assume that work will be completed within occupied cellars and a parking lot. Additional provisions including air sampling and modifications to drilling techniques to further limit potential exposure to sensitive populations will be required if work is to be conducted within occupied building areas or in occupied areas that may be impacted by the proposed work. Additional

provisions including the use of traffic control measures will be employed in order to avoid possible hazards associated with vehicular traffic and pedestrians

THE ULTIMATE RESPONSIBILITY FOR THE HEALTH AND SAFETY OF THE INDIVIDUAL EMPLOYEE RESTS WITH THE EMPLOYEE AND HIS OR HER COLLEAGUES. Each employee is responsible for exercising the utmost care and good judgment in protecting his or her own health and safety and that of fellow employees. Should any employee observe a potentially unsafe condition or situation, it is the responsibility of that employee to immediately bring the observed condition to the attention of the appropriate health and safety personnel as designated above and to follow-up the verbal notification by completing the Unsafe Conditions and Practices Form provided in Attachment C, a copy of which will be provided to the Langan Health and Safety Officer.

"Extenuating" circumstances such as budget or time constraints, equipment breakdown, changing or unexpected conditions, never justify unsafe work practices or procedures. In fact, the opposite is true. Under stressful circumstances all project personnel must be mindful of the potential to consciously or unconsciously compromise health and safety standards, and be especially safety conscious. **ALL SITE PERSONNEL ARE EXPECTED TO CONSIDER "SAFETY FIRST" AT ALL TIMES.**

1.2 Site Description

The Site is located in the Clinton neighborhood of Manhattan, New York and is identified as Lot 61. The Site historically consisted of portions of former Lot 1 and Lot 61 until the tax lots were reapportioned in June 2020 to match the current proposed redevelopment extents. A Site Location Plan is provided as Figure 1. The Site is an approximately 16,000-square foot parcel and is bordered by 10th Avenue to the west, West 41st Street to the north, West 40th Street to the south, and the active redevelopment of former Covenant House New York Wings B and C to the east. New York City Transit (NYCT) tunnels are located to the north of the site, below West 41st Street. In addition, Lincoln Tunnel entrance roads and access ramps for the nearby Port Authority Bus Terminal are located to the south of the site, beyond West 40th Street. The Site consists of Wing A of the Covenant House New York shelter for homeless youth, a parking lot, and construction field offices associated with the redevelopment of the former Wings B and C of the Covenant House New York facility (NYCOER OER Site

No. 16TMP0060M, 16EH-N056M) located adjacent to the east of the Site; remediation of the adjacent parcel was completed in June 2020 and construction of the superstructure is ongoing.

1.3 Scope of Work

The site work activities which will require the oversight by a Langan Engineer include the following scope and will include the completion of:

- Task 1: Completion of a geophysical survey;
- Task 2: Completion of soil borings and collection of soil samples;
- Task 3: Installation of groundwater monitoring wells;
- Task 4: Collection of groundwater samples;
- Task 5: Installation of soil vapor and sub-slab soil vapor sampling points; and,
- Task 6: Collection of indoor air, soil vapor, and sub-slab soil vapor samples.

2.0 PROJECT TEAM ORGANIZATION AND RESPONSIBILITIES

This section specifies the Langan Project Organization.

2.1 Langan Project Manager

The Langan Project Manager (PM) is Amanda Forsburg. The PM responsibilities include:

- Prepares and organizes the background review of site conditions, the site HASP, and the field team;
- Obtains permission for site access and coordinates activities with appropriate officials;
- Briefs the field team on their specific assignments;
- Coordinates with the Health and Safety Officer (HSO) to ensure that health and safety requirements are met;
- Serves as the liaison with public officials;
- Ensuring that this HASP is developed and approved prior to on-site activities;

- Ensuring that all the tasks in the project are performed in a manner consistent with Langan's comprehensive Health and Safety Program for Hazardous Waste Operations and this HASP.

2.2 Health and Safety Manager (HSM)

The Langan Corporate Health and Safety Manager (HSM) is Tony Moffa. His responsibilities include:

- Serving as a resource in the development and implementation of HASPs;
- Assist in reviewing results of Jobsite Safety Inspections;
- Assisting site Health and Safety Officer (HSO) with development of the HASP, updating HASP as dictated by changing conditions, jobsite inspection results, etc.;
- Maintaining all records on personnel (medical evaluation results, training and certifications, accident investigation results, etc.).

2.3 Langan Health and Safety Officer (HSO)

The Langan Health and Safety Officer (HSO) is to be identified prior to the start of field work. The HSO responsibilities include:

- Participating in the development and implementation of this HASP;
- Conducting Jobsite Safety Inspections (Attachment G) and correcting any shortcomings in a timely manner;
- Helping to select proper Personal Protective Equipment (PPE) and periodically inspecting it;
- Ensuring that PPE is properly stored and maintained;
- Controlling entry into and exit from the contaminated areas or zones of the site;
- Confirming each team member's suitability for work based on a current physician's recommendation;
- Monitoring the work parties for signs of stress, such as heat stress, fatigue, and cold exposure;
- Monitoring site hazards and conditions;

- Knowing (and ensuring that all site personnel also know) emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department;
- Resolves conflicting situations which may arise concerning safety requirements and working conditions.
- Conducting daily tailgate meetings to review applicable Hazard Analyses (Table 3) as well as check-in with site personnel.

3.0 HAZARDS ANALYSIS

This section presents an assessment of the general, chemical, physical, and biological hazards that may be encountered during the tasks specified under this HASP (Section 1.3). A detail on types of potential contaminants of concerns Langan anticipates to encounter at different locations during the intrusive investigation is listed in Tables 1 and 2 of this HASP.

3.1 General Hazard Assessment

A general hazard assessment was conducted for the required field work described in Section 1.3 and the following potential hazards have been identified:

- Inhalation of volatile organic compounds (VOCs) with high volatilization potential;
- Inhalation of polycyclic aromatic hydrocarbons (PAHs) with low volatilization potential;
- Skin and eye contact with contaminants;
- Ingestion of contaminants;
- Inhalation of dusts impacted with polycyclic aromatic hydrocarbons and/or metals;
- Physical hazards associated with the use of heavy equipment;
- Excavation hazards;
- Tripping hazards;
- Noise exposure;
- Heat stress (depending on weather conditions);
- Cold exposure (depending on weather conditions);
- Flammable hazards;
- Electrical hazards; and,
- Use of personal protective equipment.

These hazards are further described in the task-by-task hazard analysis in Table 3. Specific chemical, physical and biological hazards are discussed below.

Mitigation and controls will include as needed work procedures, work/rest regiment, dust control measures, personal protective equipment, and respiratory protection as appropriate.

3.2 Chemical Exposure Hazards

The following chemical hazard evaluation for the proposed investigation activities is based on the previous environmental investigation of the site and typical compounds commonly associated with historic urban fill, gasoline filling station and automobile repair operations, and underground storage tanks (USTs). The evaluation has been conducted to identify chemicals/materials that potentially may be present at the site, and to ensure that work activities, personnel protection, and emergency response are consistent with the specific contaminants that potentially could be encountered.

3.2.1 Specific Chemical Hazards Previously Detected at the Site

Potential contaminants that may be encountered while conducting site investigation activities include VOCs, SVOCs, pesticides, and metals commonly associated with historic urban fill. Perfluoroalkyl substances (PFAS) have also been detected in soil on site. Table 1 lists Contaminants of Concern and potentially affected media. Exposure limits for potential contaminants that might be encountered in the field are listed in Table 2.

3.2.2 Chemical Hazard Exposure Routes

Potential hazards and their exposure routes include:

- Inhalation of organic vapors due to the presence of volatile organic compounds in soil and from diesel-powered equipment and minimal volatilization potential related to the presence of PAHs in soil.
- Inhalation of dust impacted with PAHs or metals associated with soil borings and/or soil sampling activity.
- Inadvertent ingestion of potentially toxic substances via hand to mouth contact or deliberate ingestion of materials inadvertently contaminated with potentially toxic materials.

- Dermal exposure and possible percutaneous (skin) absorption of certain lipophilic (readily absorbed through the skin) PAHs.
- Skin and eye contact with contaminants at the site and decontamination activities.

Exposure limits and health effects of selected chemicals are in Table 2. The probability of exposure for each task is outlined in Table 3.

3.2.3 Control of Exposure to Chemical Hazards

To protect potentially exposed personnel the following procedures and protocols will be adopted and used as needed: work procedures will be adhered to, work zones will be established, dust control will be utilized, respirators (if required) and personal protective equipment will be worn, Dust monitoring will be conducted during times of disturbance of the impacted soil to assess the potential inhalation pathway of exposure and strict personnel decontamination procedures will be followed.

3.3 Physical Hazards

3.3.1 Temperature Extremes

Hot Temperatures

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE, in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke. If onsite workers exhibit the signs of heat exhaustion or heat stroke, they should seek immediate medical attention.

Cold Temperatures

Workers may be exposed to the hazard of working in a cold environment. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia, as well as slippery surfaces, brittle equipment, poor judgment, and unauthorized procedural changes. In order to prevent frostbite, hypothermia, trench foot and immersion foot, the workers are responsible for dressing warmly in layers with thick socks, gloves, and appropriate head and face gear. Upon the onset of discomfort due to the cold, onsite workers should take regular five to ten minute breaks to warm up inside nearby buildings and to drink warm fluids. Please

note that the NYCDEP statute prohibits idling an engine for more than three minutes (one-minute if adjacent to a school). This statue includes the use of a vehicle for the purpose of warming up employees. As such, all contractors and employees shall identify a place to warm up in advance. If discomfort continues and the onsite workers start to exhibit the signs of frostbite, hypothermia, trench foot or immersion foot, they should seek immediate medical attention.

3.3.2 Noise and Air Resources

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps and generators. Hearing protection is required and shall be used in designated areas of the site as indicated by the posted signs.

3.3.3 Hand and Power Tools

In order to complete the various tasks for the project, personnel will utilize hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Hand and power tools will be inspected prior to use. Proper personal protective equipment shall be worn while utilizing hand and power tools. Ground Fault Circuit Interrupters (GFCIs) are required for all portable electric tools.

3.3.4 Slips, Trips, and Falls

Working in and around the site will pose slip, trip and fall hazards due to equipment, piping, slippery surfaces that may be oil covered, or from surfaces that are wet from rain or ice. Potential adverse health effects include falling to the ground and becoming injured or twisting an ankle. Good housekeeping at the site must be maintained at all times.

3.3.5 Fire and Explosion

Prior to starting all excavation work, a review of appropriate New York City maps will be conducted to identify potential hazards. The possibility of encountering fire and explosion hazards exists from under- ground utilities and gases. Therefore, all excavation equipment must be grounded.

3.3.6 Material Handling

Manual lifting of heavy objects may be required. Failure to follow proper lifting techniques can result in back injuries and strains. Back injuries are a serious concern as they are the most common workplace injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

Whenever possible, heavy objects must be lifted and moved by mechanical devices rather than by manual effort. The mechanical devices will be appropriate for the lifting or moving task and will be operated only by trained and authorized personnel. Objects that require special handling or rigging will only be moved under the guidance of a person who has been specifically trained to move such objects, such as a Master Rigger or equivalent. Lifting devices, including equipment, slings, ropes, chains, and straps, will be inspected, certified, and labeled to confirm their weight capacities. Defective equipment will be taken out of service immediately and repaired or destroyed.

The lift and swing path of a crane/equipment will be watched and maintained clear of obstructions. Personnel will not pass under a raised load, nor will a suspended load be left unattended. Personnel will not be carried on lifting equipment, unless it is specifically designed to carry passengers.

All reciprocating, rotating, or other moving parts will be guarded at all times. Accessible fire extinguishers will be made available in all mechanical lifting devices. All material must be stored in tiers, racked, blocked, or otherwise secure to prevent sliding, falling, or collapse. All loads/material will be verified to be secure before transportation.

3.3.7 Confined Space/Excavation Hazards

Personnel entry into confined spaces, trenches, or unshored (e.g., lagging) excavations is not anticipated and will not be permitted. No other confined spaces are known to exist on Site. If entry into trenches or excavations is required, all work will stop until the HASP has been revised to address the new hazards.

3.3.8 Working Near Equipment

Personnel working in the immediate vicinity of heavy equipment (*e.g.*, excavators, loaders, etc.) may encounter physical hazards resulting from contact with equipment. Field personnel should be aware of the presence of these hazards at all times and take appropriate action to avoid them. Due to the limited ability to communicate when wearing respiratory protection, the risk is increased. Workers must be careful to communicate with heavy equipment operators regarding their location, and should maintain a safe distance from operating equipment at all times. Prior to working around equipment, the site personnel will review appropriate hand signals with the operator.

Equipment will be equipped with back up alarms.

3.3.9 Drill Rig Operations

In order to complete soil borings, a portable electric drill unit and track mounted drill rig will be used. Working with and near this equipment and associated power generators pose many potential hazards, including being struck by or against, or pinched/caught by moving parts. These hazards can result in serious physical harm. Other hazards include electrocution and explosion due to encountering overhead or underground utilities.

Drill rigs for hollow stem auger drilling and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and other field personnel must be aware of the location of this device. This device must be tested prior to job initiation and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency switch. Only equipment that has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be allowed.

The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of rotating equipment. A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or

near the rotating equipment. Drillers, helpers, and other field personnel must secure all loose clothing when in the vicinity of drilling operations. No person shall climb the drill mast while tools are rotating or without the use of ANSI-approved fall protection (approved belts, lanyards and a fall protection slide rail) or portable ladder that meets the requirement of the OSHA standard.

3.3.10 Electrical Safety

The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Ground Fault Circuit Interrupters (GFCIs) are required for all portable electric tools.

3.3.11 Utilities

Prior to the start of any intrusive work, the location of above-ground and underground utilities and other structures will be completed by the contractor/subcontractor responsible for completing investigation activities.

3.3.12 Vehicular Traffic

Portions of site activities (load in and load out) will be conducted in the street and drilling and sampling activities will occur in a parking lot. As such, vehicular and pedestrian traffic will be present. Appropriate precautions to protect the on-site workers and civilians should be used including the use of cones and traffic vests as appropriate.

3.4 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals and insects. As the potential for exposure to blood borne pathogens during site investigation is anticipated to be low, a Blood Borne Pathogen Exposure Plan (BBPEP) is not required. A BBPEP will be prepared if site operation requires its implementation.

3.4.1 Animals

During site operations, animals such as dogs, cats, pigeons, mice, and rats may be encountered. Workers shall use discretion and avoid all contact with animals. Bites and scratches from dogs and cats can be painful and if the animal is rabid, the potential for contracting rabies exists. Contact with rat and mice droppings may lead to contracting hantavirus. Inhalation of dried pigeon droppings may lead to psittacosis. Cryptococcosis and histoplasmosis are also diseases associated with exposure to dried bird droppings but these are less likely to occur in this occupational setting.

3.4.2 Insects

Insects, including bees, wasps, hornets, mosquitoes, spiders, and ticks may be present at the site. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life threatening condition. In addition, mosquito bites may lead to St. Louis encephalitis or West Nile encephalitis.

3.4.3 Wound Care

A source of occupational exposure may occur when an employee gives First Aid and or CPR to an individual who had infectious blood. The occupational exposure occurs when there is the possibility for an employee's eyes, mucous membranes, non-intact skin (i.e., cut and abraded skin) to come into contact with potentially infectious materials from another employee. If an accident were to occur where First Aid would need to be administered, the person administering the First Aid will presume that any wounds and materials used are contaminated with BBP and should wear the appropriate PPE to prevent contact with these materials. Additionally, should the use of First Aid materials and or clothing that was potentially contaminated with BBP be encountered these materials should be property containerized and transported to the nearest hospital for proper disposal.

3.5 Coronavirus

General Preventative Measures

Field personnel must follow general proper hygiene measures while in the field including:

- Avoid touching eyes, nose and mouth.
- Cover cough or sneeze with tissue, and throw in trash.
- Wash hands often with soap and water for 20 seconds after going to bathroom, before eating, after blowing nose, coughing or sneezing.
- Use hand sanitizer with at least 60% alcohol if soap and water are not available.
- Avoid physical contact with other people (e.g., no handshakes).
- Maintain a safe distance of at least 6 feet from other people (social distancing).
- Wear face coverings when around other worker to minimize spread of COVID-19. (May be required in certain states or locations.)

Construction Trailers

Employees should avoid use of shared construction trailers or where employees cannot maintain a safe distance (minimum 6 feet) from other workers. If trailer use is needed, areas such as desks, phones, chairs and other common areas, should be cleaned and disinfected before and after use. Protocols should be developed to minimize trailer use to essential personal, restrict use from any workers who are ill or showing symptoms of being ill, use if face coverings and ensure a safe distance of 6 feet can be established between workers.

Communication

Include Coronavirus topics and prevention topics in daily tailgate meetings to ensure Coronavirus awareness is communicated daily. Discussions can focus on general topics including: social distancing, prevention measures for field personnel, signs and symptoms and recent news on the Coronavirus. Site-specific topics should include minimizing face-to-face contact, disinfecting/sterilizing field equipment, use of PPE to reduce exposure, site security, use of face coverings and other potential exposure issues/concerns.

Sick/Ill Workers

No Langan employee is permitted to be onsite when ill and/or showing potential symptoms of the Coronavirus. Symptoms of the Coronavirus may appear 2-14 days after exposure and can range from mild to severe. The most common symptoms include: fever, fatigue, dry cough, shortness of breath chills, repeated shaking with chills, muscle pain, headache, sore throat, or new loss of taste or smell. If an employee or subcontractor is observed being ill or exhibiting symptoms of Coronavirus, employees must immediately utilize their Stop Work Authority and contact their project manager to address the situation. If an employee observes another worker onsite exhibiting symptoms of Coronavirus, immediately utilize Stop Work Authority and notify their project manager and site construction manager or safety officer. Work should resume when the safety and health of Langan and subcontractors is adequately addressed.

3.6 Task Hazard Analysis

The tasks to be completed during the proposed site work activities, as summarized in Section 1.3, are listed in Table 3 with a Hazard Analysis for each task.

3.6.1 Drilling: Soil Boring Installation, Permanent Monitoring Well Installation, and Temporary Soil Vapor Point Installation

Special attention shall be given to establishing the location of any underground utilities prior to boring or drilling. Prior to beginning the site investigation work, the N.Y. One Call Center will be contacted by the boring/drilling contractor for utility mark-outs. Additionally, a private utility clearance subcontractor has been retained to complete a geophysical survey in the vicinity of each boring location to identify the potential presence of underground utility lines and to evaluate for the presence of USTs and any other subsurface anomalies. Pressure safety valves and hose whip prevention devices will be installed and operational on any air compressors, hoses, and their tools to be used on site. Additionally, all appropriate and current FDNY Certificates of Fitness (C of F) cards must be on site for those workers using equipment where C of Fs are required.

Chemical exposure may also occur as soil boring cuttings are handled, and soil and groundwater samples are collected. Activities will be conducted in Level D, but personnel should be prepared to upgrade to Level C, as appropriate, based on field screening criteria.

If evidence of historic contamination is encountered during test borings other than what is part of the intended investigation, work will be stopped and emergency contacts listed in Attachment E of this HASP will be immediately notified.

3.6.2 Soil and Groundwater Sample Collection

Chemical exposure may occur as soil and groundwater samples are collected. Activities will be conducted in Level D, but personnel should be prepared to upgrade to Level C, as appropriate, based on field screening criteria.

If evidence of historic contamination is encountered during test borings other than what is part of the intended investigation, work will be stopped and emergency contacts listed in Attachment D of this HASP will be immediately notified.

3.6.3 Temporary Sub-Slab Soil Vapor Sampling Point Installation

Temporary sub-slab soil vapor sampling points will be installed for the collection of sub-slab soil vapor samples. The temporary sub-slab soil vapor sampling points will be installed using a portable hammer drill and will consist of Teflon-lined tubing which will extend approximately 6-inches beneath the bottom of the basement concrete floor slab.

Chemical exposure may also occur as sub-slab soil vapor sampling points are installed. Activities will be conducted in Level D, but personnel should be prepared to upgrade to Level C, as appropriate, based on field screening criteria.

If evidence of historic contamination is encountered during soil vapor sampling point installation other than what is part of the intended investigation, installation or drilling, work will be stopped and emergency contacts listed in Attachment D of this HASP will be immediately notified.

3.6.4 Indoor Air, Soil Vapor, and Sub-Slab Soil Vapor Sample Collection

Chemical exposure may occur as indoor air, soil vapor, and sub-slab soil vapor samples are collected. Activities will be conducted in Level D, but personnel should be prepared to upgrade to Level C, as appropriate, based on field screening criteria.

If evidence of historic contamination is encountered during test borings other than what is part of the intended investigation, installation or drilling, work will be stopped and emergency contacts listed in Attachment D of this HASP will be immediately notified.

4.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

4.1 Levels of Protection

PPE must protect workers from the specific hazards they are likely to encounter on site. Selection of the appropriate PPE must take into consideration: (1) identification of the hazards or suspected hazards; (2) potential exposure routes; and, (3) the performance of the PPE construction (materials and seams) in providing a barrier to these hazards. Based on anticipated site conditions and the proposed work activities to be performed at the site, Level D Protection will be used for work completed within the defined exclusion zone. This will include any work within the defined drilling areas. Level D Protection will be required for all personnel working outside the investigation area but engaged with investigation activities. The upgrading/downgrading of these levels of protection will be based on continuous air monitoring results as described in Section 5.0. The decision to modify standard PPE will be made by the HSO after conferring with the Project Manager. The levels of protection are described below.

- **Level D Protection**

  a. Safety glasses w/ sideshields or chemical splash goggles
  b. Safety boots/shoes (toe-protected)
  c. Hard hat
  d. Long sleeve work shirt and work pants
  e. Nitrile gloves
  f. Hearing protection (as needed)
  g. Reflective traffic vest

- **Level D Protection (Modified)**

  a. Safety glasses w/ sideshields or chemical splash goggles
  b. Safety boots/shoes (toe-protected)
  c. Disposable chemical-resistant boot covers
  d. Coveralls Tyvek or equivalent to be worn when contact with contaminated soil or groundwater, or non-aqueous phase liquids is anticipated)
  e. Hard hat
  f. Long sleeve work shirt and work pants
  g. Nitrile gloves
  h. Hearing protection (as needed)
  i. Reflective traffic vest

- **Level C Protection**

  a. Full face-piece, air-purifying, cartridge*-equipped, NIOSH-approved respirator [*combo cartridge P100/OV/CL/HC/SD/CD/HS (escape)]
  b. Inner (latex) and outer (nitrile) chemical-resistant glove
  c. Chemical-resistant safety boots/shoes (toe-protected)
  d. Disposable chemical-resistant boot covers
  e. Hard hat
  f. Long sleeve work shirt and work pants
  g. Coveralls (Tyvek or equivalent, poly-coated Tyvek will be worn when contact, or anticipated contact with wet contaminated soils, ground water, and/or non-aqueous phase liquids (NAPL) is anticipated))
  h. Hearing protection (as needed)
  i. Reflective traffic vest

The action levels used in determining the necessary levels of respiratory protection and upgrading to Level C are summarized in Table 4. The written Respiratory Protection Program is maintained by Langan's H&S Department in Langan's Doylestown, Pennsylvania office. The monitoring procedures and equipment are outlined in Section 5.0.

4.2 Respirator Fit-Test

All Langan employees and subcontractors performing site work who could be exposed to hazardous substances at the work site are in possession of a full face-piece, air-purifying respirator and have been successfully quantitative fit-tested within the past year. Quantitative fit-test records are maintained by Langan's H&S Department.

4.3 Respirator Cartridge Change-Out Schedule

Respiratory protection is required to be worn when certain action levels (Table 2) are reached. A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is as follows:

- Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first.
- If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.

Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short the time period was the previous day they were used.

5.0 AIR QUALITY MONITORING AND ACTIONS LEVELS

5.1 Monitoring During Site Operations

Atmospheric air monitoring results are used to provide data to determine when exclusion zones need to be established and when certain levels of personal protective equipment are required. For all instruments there are Site-specific action level criteria which are used in making field health and safety determinations. Other data, such as the visible presence of contamination or the steady state nature of air contaminant concentration, are also used in making field health and safety decisions. Therefore, the Langan Health and Safety Officer may expand the exclusion zone beyond the extents of the excavation or sampling area

or require a person to wear a respirator even though atmospheric air contaminant concentrations are below established HASP action levels.

During site work involving disturbance of impacted soils, real time air monitoring will be conducted to assess the potential for exposure to airborne contaminants of concern including VOCs, PAHs, and metals. A photoionization detector (PID) and/or flame ionization detector (FID) will be used to monitor concentrations of VOCs at personnel breathing-zone height to assess the potential exposure to petroleum related VOCs related to use of machinery including backhoes, drill rigs, compressors etc. Dust monitoring will be completed with an aerosol monitor. Air monitoring will be the responsibility of the Langan Health and Safety Officer or designee. Air monitoring will be conducted during intrusive activities associated with the completion of soil borings, installation of permanent monitoring wells, installation of soil vapor and sub-slab soil vapor sampling points, and collection of soil and soil vapor samples. All manufacturers' instructions for instrumentation and calibration will be available onsite.

Subcontractors' air monitoring plans must be equal or more stringent as the Langan plan.

An air monitoring calibration log is provided in Attachment D of this HASP.

5.1.1 Volatile Organic Compounds

Monitoring with a PID, such as a MiniRAE 2000 (10.6v) or equivalent will occur during investigation activities. Colormetric Indicator Tubes for benzene may be used as backup for the PID, if measurements remain above background monitor every 2 hours. The HSO will monitor the employee breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (odors, visible gases, appearance of drill cuttings, etc.) since the last measurement. Instrument action levels for monitored gases are provided in Table 4.

5.1.2 Dust

The soil at the site is impacted with PAHs, pesticides, and metals. Additionally, the soil at the site is assumed to consist of historic fill. During invasive procedures that have the potential for creating airborne dust, real time air monitoring with an aerosol monitor, such as a Thermo MEI person

DataRAM-1000 (pDR-1000) will occur. If dust is generated during disturbance activities, dust suppression methods will be employed to minimize potential for exposure. Action levels for dust monitoring are provided in Table 4.

5.1.3 Determination of Background Levels

Background (BKD) levels for VOCs and dust will be established prior to intrusive activities within the work zone. A notation of BKD levels will be referenced in the daily monitoring log. BKD levels are a function of prevailing conditions. BKD levels will be taken in an appropriate upwind location as determined by the Langan Health and Safety Officer.

5.2 Monitoring Equipment Calibration and Maintenance

Instrument calibration shall be documented and included in a dedicated safety and health logbook or on separate calibration pages of the field book. All instruments shall be calibrated before and after each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

All instruments shall be operated in accordance with the manufacturers' specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on site by the HSO for reference.

5.3 Noise Monitoring

As a standard work practice, hearing protection will be worn within the area that exceeds 85 dBA created by any loud machinery as a precaution. Work areas or tasks which pose an exposure risk greater than 85 dBA will require hearing protection. Hearing protection is required and should be used in the exclusion zone while the drill rig is operating.

6.0 COMMUNITY HEALTH AND SAFETY CONSIDERATIONS

Community air monitoring will be conducted in compliance with the NYSDOH Generic CAMP outlined below.

The CAMP will include real-time monitoring for VOCs and particulates at the downwind perimeter of each designated work area when ground-intrusive work is in progress. Continuous monitoring will be required for all ground-intrusive work. Ground-intrusive work includes, but is not limited to, soil/fill excavation and handling and utility trenching. Periodic monitoring for VOCs may be required during non-intrusive work such as the collection of soil samples. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location and taking a reading prior to leaving a sample location.

CAMP monitoring of total VOC levels will be conducted using PIDs, and monitoring for particulates will be conducted using particulate sensors equipped with filters that can detect airborne particulates less than 10 microns in diameter (PM10). Monitoring for particulates and odors will be conducted during ground-intrusive work by a field engineer, scientist, or geologist under the supervision of the RE. The work zone is defined as the general area in which machinery is operating in support of remediation. A portable PID will be used to monitor the work zone and for periodic monitoring of total VOC levels during work such as soil sampling. The site perimeter will be visually monitored for fugitive dust emissions.

The following actions will be taken based on total VOC levels measured:

- If total VOC levels exceed 5 ppm above background for the 15-minute average at the perimeter, work will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work will resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the work zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work will resume provided that the total VOC level 200 feet downwind of the hot 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 above background for the 15-minute average.

- If the total VOC level is above 25 ppm at the perimeter of the hot zone, work will be shut down.

The following actions will be taken based on dust levels measured or visual dust observations:

- If the downwind particulate level is 100 µg/m³ greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression must be employed. Work may continue with dust suppression techniques provided that downwind PM10 levels do not exceed 150 µg/m³ above the background level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM10 levels are greater than 150 µg/m³ above the background level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 concentration to within 150 µg/m³ of the upwind level and in preventing visible dust migration.

Sustained concentrations of VOCs or PM10 will be reported to the NYSDEC and NYSDOH Project Managers and included in the daily report. In addition, a map showing the location of the downwind and upwind CAMP stations will be included in the daily report.

7.0 WORK ZONES AND DECONTAMINATION

7.1 Site Control

Work zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas.

Any person working in an area where the potential for exposure to site contaminants exists will only be allowed access after providing the HSO with proper training and medical documentation.

Exclusion Zone (EZ) - All activities which may involve exposure to site contaminants, hazardous materials and/or conditions should be considered an EZ. Decontamination of field equipment will also be conducted in the Contaminant Reduction Zone (CRZ) which will be located on the perimeter of the EZ. The EZ

and the CRZ will be clearly delineated by cones, tapes or other means. The Langan Health and Safety Officer may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the Langan Health and Safety Officer allowing adequate space for the activity to be completed, field members and emergency equipment. For purposes of this HASP the exclusion zones are defined by ta 10-foot buffer around each soil boring, soil vapor sampling location, and groundwater monitoring well location but may be expanded based on the results of air monitoring or any other field conditions identified by the HSO. All personnel working in the EZ must have 40 hours HAZWOPER training and be enrolled in a medical monitoring program prior to conducting any site activities.

7.2 Contamination Control

7.2.1 Personnel Decontamination Station

Personal hygiene, coupled with diligent decontamination, will significantly reduce the potential for exposure.

7.2.2 Minimization of Contact with Contaminants

During completion of all site activities, personnel should attempt to minimize the chance of contact with contaminated materials. This involves a conscientious effort to keep "clean" during site activities. All personnel should minimize kneeling, splash generation, and other physical contact with contamination as PPE is intended to minimize accidental contact. This may ultimately minimize the degree of decontamination required and the generation of waste materials from site operations.

Field procedures will be developed to control over spray and runoff and to ensure that unprotected personnel working nearby are not affected.

7.2.3 Personnel Decontamination Sequence

Decontamination will be performed by removing all PPE used in EZ and placing it in drums/trash cans at the CRZ. Baby wipes shall be available for wiping hands and face. Drums/trash cans will be labeled by the field crews in accordance with all local, state, and federal requirements. Management

plans for contaminated PPE, tools and investigative-derived waste (i.e., soil cutting) are provided below.

7.2.4 Emergency Decontamination

If circumstances dictate that contaminated clothing cannot be readily removed, then remove gross contamination and wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or transporting equipment.

If the injured person can be moved, he/she will be decontaminated by site personnel as described above before emergency responders handle the victim. If the person cannot be moved because of the extent of the injury (a back or neck injury), provisions shall be made to ensure that emergency response personnel will be able to respond to the victim without being exposed to potentially hazardous atmospheric conditions. If the potential for inhalation hazards exist, such as with open excavation, this area will be covered with polyethylene sheeting to eliminate any potential inhalation hazards. All emergency personnel are to be immediately informed of the injured person's condition, potential contaminants, and provided with all pertinent data.

7.2.5 Hand-Held Equipment Decontamination

Hand-held equipment includes all monitoring instruments as stated earlier, samples, hand tools, and notebooks. The hand-held equipment is dropped at the first decontamination station to be decontaminated by one of the decontamination team members. These items must be decontaminated or discarded as waste prior to removal from the CRZ.

To aid in decontamination, monitoring instruments can be sealed in plastic bags or wrapped in polyethylene. This will also protect the instruments against contaminants. The instruments will be wiped clean using wipes or paper towels if contamination is visually evident. Sampling equipment, hand tools, etc. will be cleaned with non-phosphorous soap to remove any potentially contaminated soil, and rinsed with deionized water. All decontamination fluids will be containerized and stored on-site pending waste characterization sampling and appropriate off-site disposal.

7.2.6 Heavy Equipment Decontamination

All heavy equipment and vehicles arriving at the work site will be free from contamination from offsite sources. Any vehicles arriving to work that are suspected of being impacted will not be permitted on the work site. Potentially contaminated heavy equipment will not be permitted to leave the EZ unless it has been thoroughly decontaminated and visually inspected by the HSO or his designee.

7.3 Communications

The following communications equipment will be utilized as appropriate.

- Telephones - A cellular telephone will be located with the HSO for communication with the HSM and emergency support services/facilities.
- Hand Signals - Hand signals shall be used by field teams, along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

Signal	Meaning
Hand gripping throat	Out of air, can't breathe
Grip on partner's wrist or placement of both hands around partner's waist	Leave area immediately, no debate
Hands on top of head	Need assistance
Thumbs up	Okay, I'm all right, I understand
Thumbs down	No, negative

8.0 MEDICAL SURVEILLANCE

All personnel who will be performing field work involving potential exposure to toxic and hazardous substances will be required to have passed an initial baseline medical examination, with annual follow-up medical exams thereafter, consistent with 29 CFR 1910.120(f). Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine. Results of medical evaluations are maintained by Langan's H&S Department.

9.0 EMERGENCY RESPONSE PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures that are addressed in the following subsections include communications, local emergency support units, preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures. In case of emergency, in addition to 911 the Langan Incident/Injury Hotline (973-560-4699) should be called as soon as possible.

9.1 Responsibilities

9.1.1 Langan Health and Safety Officer (HSO)

The HSO is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The HSO is responsible for ensuring the HSM are notified of all incidents, all injuries, near misses, fires, spills, releases or equipment damage. The HSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the HSM can notify OSHA within the required time frame.

9.1.2 Emergency Coordinator

For this project the Emergency Coordinator is the HSO.

The Emergency Coordinator shall locate emergency phone numbers and identify hospital routes prior *to beginning* work on the sites. The Emergency Coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator is responsible for implementing the Emergency Response/ Contingency Plan whenever conditions resulting from the Site Investigation warrant such action.

9.1.3 Site Personnel

Project site personnel are responsible for knowing the Emergency Response Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency. Project site personnel, including all subcontractors will be trained in the Emergency Response Plan.

9.2 Communications

Once an emergency situation has been stabilized or as soon as practically possible, the HSO will contact the Langan Incident/Injury Hotline (973-560-4699) and Project Manager to identify any emergency situation.

9.3 Local Emergency Support Units

In order to be able to deal with any emergency that might occur during investigative activities at the site, Attachment E Emergency Notification Numbers, will be available in the field vehicles and provided to all personnel conducting work within the EZ.

Figure 2 is the hospital route map. Outside emergency number 911 and local ambulance should be relied on for response to medical emergencies and transport to emergency rooms. Due to traffic congestion that is prevalent in the New York metropolitan area, alternate hospital routes will need to be considered. The Emergency Coordinator will determine the appropriate route based on time of day and traffic patterns. Changes in the referenced primary facilities shall be documented with the HASP Field Change Authorization Request Form (Attachment B).

The Emergency Phone Numbers listed are preliminary. Upon mobilization, the HSO shall verify all numbers and document the changes in the Site Logbook. Any changes shall also be documented with the HASP Field Change Authorization Request Form.

A Hospital route map is provided as Figure 2.

9.4 Pre-Emergency Planning

Langan will communicate directly with administrative personnel from the emergency room at the hospital in order to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

9.5 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the HSO on site immediately. First-aid equipment will be available on site at the following locations:

First Aid Kit:	Vehicles
Emergency Eye Wash:	Vehicles

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

Personnel with current first aid and CPR certification will be identified.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance.

Nearest hospital: **Mount Sinai West: Emergency Room**
1000 10th Avenue
New York, NY 10019
(212) 523-6800
(directions from site to hospital found on Figure 2)

9.6 Non-Emergency Medical Treatment

In case of injury to personnel, which is not a medical emergency the employee will contact WorkCare at (1-888-449-7787). WorkCare provides access 24 hours / 7 days a week to experienced occupational health nurses and physicians who confer with employees at the onset of a work-related injury or illness. WorkCare will provide over the phone injury treatment or direct employees to medical treatment by third party provider, if appropriate.

9.7 Emergency Site Evacuation Routes and Procedures

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs as a result of the site investigation activities, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, the Langan Project Manager will be verbally notified immediately. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the nearest intersection to be accounted for and to receive further instructions.

9.8 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site and notification of the Langan Project Manager of the investigation activities. Portable fire extinguishers will be provided at the work zone. The extinguishers located in the various locations should also be identified prior to the start of work. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

9.8.1 Fire Prevention

Fires will be prevented by adhering to the following precautions:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.
- Shutting off engines to refuel.
- Grounding and bonding metal containers during transfer of flammable liquids.

- Use of UL approved flammable storage cans.
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities.

The person responsible for the control of fuel source hazards and the maintenance of fire prevention and/or control equipment is the HSO.

9.9 Significant Vapor Release

Based on the proposed tasks, the potential for a significant vapor release is low. However, if a release occurs, the following steps will be taken:

- Move all personnel to an upwind location. All non-essential personnel shall evacuate.
- Upgrade to Level C Respiratory Protection.
- Downwind perimeter locations shall be monitored for volatile organics..
- If the release poses a potential threat to human health or the environment in the community, the Emergency Coordinator shall notify the Langan Project Manager.
- Local emergency response coordinators will be notified.

9.10 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Safety Data Sheet (SDS) will be followed, when necessary.

SKIN AND EYE: Use copious amounts of soap and water from eye-wash kits and portable hand wash stations.

CONTACT: Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Skin shall also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs. Affected items of clothing shall also be removed from contact with skin.

Providing wash water and soap will be the responsibility of each individual contractor or subcontractor on-site.

9.11 Decontamination During Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or omitted. The HSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

9.12 Incident Reporting

Once first aid and/or emergency response needs have been met, the following parties are to be contacted:

- WorkCare (1-888-449-7787)
- Langan Incident/Injury Report Hotline (973-560-4699)
- Langan Project Manager, Amanda Forsburg (973-560-4574)
- Langan Health and Safety Manager, Tony Moffa (215-491-6500)
- The employer of any injured worker who is not a Langan employee

For emergencies involving personal injury and/or exposure including near-misses, the HSO or designee will complete and submit an Accident/Incident Report Form (Attachment F) within 24 hours. If the employee involved is not a Langan employee, his employer shall receive a copy of the report.

9.13 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work will continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds).
- Limited visibility (fog).
- Potential for electrical storms.
- Earthquakes.
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The HSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

9.14 Spill Control and Response

All small spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the SDS will be consulted to assist in determining proper waste characterization and the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. All spill containment materials will be properly disposed. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill.

All contractor vehicles shall have spill kits on them with enough material to contain and absorb the worst-case spill from that vehicle. All vehicles and equipment shall be inspected prior to be admitted on site. Any vehicle or piece of equipment that develops a leak will be taken out of service and removed from the job site.

The following seven steps shall be taken by the Emergency Coordinator:

1. Determine the nature, identity and amounts of major spills.
2. Make sure all unnecessary persons are removed from the spill area.
3. Notify the HSO immediately.
4. Use proper PPE in consultation with the HSO.
5. If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosion-proof equipment to contain or clean up the spill (diesel-only vehicles, air-operated pumps, etc.).
6. If possible, try to stop the leak with appropriate material.
7. Remove all surrounding materials that can react or compound with the spill.

In addition to the spill control and response procedures described in this HASP, Langan personnel will coordinate with the designated project manager relative to spill response and control actions. Notification to the Project Manager must be immediate and, to the extent possible, include the following information:

- Time and location of the spill.
- Type and nature of the material spilled.
- Amount spilled.
- Whether the spill has affected or has a potential to affect a waterway or sewer.
- A brief description of affected areas/equipment.
- Whether the spill has been contained.
- Expected time of cleanup completion. If spill cleanup cannot be handled by Langan's on-site personnel alone, such fact must be conveyed to the Project Manager immediately.

Langan shall not make any notification of spills to outside agencies. The client will notify regulatory agencies as per their reporting procedures.

9.15 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on site:

- Industrial first aid kit.
- Fire extinguishers (one per site).
- Absorbent material.

9.16 Restoration and Salvage

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers.
- Refilling medical supplies.
- Recharging eyewashes and/or showers.
- Replenishing spill control supplies.

10.0 TRAINING

10.1 General Health and Safety Training

Completion of an initial 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training program (or its equivalent) as detailed in OSHA's 29 CFR 1910.120(e) is required for all employees who will perform work in areas where the potential for a toxic exposure exists. Annual 8-hour refresher training is also required to maintain competencies to ensure a safe work environment.

10.2 Site Specific Training

Prior to commencement of site activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include a documented verbal review of the entire HASP and all the provisions within the HASP document. Should any new employees arrive on-site, they will also be given

a documented full HASP review – or one that address the appropriate tasks that remain at the time of the new employee's arrival.

10.3 Onsite Safety Briefings

Project personnel and visitors will participate in documented daily on-site health and safety briefings ("Tailgate Talks") led by the HSO to assist site personnel in safely conducting their work activities. The briefings will include information on operations to be conducted that shift, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity for the work crews to be updated on monitoring results. Prior to starting any new activity, a training session will be held for crew members involved in the activity. The Health and Safety Briefing Statement (Attachment A) can be used to facilitate this effort.

10.4 Hazard Communication

All material brought on-site will be in the appropriate containers and will be properly labeled. The SDS for contaminants typically associated with historic fill and previously identified on the site are attached. Langan's written Hazard Communication program, in compliance with 29 CFR 1910.1200, is maintained by Langan's H&S Department.

11.0 RECORDKEEPING

The following is a summary of required health and safety logs, reports and recordkeeping.

11.1 Field Change Authorization Request

A Field Procedures Change Authorization Request Form is to be completed for requesting a change to this HASP (Attachment B). Any changes to the work to be performed that is not included in the HASP will require an Addendum that is approved by the Langan Project Manager and Langan HSM to be prepared. Approved changes will be reviewed with all field personnel at a safety briefing.

11.2 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training, documentation of three-day OJT, and respirator fit-test records) and medical clearance for Site work and respirator use will be maintained in the office and available upon request. Records for all subcontractor employees must also be available upon request. All employee medical records will be maintained by Langan's H&S Department.

11.3 Onsite Log

A log of personnel on site each day will be kept by the Site Supervisor or designee.

11.4 Daily Safety Meetings ("Tailgate Talks")

Completed Safety Briefing forms will be maintained by the HSO.

11.5 Exposure Records

All personal monitoring results, laboratory reports, calculations and air sampling data sheets are part of an employee exposure record. These records will be maintained by the HSO during site work. At the end of the project they will be maintained according to 29 CFR 1910.1020.

11.6 Hazard Communication Program/SDS

Safety Data Sheets (SDS) have been obtained for applicable substances and are included in this HASP (Attachment H). Langan's written Hazard Communication program, in compliance with 29 CFR 1910.1200, is maintained by Langan's H&S Department.

11.7 Documentation

Employees are required to contact WorkCare at 1-888-449-7787 to document incidents/injuries which are not medical emergencies. Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan Incident/Injury Hotline at 973-560-4699 and the client representative to report the incident or near miss. A written report must be completed and submitted to the client representative within 24 hours of the incident. For emergencies involving personnel injury and/or

exposure, employee will complete and submit the Langan Incident/Injury Report to the Langan Corporate Health and Safety Manager as soon as possible following the incident. Accidents will be investigated in-depth to identify all causes and to recommend hazard control measures.

12.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have been verbally given a full HASP review by Langan personnel, and understand the provisions of this EHS Plan. It is maintained on site by the HSO as a project record.

Each field team member shall sign this section after Site-specific training is completed and before being permitted to work onsite.

Name (Print and Sign)	***Company***	***Date***

TABLES

TABLE 1
SUSPECTED CONTAMINANTS OF CONCERN
550 10TH AVENUE
NEW YORK, NEW YORK

Contaminant Of Concern	Affected Media
VOLATILES	
1,2,4-Trimethylbenzene	Soil, Soil Vapor, Groundwater
1,3,5-Trimethylbenzene	Soil, Soil Vapor, Groundwater
Acetone	Soil, Soil Vapor, Groundwater
Benzene	Soil, Soil Vapor, Groundwater
Ethyl Benzene	Soil, Soil Vapor, Groundwater
Ispropylbenzene	Soil, Soil Vapor, Groundwater
n-Butylbenzene	Soil, Soil Vapor, Groundwater
n-Propylbenzene	Soil, Soil Vapor, Groundwater
Naphthalene	Soil, Soil Vapor, Groundwater
p-Isopropyltoluene	Soil, Soil Vapor, Groundwater
Sec-Butylbenzene	Soil, Soil Vapor, Groundwater
Xylenes (m,p-Xylene, and o-Xylene)	Soil, Soil Vapor, Groundwater
Toluene	Soil, Soil Vapor, Groundwater
SEMI-VOLATILES	
Acenaphthene	Soil, Groundwater
Anthracene	Soil, Groundwater
Benzo(a)anthracene	Soil, Groundwater
Benzo(a)pyrene	Soil, Groundwater
Benzo(b)fluoranthene	Soil, Groundwater
Benzo(k)fluoranthene	Soil, Groundwater
Chrysene	Soil, Groundwater
Dibenz(a,h)anthracene	Soil
Fluoranthene	Soil, Groundwater
Fluorene	Soil, Groundwater
Indeno (1,2,3-cd)pyrene	Soil, Groundwater
Naphthalene	Soil, Groundwater
Phenanthrene	Soil, Groundwater
Pyrene	Soil, Groundwater
Diesel Fuel / Fuel Oils	Soil, Groundwater
Hydraulic Oil	Soil, Groundwater
PESTICIDES	
4,4'-DDT	Soil

TABLE 1
SUSPECTED CONTAMINANTS OF CONCERN
550 10TH AVENUE
NEW YORK, NEW YORK

METALS	
Lead	Soil, Groundwater
Iron	Soil, Groundwater
Arsenic	Soil, Groundwater
Barium	Soil, Groundwater
Beryllium	Soil, Groundwater
Cadmium	Soil
Chromium	Soil, Groundwater
Mercury	Soil, Groundwater
Manganese	Soil, Groundwater
Copper	Soil, Groundwater
Nickel	Soil, Groundwater
Selenium	Soil, Groundwater
Sodium	Soil, Groundwater
Zinc	Soil, Groundwater
Per- and Polyfluoroalkyl Substances (PFAS)	
Perfluorooctanesulfonic Acid (PFOS)	Soil, Groundwater
Perfluorooctanoic Acid (PFOA)	Groundwater

\\langan.com\data\PAR\data4\100674401\Project Data_Discipline\Environmental\Reports_Phase 2 (100674402)\2021-05 - BCP RIWP\Appendix A - HASP\Tables\HASP TABLE 1 - Contaminants of Concern.doc

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
550 10TH AVENUE
NEW YORK, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
1,2,4 Trimethylbenzene	---	---	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)
1,3,5 Trimethylbenzene	---	---	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)
Acetone	1000 ppm	2500 ppm	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis
Benzene	1 ppm	50 ppm	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritate eyes, skin, nose; respiratory system; giddiness; head, nausea, staggered gait; fatigue, anorexia, lassitude; dermatitis; bone marrow depression; [carcinogenic]
Ethylbenzene	100 ppm	800 ppm (10% LEL)	Inhalation, Ingestion, skin and/or eye contact	Irritate eyes, skin, mucous membrane ;headache, dermatitis; narcosis, coma
Isopropylbenzene	50 ppm	900 ppm (10% LEL)	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma
n-Propylbenzene	--	--	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	May cause respiratory irritation. Fatal if swallowed and enters air ways. Can cause lung damage. May depress activity.

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
550 10TH AVENUE
NEW YORK, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Naphthalene	10 ppm	250 ppm	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in urine), renal shutdown; dermatitis, optical neuritis, corneal damage
Xylenes	100 ppm	900 ppm	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritate eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corn vacuolization; anorexia, nausea, vomit, abdominal pain; dermatitis
Toluene	200 ppm	500 ppm	Inhalation, Skin Absorption, Ingestion, skin and/or eye contact	Irritate eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation; nervousness, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage; mucous membrane; narcosis, coma
Anthracene	0.2 mg/m^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Fluoranthene	0.2 mg/m^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Phenanthrene	0.2 mg/m^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough
Pyrene	0.2 mg/m^3	80 mg/m^3	Inhalation, Skin Absorption, Ingestion	Irritate eyes, skin, upper respiratory system, cough

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
550 10TH AVENUE
NEW YORK, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Diesel Fuel / Fuel Oils	---	---	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)
Pesticides	1 mg/mg^3	500 mg/m^3	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]
Lead	0.050 mg/m^3	100 mg/m^3	Inhalation, ingestion, skin, and/or eye contact	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension
Arsenic	0.010 mg/m^3	5 mg/m^3	Inhalation, skin absorption, skin and/or eye contact, ingestion	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin [potential occupational carcinogen]
Hexavalent Chromium	5 mg/m^3	250 mg/m^3	Inhalation, Ingestion, Skin and/or Eye Contact	Irritation eyes, skin; lung fibrosis (histologic)

TABLE 2
SELECTED POTENTIAL CHEMICAL EXPOSURE LIMITS AND HEALTH EFFECTS
550 10TH AVENUE
NEW YORK, NEW YORK

Chemical	Permissible Exposure Limit	IDLH Limit	Exposure Routes	Exposure Symptoms
Chromium	1 mg/m^3	250 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; lung fibrosis (histologic)
Mercury	0.1 mg/m^3	10 mg/m^3	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria
Copper	1 mg/m^3	100 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, pharynx; nasal septum perforation; metallic taste; dermatitis; In Animals: lung, liver, kidney damage; anemia
Nickel	1 mg/m^3	10 mg/m^3	Inhalation, ingestion, skin and/or eye contact	Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]

--- No exposure limits listed in the NIOSH Pocket Guide to Chemical Hazards dated November 2010.

TABLE 3
HAZARD ANALYSIS
550 10TH AVENUE
NEW YORK, NEW YORK

Task	Potential Risk	Description	Control Measure
1, 2, 3, 4, 5, 6	Lifting equipment	Improper lifting/carrying of equipment and materials	Follow safe lifting and general material handling
2, 3, 5	Noise	Loud sounds caused by the machines during drilling, or excavation	Wear proper PPE (hearing protection)
1, 2, 3, 5	Working near heavy machinery	Close proximity to drill rig and/or construction equipment	Be aware of surroundings, wear safety vest and hard hat
1, 2, 3, 4, 5, 6	Slips, trips, and falls	Any number of injuries from slips, trips, and falls in carrying out these tasks	Good housekeeping at site, constant awareness and focus on the task
2, 3, 5, 6	Inhalation of Dust	Breathing in visible dust from earthwork using drills or excavators	Wear proper PPE, monitor air for dust concentrations, use dust suppression techniques
2, 3, 4, 5, 6	Inhalation of Volatiles	Breathing in volatiles from earthwork using drills or excavators causing dust	Wear proper PPE, monitor air for volatile concentrations, use dust suppression techniques
1, 2, 3, 5	Utilities	Hitting utility lines during drilling and or excavating	Use proper mark out of underground utilities before beginning earthwork
2, 3, 4, 5, 6	Skin contact with contaminated material	Material falls on skin; gets in eye	Wear proper PPE; follow safe work practices
2, 3, 4, 5, 6	Ingestion of contaminated material	Material falls on skin; gets into mouth	Wear proper PPE; follow safe work practices
2, 3, 4, 5, 6	Skin and eye contact with contaminated material	Material falls on skin; gets in eye	Wear proper PPE; follow safe work practices
1, 2, 3, 4, 5, 6	Heat Stress	Stress or exhaustion related to high temperatures	Hydrate and rest as needed
1, 2, 3, 4, 5, 6	Cold Stress	Stress or exhaustion related to low temperatures; hypothermia	Wear proper PPE; follow safe work practices
1, 2, 3, 4, 5, 6	Bites and stings	Bee stings, ticks, snake bites	Wear proper PPE, be watchful, follow safe work practices
1, 2, 3, 4, 5, 6	Lacerations and abrasions	Many opportunities working with hand tools	Inspect equipment being used for sharp edges, wear proper PPE; follow safe work practices

TABLE 4
INSTRUMENTATION ACTION LEVELS
550 10TH AVENUE
NEW YORK, NEW YORK

Instrument	Action Level	Level of Protection / Action Required
PID	Background to 5 ppm	Level D/No respirator; no further action required
	> 5 ppm for > 5 minutes	1. Temporarily discontinue all activities and evaluate potential causes of the excessive readings. If these levels persist and cannot be mitigated (i.e., by slowing drilling or excavation activities), contact HSO to review conditions and determine source and appropriate response action. 2. If PID readings remain above 5 ppm, temporarily discontinue work and upgrade to Level C protection. 3. If sustained PID readings fall below 1 ppm, downgrading to Level D protection may be permitted
	> 5 ppm but < 150 ppm for > 5 minutes	Level C/ 1. Discontinue all work; all workers shall move to an area upwind of the jobsite. 2. Evaluate potential causes of the excessive readings and allow work area to vent until VOC concentrations fall below 5 ppm. 3. Level C protection will continue to be used until PID readings fall below 1 ppm.
	> 30 ppm (steady state condition) within AOC zone	Stop Work / Suppress Emissions / Evacuate and re-evaluate.
	> 150 ppm	Evacuate the work area
Total Dust Aerosol Monitor	> 0.100 mg/m³ above BKD (steady state condition) at perimeter of AOC zone for 15-minutes or visible dust.	Stop Work / Implement dust control / Continue dust monitoring if dust levels are less than 150 mg/m3
	> 0.150 mg/m3 above BKD (following dust suppression measures)	Stop Work / implement dust control, continue work once levels are <150 mg/m3
	>5 mg/m³	Level C

Notes:

1. 1 ppm level based on OSHA Permissible Exposure Limit (PEL) for benzene.
2. 5 ppm level based on OSHA Short Term Exposure Limit (STEL) maximum exposure for vinyl chloride for any 15 minute period.
3. 150 ppm level based on NIOSH Immediately Dangerous to Life and Health (IDLH) for tetrachloroethylene

TABLE 5
PERSONAL PROTECTIVE EQUIPMENT
550 10TH AVENUE
NEW YORK, NEW YORK

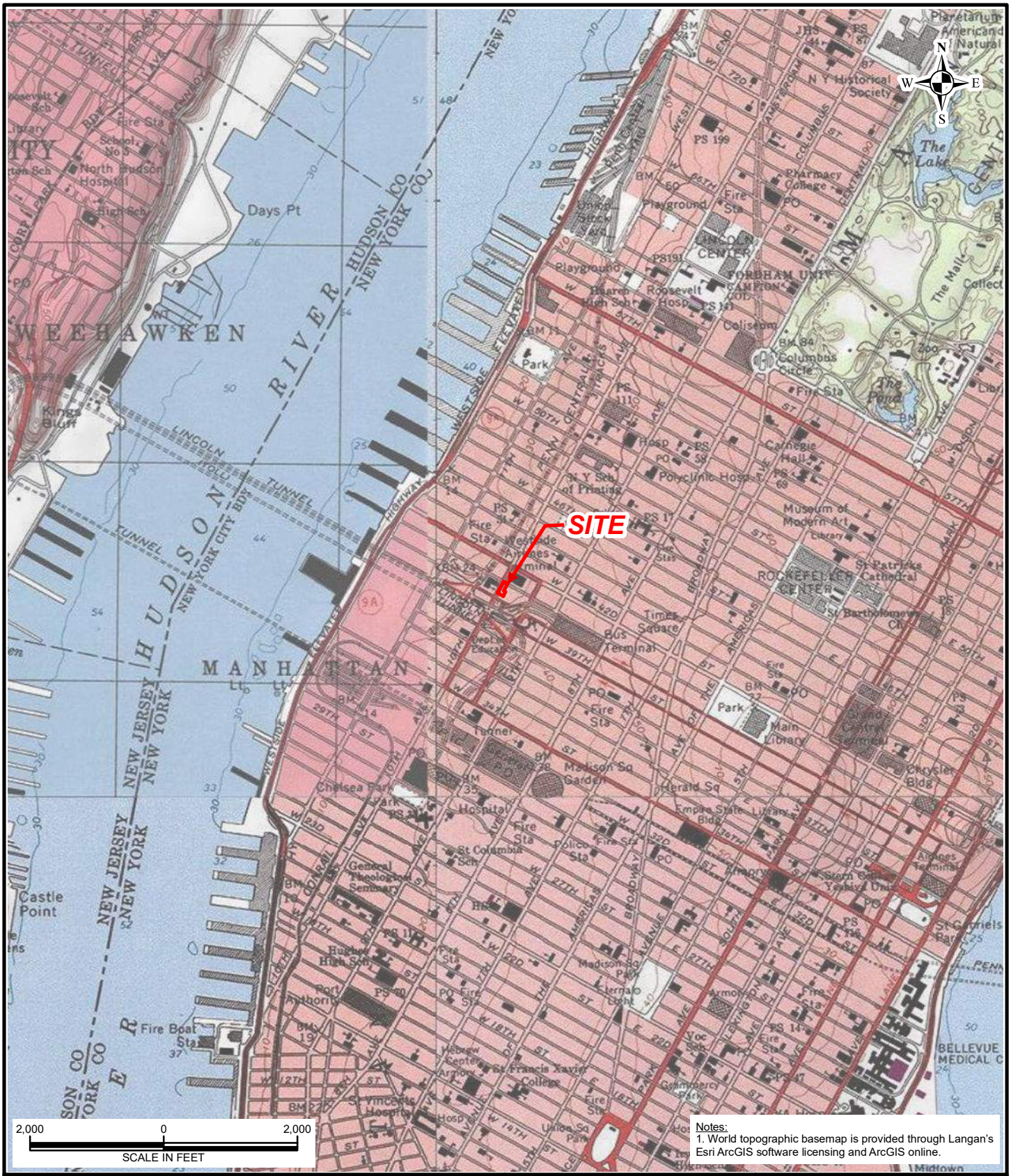
Respiratory Protection*:*

Level D:	No respirator required.
Level C:	Half-face, Air Purifying Respirator (APR) with combination HEPA (dusts, fumes, aerosols) and organic vapor cartridges. The respirator will be NIOSH-approved.
Level C - supplemental by task	Fullface, Air Purifying Respirator (APR) with combination HEPA (dusts, fumes, aerosols), acid gas, organic vapor cartridges. The respirator will be NIOSH-approved.

Personal Protective Clothing*:*

Level D:	Hard-hat, traffic vest (if working on or adjacent to the roadway), long sleeve work shirt & work pants of natural fibers, safety glasses or goggles, steel-toed boots, hearing protection (if needed), nitril inner gloves and leather outer gloves.
Level D - supplemental PPE by task	Tyvek disposal suit
Level C:	Chemically resistant outer boots and Chemical resistant Tyvek disposal suite.

FIGURES



LANGAN
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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
550 10TH AVENUE REDEVELOPMENT

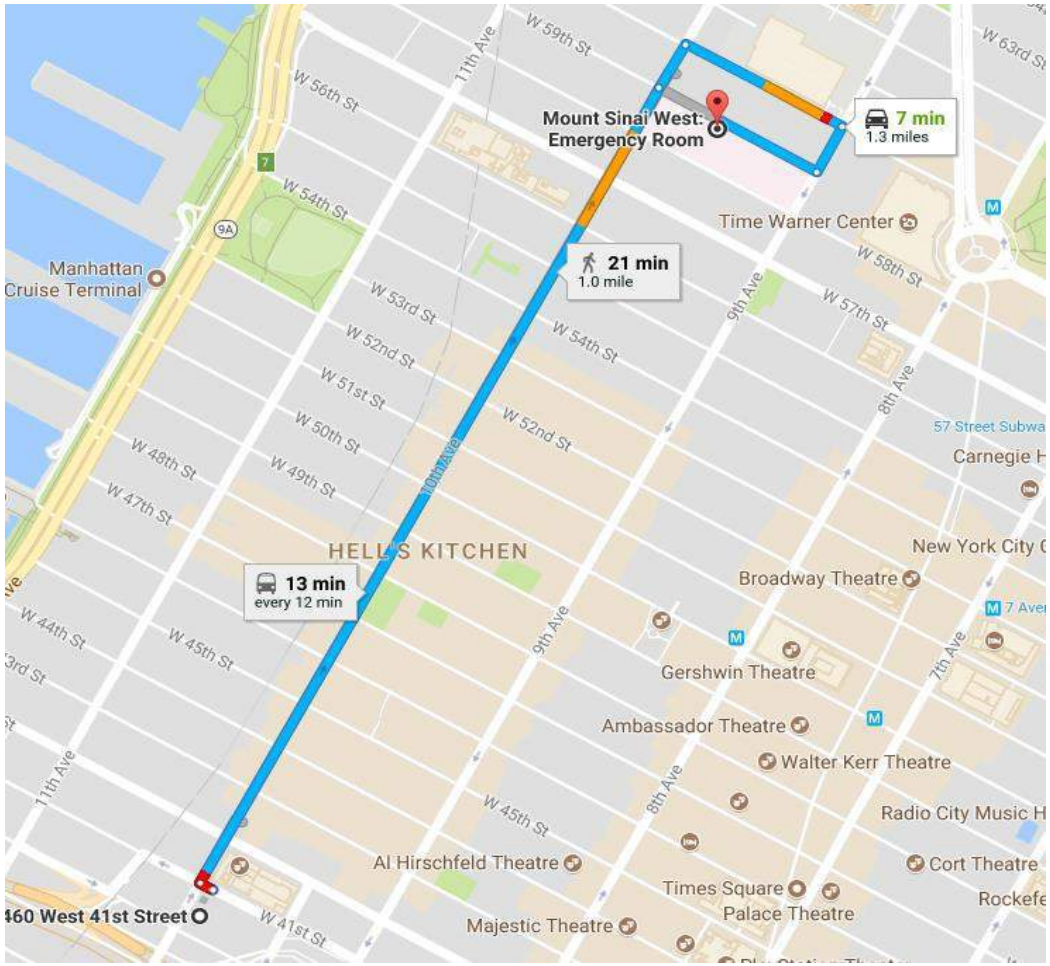
BLOCK No. 1050
LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
SITE LOCATION MAP

Project No.	100674402
Date	4/12/2021
Scale	1"=2,000'
Drawn By	IHB
Submission Date	4/12/2021

Figure
1

Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\MXD\Environmental_Figures\2021-03 - Phase 2 RIR\Figure 1 - Site Location Map.mxd Date: 4/12/2021 User: ibaker Time: 11:38:22 AM



Emergency Route to Mount Sinai West (Phone # (212) 523-6800) :

1 Head northwest on West 41st St. towards 10th Ave.
2 Turn right at the 1st cross street onto 10th Ave.
3 Continue onto Amsterdam Ave.
4 Turn right onto West 60th St.
5 Turn right onto Columbus Ave.
6 Turn right onto West 59th St.
7 Emergency Room entrance will be on the left.

MAP REFERENCE: Google Maps

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Project

550 Tenth Avenue
EMERGENGY HOSPITAL ROUTE MAP

Manhattan **New York**

Project	DATE	SCALE	FIGURE NO.
100674401	**5/14/2021**	**NTS**	**2**

\\langan.com\data\PAR\data4\100674401\Project Data_Discipline\Environmental\Reports_Phase 2 (100674402)\2021-05 - BCP RIWP\Appendix A - HASP\Figures\Figure 2 - Hospital Route/Figure 2 - Hospital Route

ATTACHMENT A

Health and Safety Briefing Statement

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ATTACHMENT A

HEALTH AND SAFETY BRIEFING STATEMENT

The following personnel were present at a pre-job safety briefing conducted at _____(time) on _____ (date) at _____(location), and have read this Health and Safety Plan for the above Site and are familiar with its provisions:

Name	Signature
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Fully charged ABC class fire extinguisher available on Site? _____
Fully stocked First Aid Kit available on Site? _____
All project personnel advised of location of nearest phone? _____
All project personnel advised of location of designated medical facility? _____

_____
Name of Field Team Leader or Site Safety Officer

_____
Signature Date

ATTACHMENT B

Field Procedures Change Authorization Form

ATTACHMENT B

FIELD PROCEDURES CHANGE AUTHORIZATION FORM

Section to be changed:_____

Duration of Authorization Requested Date:_____

_____ Today only

_____ Duration of Task

_____ Other_____

_____

_____

Description of Procedures Modification:

_____

_____

_____

Justification:

_____ _____

Person Requesting Change Verbal Authorization Received From:

_____ _____

Name Name Time

_____ _____

Title Title

_____

Signature

Approvals:

_____

_____

_____

ATTACHMENT C

Unsafe Conditions and Practices Form

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ATTACHMENT C

UNSAFE CONDITIONS AND PRACTICES FORM

DESCRIPTION OF CIRCUMSTANCES REGARDING UNSAFE CONDITION OR PRACTICE:

_____

_____

_____

_____

_____

_____

_____

IS THIS CONDITION EXISTING OR POTENTIAL?_____

REPORTED TO: _____

REPORTED BY:_____

DATE REPORTED:_____

COMMENTS:_____

_____

_____

ATTACHMENT D

Calibration Log

ATTACHMENT D

PROJECT:_____

DATE:_____

CALIBRATION LOG

Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calib Reading	Performed By:

ATTACHMENT E

Emergency Notification Numbers

ATTACHMENT E

EMERGENCY NOTIFICATION NUMBERS

The following list provides names and telephone numbers for emergency contact personnel.

ORGANIZATION	CONTACT		TELEPHONE
New York City Police			911
New York City Fire			911
Mt. Sinai West			(212) 523-6800
Langan Incident/Injury Hotline			1-800-952-6426 or (973)560-4699
Langan Project Manager	Amanda Forsburg		973-560-4574
National Response Center			800-424-8802
Center for Disease Control			404-488-4100
CHEMTREC			800-424-9300
TSCA HOTLINE			202-554-1404
RCRA HOTLINE			800-424-9346
CDC		(DAY) (NIGHT)	404-452-4100 404-329-2888
BUREAU OF ALCOHOL, TOBACCO & FIREARMS			800-424-9555 202-566-7777
NATIONAL RESPONSE CENTER			800-424-8802
PESTICIDE INFORMATION SERVICE			800-424-9346
BUREAU OF EXPLOSIVES, A.A. RAILWAYS			202-835-9500
FEDERAL EXPRESS - HAZARDOUS MATERIAL INFO			901-922-1666

ATTACHMENT F

Accident / Incident Report Form

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ATTACHMENT F

INCIDENT REPORT

LANGAN EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT
(Submit a Separate Report for Each Employee and/or Incident)

Date: _____

Employee's Name:_____ Employee No:_____

Sex: M _____ F _____ Age: _____

Region: _____ Location:_____

Project: _____ Project No: _____

Incident:_____

Type: Possible Exposure _____ Exposure _____ Physical Injury _____

Location: _____

Date of Incident: _____ Time of Incident: _____

Date of Report Incident: _____

Person(s) to Whom Incident was Reported: _____

Weather Conditions During Incident: Temperature _____ Humidity _____

Wind Speed and Direction: _____ Cloud Cover: _____

Clear: _____ Precipitation: _____

Materials Potentially Encountered: _____

Chemical (give name of description - liquid, solid, gas, vapor, fume, mist):

_____

_____

Radiological:_____

Other: _____

Nature of the Exposure/Injury: (State the nature of the exposure/injury in detail and list the parts of the body affected. Attach extra sheets if necessary).

_____

_____

_____

_____

_____

Did you receive medical care? Yes _____ No _____ If so, when _____

Where? On-Site _____ Off-Site _____

By Whom: Name of Paramedic: _____

Name of Physician: _____

Other: _____

If Off-Site, name facility (hospital, clinic, etc):_____

_____

Length of stay at the facility?_____

Was the Site Safety Officer contacted? Yes _____ No _____ When?_____

Was the Corporate Health and Safety Officer contacted? Yes _____ No _____

If so, who was the contact?_____

Did the exposure/injury result in permanent disability? Yes _____ No _____

If so, explain:_____

_____

_____

_____

Has the employee returned to work? Yes _____ No _____

List the names of other persons affected during this incident:

_____

_____

_____

_____

_____

_____

_____

List the names of persons who witnessed the exposure/injury incident:

_____

_____

_____

_____

Possible cause of the exposure/injury incident: _____

_____

_____

_____

_____

_____

What was the name and title of the field team leader or immediate supervisor at the site of the incident?

_____

Was the operation being conducted under an established Health and Safety Plan?

Yes _____ No _____ If yes, attach a copy. If no, explain

_____

_____

_____

_____

_____

_____

Describe protective equipment and clothing used by the employee:

_____

_____

_____

_____

_____

_____

Did any limitations in safety equipment or protective clothing contribute to or affect exposure? If so, explain:

_____

_____

_____

What was the employee doing when the exposure/injury occurred? (Describe briefly as Site Reconnaissance, Site Characterization, or Sampling, etc.):

_____

_____

_____

_____

Where exactly on site or off site did the exposure/injury occur?

_____

_____

_____

_____

_____

How did the exposure/injury occur? (Describe fully what factors led up to and/or contributed to the incident):

_____

_____

_____

_____

_____

Name of person(s) initiating report, job title, phone number:

_____

_____

_____

_____ _____

Employee Signature Date

_____ _____

Site Safety Officer Signature or Field Team Leader Signature Date

ATTACHMENT G

Jobsite Safety Inspection Checklist

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JOBSITE SAFETY INSPECTION CHECKLIST

Client: _____ Inspection Date: _____

Site: _____ Inspector: _____

Employees: _____

Notes:_____
_____
_____

Check one of the following: **A:** Acceptable **NA**: Not Applicable **D**: Deficiency

	A	NA	D	Remarks
GENERAL				
Appropriate PPE being worn by Langan employees and subcontractors?				
Air monitoring instruments calibrated daily and results recorded on the Daily Instrument Calibration check sheet?				
Air monitoring readings recorded on the air monitoring data sheet/field log book?				
Incident reporting procedures known?				
Site security an issue?				
Vehicle /pedestrian traffic issue?				
Adequate size/type fire extinguisher supplied?				
Evidence that drilling operator is responsible for the safety of his rig.				
First Aid kit available?				
PERSONAL PROTECTIVE EQUIPMENT				
Eye Protection?				
Head protection?				
Safety Shoes?				
Safety vests?				
Hand protection?				
Other?				
Deficiencies??				
HOUSEKEEPING				
Work area kept clean/tidy to minimize potential hazards?				
Waste being disposed of quickly and properly				
Adequate lighting for job?				
Portable water available?				
HAND TOOLS				
Are tools in good condition and properly used? (INSPECT)				
Are proper tools being used?				
Are tools safety stored when not in use?				
Have tools been inspected prior to use?				
Are employees familiar with using tools?				
Is additional PPE required for tools? Available?				
POWER TOOLS				
Are tools in good condition and properly used? (INSPECT)				
Are tools properly grounded?				
Safety guards in place and used correctly?				
Competent instruction / supervision?				
Cords include in inspection?				

HAZWOPER				
Employees have current 40-hr./8-hr./Supervisor HAZWOPER training?				
Project staff medically cleared to work in hazardous waste sites and fit-tested to wear respirators, if needed?				
Respiratory protection readily available?				
Subcontract workers have current 40-hr./8-hr./Spvsr. HAZWOPER training, as appropriate?				
Subcontract workers medically cleared to work on site, and fit-tested for respirator wear?				
Subcontract workers have respirators readily available?				
HEALTH & SAFETY PLAN				
HASP available on site for inspection?				
Health & Safety Compliance agreement (in HASP) appropriately signed by Langan employees and subcontractors?				
Hospital route map with directions posted on site?				
Emergency Notification List posted on site?				
Personnel trained in CPR/First Aid on site?				
MSDSs readily available, and all workers knowledgeable about the specific chemicals and compounds to which they may be exposed?				
Project site safe practices ("Standing Orders") posted?				
Health & Safety Incident Report forms available?				
Decontamination procedures being followed as outlined in HASP?				
UNDERGROUND UTILITY				
Mark outs of underground utilities done prior to initiating any subsurface activities?				
Underground utilities located and authorities contacted before digging?				
Visually observed mark-outs?				
Is subsurface work within three feet of underground utilities?				
- Is so, is or was soft dig techniques used?				
Drilling performed in areas free from underground utilities?				
EXCAVATION / TRENCH				
Are excavations/trenches over 5 feet deep sloped, shored or a trench box used?				
Operations supervised by a Competent Person?				
Is Competent Person preforming daily inspections of excavation/trench?				
Adequate barricades in place?				
Have underground utilities been identified?				
Ladders / means of egress in trench with 25-foot of every worker?				
Has PE designed or approved protective system?				
Excavated material and other objects placed more than 2 feet away from excavation edge?				
Public protected from exposure to open excavation?				
CONFINED / PERMIT-ENTRY CONFINED SPACE				
People entering the excavation regarding it as a permit-required confined space and following appropriate procedures?				
Confined space entry permit is completed and posted?				
All persons knowledgeable about the conditions and characteristics of the confined space?				
All persons engaged in confined space operations have been trained in safe entry and rescue (non-entry)?				
Full body harnesses, lifelines, and hoisting apparatus available for rescue needs?				
Attendant and/or supervisor certified in basic first aid and CPR?				
Confined space atmosphere checked before entry and continuously while the work is going on?				
Results of confined space atmosphere testing recorded?				
Evidence of coordination with off-site rescue services to perform entry rescue, if needed?				
ELECTRICAL SAFETY				
Equipment at least 10 feet from overhead power lines?				
Is equipment grounded?				
GFCI used and tested where required?				
Are extension cords rated for this work being used and are they properly maintained?				
Electrical dangers posted at site?				

FLAMMABLE LIQUIDS				
Are flammable liquids used at site?				
Are flammable liquids stored in appropriate containers?				
Are flammable liquids kept away from combustion sources?				
Do flammable liquid containers have warning labels?				
LADDERS				
Are ladders used at site?				
Were ladders inspected prior to use?				
Are ladders in good working condition?				
Are ladders secured to prevent slipping, sliding or falling?				
Do side rails extend three feet above top of landing area?				
Are top two steps of stepladders being used?				
Is extension on ladder facing out?				
Are ladders sufficient for task?				
Are ladders sufficient for task?				

Unsafe acts observed? _____

Additional remarks _____

Notes:_____

Distribution: Project Manager - Name: _____
Health & Safety Officer - Name: _____
Health & Safety Manager- Name: Anthony Moffa, CHMM

Q:\Other\HealthandSafety\GenericAppendixAJobsiteSafetyInspectionChecklist

ATTACHMENT H

Safety Data Sheets
(SDS)

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ATTACHMENT H

MATERIAL SAFETY DATA SHEETS

SAFETY DATA SHEETS

All Langan Field Personnel Completing This Work Plan Are To Have Real Time Accessibility To Material Safety Data Sheet (MSDs) or Safety Data Sheet (SDSs) Through Their Smart Phone.

The link is http://www.msds.com/
The login name is "drapehead"
The password is "2angan987"

If You Are Unable To Use the Smart Phone App, You Are To Bring Printed Copies of the MSDs/SDSs to the Site

ATTACHMENT I

Langan Guidelines

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ATTACHMENT I

LANGAN GUIDELINES

GENERAL

- No smoking, eating, or drinking in this work zone.
- Upon leaving the work zone, personnel will thoroughly wash their hands and face.
- Minimize contact with contaminated materials through proper planning of work areas and decontamination areas, and by following proper procedures. Do not place equipment on the ground. Do not sit on contaminated materials.
- No open flames in the work zone.
- Only properly trained and equipped personnel are permitted to work in potentially contaminated areas.
- Always use the appropriate level of personal protective equipment (PPE).
- Maintain close contact with your buddy in the work zone
- Contaminated material will be contained in the Exclusion Zone (EZ).
- Report any unusual conditions.
- Work areas will be kept clear and uncluttered. Debris and other slip, trip, and fall hazards will be removed as frequently as possible.
- The number of personnel and equipment in the work zone will be kept to an essential minimum.
- Be alert to the symptoms of fatigue and heat/cold stress, and their effects on the normal caution and judgment of personnel.
- Conflicting situations which may arise concerning safety requirements and working conditions must be addressed and resolved quickly by the site HSO.

TOOLS AND HEAVY EQUIPMENT

- Do not, under any circumstances, enter or ride in or on any backhoe bucket, materials hoist, or any other device not specifically designed to carrying passengers.
- Loose-fitting clothing or loose long hair is prohibited around moving machinery.
- Ensure that heavy equipment operators and all other personnel in the work zone are using the same hand signals to communicate.
- Drilling/excavating within 10 feet in any direction of overhead power lines is prohibited.
- The locations of all underground utilities must be identified and marked out prior to initiating any subsurface activities.
- Check to insure that the equipment operator has lowered all blades and buckets to the ground before shutting off the vehicle.
- If the equipment has an emergency stop device, have the operator show all personnel its location and how to activate it.
- Help the operator ensure adequate clearances when the equipment must negotiate in tight quarters; serve as a signalman to direct backing as necessary.
- Ensure that all heavy equipment that is used in the Exclusion Zone is kept in that zone until the job is done, and that such equipment is completely decontaminated before moving it into the clean area of the work zone.
- Samplers must not reach into or get near rotating equipment such as the drill rig. If personnel must work near any tools that could rotate, the equipment operator must completely shut down the rig prior to initiating such work. It may be necessary to use a remote sampling device.

QUALITY ASSURANCE PROJECT PLAN

for

550 Tenth Avenue Redevelopment
New York, New York
NYSDEC BCP No. C231148

Prepared For:

Go Covenant LLC
432 Park Avenue South, 2nd Floor
New York, New York 10016

Prepared By:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
300 Kimball Drive
Parsippany, New Jersey 07054

May 2021
Revised December 2021
100674402

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1.0 PROJECT DESCRIPTION

1.1 Introduction

Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) has prepared this Quality Assurance Project Plan (QAPP) on behalf of GO Covenant LLC (the Applicant) for the property at 550 Tenth Avenue (Tax Block 1050, Lot 61) in the Clinton neighborhood of Manhattan, New York (the Site). A Site Location Map is included as Figure 1.

This QAPP specifies analytical methods to be used to ensure that data collected during the Remedial Investigation (RI) are precise, accurate, representative, comparable, complete, and meet the sensitivity requirements of the project.

1.2 Project Objectives

The Remedial Investigation Work Plan (RIWP) has been developed to meet the investigation requirements of the NYSDEC Brownfield Cleanup Program in accordance with the requirements of Environmental Conservation Law (ECL) Article 27-1415(2). Soil, groundwater, indoor air, sub-slab soil vapor, and soil vapor samples will be collected to further assess subsurface conditions across the Site. This QAPP addresses sampling and analytical methods that will be necessary in support of RI activities. These objectives have been established in order to meet standards that will protect public health and the environment for the site.

1.3 Scope of Work

The specific scope of work covered in this QAPP includes any sampling that will occur during implementation of the RIWP. The RIWP requires collection of soil, groundwater, sub-slab soil vapor, soil vapor, and indoor air samples to further assess subsurface conditions across the Site.

2.0 DATA QUALITY OBJECTIVES AND PROCESS

Data Quality Objectives (DQOs) are qualitative and quantitative statements to help ensure that data of known and appropriate quality are obtained during the project. The overall objectives are:

- To evaluate the quality of soil through the collection of soil samples;
- To evaluate the quality of groundwater through the collection of groundwater samples;
- To evaluate the quality of soil vapor through the collection of soil vapor samples.
- To complete a soil vapor intrusion evaluation through the collection of indoor air samples and sub-slab soil vapor samples.

DQOs for sampling activities are determined by evaluating five factors:

- Data needs and uses: The types of data required and how the data will be used after it is obtained.
- Parameters of Interest: The types of chemical or physical parameters required for the intended use.
- Level of Concern: Levels of constituents, which may require remedial actions or further investigations.
- Required Analytical Level: The level of data quality, data precision, and quality assurance/quality control (QA/QC) documentation required for chemical analysis.
- Required Detection Limits: The detection limits necessary based on the above information.

The quality assurance and quality control objectives for all measurement data include:

- Precision – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal QC duplicates and/or matrix spike duplicates.

- Accuracy – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. For soil samples, accuracy will be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), internal standards, laboratory method blanks, instrument calibration, and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks.
- Representativeness – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is accomplished by following all applicable methods, laboratory-issued standard operating procedures (SOPs), the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.
- Completeness – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.
- Comparability – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis as documented in the QAPP, using standard reporting units and reporting formats, and data validation.
- Sensitivity – the ability of the instrument or method to detect target analytes at the levels of interest. The project manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

Implementation of the RIWP will be overseen by Langan for GO Covenant LLC. The environmental consultant will also arrange data analysis and reporting tasks. The analytical services will be performed by an Environmental Laboratory Approval Program (ELAP)-certified laboratory. Data validation services will be performed by approved data validation contractor(s).

For the required sampling as stated in the RIWP, sampling will be conducted by Langan, the analytical services will be performed by York Analytical Laboratories, Inc. of Stratford, Conn. (New York State Department of Health [NYSDOH] ELAP certification number 10854). Data validation services will be performed by Joe Conboy; résumé attached (Attachment A).

Key contacts for this project are as follows:

GO Covenant LLC	Bryan Kelly Telephone: (212) 716-2502
Langan Project Manager:	Christopher McMahon Telephone: (973) 560-4900
Langan Quality Assurance Officer (QAO):	Steve Ciambruschini Telephone: (973) 560-4900
Langan Remedial Engineer:	Ron Boyer Telephone: (973) 560-4900
Program Quality Assurance Monitor:	Amanda Forsburg Telephone: (973) 560-4900
Data Validator:	Joe Conboy Telephone: (215) 845-8985
Laboratory Representative:	York Analytical Laboratories, Inc. Phil Murphy Telephone: (203) 598-1371

4.0 QUALITY ASSURANCE OBJECTIVES FOR COLLECTION OF DATA

The overall quality assurance objective is to develop and implement procedures for sampling, laboratory analysis, field measurements, and reporting that will provide data of sufficient quality to evaluate soil impacts at the site. The sample set, chemical analysis results, and interpretations must be based on data that meet or exceed quality assurance objectives established for the site. Quality assurance objectives are usually expressed in terms of accuracy or bias, sensitivity, completeness, representativeness, comparability, and sensitivity of analysis. Variances from the quality assurance objectives at any stage of the investigation will result in the implementation of appropriate corrective measures and an assessment of the impact of corrective measures on the usability of the data.

Precision

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates. Laboratory precision and sample heterogeneity also contribute to the uncertainty of field duplicate measurements. This uncertainty is taken into account during the data assessment process. For field duplicates, results less than 2x the reporting limit (RL) meet the precision criteria if the absolute difference is less than ±2X the RL. For results greater than 2X the RL, the acceptance criteria is a relative percent difference (RPD) of ≤50% (soil), and <30% (groundwater). RLs and method detection limits (MDL) are provided in Attachment B.

Accuracy

Accuracy is the measurement of the reproducibility of the sampling and analytical methodology. It should be noted that precise data may not be accurate data. For the purpose of this QAPP, bias is defined as the constant or systematic distortion of a measurement process, which manifests itself as a persistent positive or negative deviation from the known or true value. This may be due to (but not limited to) improper sample collection, sample matrix interferences, poorly calibrated analytical or sampling equipment, or limitations or errors in analytical methods and techniques.

Accuracy in the field is assessed through the use of field blanks and through compliance to all sample handling, preservation, and holding time requirements. All field blanks should be non-detect when analyzed by the laboratory. Any contaminant detected in an associated field blank was evaluated against laboratory blanks (preparation or method) and evaluated against field samples collected on the same day to determine potential for bias.

Laboratory accuracy is assessed by evaluating the percent recoveries of MS/MSD samples, LCS/LCSDs, surrogate compound recoveries, internal standard responses and the results of method preparation blanks. MS/MSD, LCS/LCSD, internal standard responses and surrogate percent recoveries were compared to either method-specific control limits or laboratory-derived control limits. Sample volume permitting, samples displaying outliers should be reanalyzed. All associated method blanks should be non-detect when analyzed by the laboratory.

Completeness

Laboratory completeness is the ratio of total number of samples analyzed and verified as acceptable compared to the number of samples submitted to the fixed-base laboratory for analysis, expressed as a percent. Three measures of completeness are defined:

- Sampling completeness, defined as the number of valid samples collected relative to the number of samples planned for collection;
- Analytical completeness, defined as the number of valid sample measurements relative to the number of valid samples collected; and
- Overall completeness, defined as the number of valid sample measurements relative to the number of samples planned for collection.

Soil and groundwater data will meet a 90% completeness criterion. If the criterion is not met, sample results will be evaluated for trends in rejected and unusable data. The effect of unusable data required for a determination of compliance will also be evaluated.

Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is dependent upon the adequate design of the sampling program and was satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. This is performed by following applicable standard operating procedures (SOPs) and this QAPP. All field technicians will be given copies of appropriate documents prior to sampling events and will be required to read, understand, and follow each document as it pertains to the tasks at hand.

Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is performed by following all applicable EPA and standard methods, laboratory-issued SOPs, the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

Comparability

Comparability is an expression of the confidence with which one data set can be compared to another. Comparability is dependent upon the proper design of the sampling program and was satisfied by ensuring that the sampling plan is followed and that sampling is performed according to the SOPs or other project-specific procedures. Analytical data were comparable when similar sampling and analytical methods are used as documented in the QAPP. Comparability was controlled by requiring the use of specific nationally-recognized analytical methods and requiring consistent method performance criteria. Comparability is also dependent on similar quality assurance objectives. Previously collected data were evaluated to determine whether they may be combined with contemporary data sets.

Sensitivity

Sensitivity is the ability of the instrument or method to detect target analytes at the levels of interest (e.g., at the NYSDEC Subpart 375-6 Soil Cleanup Objectives). The Project Manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection and QC acceptance limits that meet established performance criteria. Concurrently, the Project Manager will select the level of data assessment to ensure that only data meeting the project DQOs are used in decision-making.

Field equipment will be used that can achieve the required levels of detection for analytical measurements in the field. In addition, the field sampling staff will collect and submit full volumes of samples as required by the laboratory for analysis, whenever possible. Full volume aliquots will help ensure achievement of the required limits of detection and allow for reanalysis if necessary. The concentration of the lowest level check standard in a multi-point calibration curve will represent the reporting limit.

Analytical methods and quality assurance parameters associated with the sampling program are presented in Attachment C. The frequency of associated field blanks and duplicate samples will be based on the recommendations listed in DER-10 and as described in Section 5.3.2.

5.0 SAMPLE COLLECTION AND FIELD DATA ACQUISITION PROCEDURES

Soil sampling will be conducted in accordance with the established NYSDEC protocols contained in DER-10/Technical Guidance for Site Investigation and Remediation (May 2010). The following sections describe procedures to be followed for specific tasks.

5.1 Field Documentation Procedures

Field documentation procedures will include summarizing field data in field books and proper sample labeling. These procedures are described in the following sections.

5.1.1 Field Data and Notes

Field notebooks contain the documentary evidence regarding procedures conducted by field personnel. Hard cover, bound field notebooks will be used because of their compact size, durability and secure page binding. The pages of the notebook will not be removed.

Entries were made in waterproof, permanent blue or black ink. No erasures will be allowed. Incorrect entries will be crossed out with a single strike mark and the change initialed and dated by the team member making the change.

Each entry will be dated. Entries will be legible and contain accurate and complete documentation of the individual or sampling team's activities or observations made. The level of detail will be sufficient to explain and reconstruct the activity conducted. Each entry will be signed by the person(s) making the entry.

The following types of information will be provided for each sampling task, as appropriate:

- Project name and number;
- Reasons for being on-site or taking the sample;
- Date and time of activity;

- Sample identification numbers;
- Geographical location of sampling points with references to the site, other facilities or a map coordinate system. Sketches were made in the field logbook when appropriate;
- Physical location of sampling locations such as depth below ground surface;
- Description of the method of sampling including procedures followed, equipment used and any departure from the specified procedures;
- Description of the sample including physical characteristics, odor, etc.;
- Readings obtained from health and safety equipment;
- Weather conditions at the time of sampling and previous meteorological events that may affect the representative nature of a sample;
- Photographic information including a brief description of what was photographed, the date and time, the compass direction of the picture and the number of the picture on the camera;
- Other pertinent observations such as the presence of other persons on the site, actions by others that may affect performance of site tasks, etc.; and,
- Names of sampling personnel and signature of persons making entries.

Field records will also be collected on field data sheets including boring logs, which will be used for geologic and drilling data during soil boring activities. Field data sheets will include the project-specific number and stored in the field project files when not in use. At the completion of the field activities, the field data sheets will be maintained in the central project file.

5.1.2 Sample Labeling

Each sample collected will be assigned a unique identification number and placed in an appropriate sample container. Each sample container will have a sample label affixed to the outside with the date and time of sample collection and project name. In addition, the label will contain the sample identification number, analysis required and chemical preservatives added, if any. All documentation will be completed in waterproof ink. Sample nomenclature procedures are included in Attachment D.

5.2 Equipment Calibration and Preventative Maintenance

A photoionization detector (PID) will be used during the sampling activities to evaluate work zone action levels and screen soil samples. Field calibration and/or field checking of the PID will be the responsibility of the field team leader and the site HSO, and will be accomplished by following the procedures outlined in the operating manual for the instrument. At a minimum, field calibration and/or field equipment checking will be performed once daily, prior to use. Field calibration will be documented in the field notebook. Entries made into the logbook regarding the status of field equipment will include the following information:

- Date and time of calibration
- Type of equipment serviced and identification number (such as serial number)
- Reference standard used for calibration
- Calibration and/or maintenance procedure used
- Other pertinent information

Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent utilization. The equipment will be properly tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated to the manufacturer's specifications by qualified personnel. Equipment that cannot be repaired will be replaced.

Off-site calibration and maintenance of field instruments will be conducted as appropriate throughout the duration of project activities. All field instrumentation, sampling equipment and accessories will be maintained in accordance with the manufacturer's recommendations and specifications and established field equipment practice. Off-site calibration and maintenance will be performed by

qualified personnel. A logbook will be kept to document that established calibration and maintenance procedures have been followed. Documentation will include both scheduled and unscheduled maintenance.

5.3 Sample Collection

5.3.1 Soil Samples

Soil samples will be visually classified and field screened using a PID to assess potential impacts from VOCs and for health and safety monitoring. Soil samples collected for analysis of VOCs will be collected using Terra Core® sampling equipment. For analysis of non-volatile parameters, samples will be homogenized and placed into glass jars. After collection, all sample jars will be capped and securely tightened, and placed in iced coolers and maintained at 4°C ±2°C until they are transferred to the laboratory for analysis, in accordance with the procedures outlined in Section 5.4. Analysis and/or extraction and digestion of collected soil samples will meet the holding times required for each analyte as specified in Attachment C. In addition, analysis of collected soil sample will meet all quality assurance criteria set forth by this QAPP and DER-10.

Soil samples analyzed for per- and poly-fluoro alkyl substances (PFAS) will be collected in 250-milliliter (mL) high-density polyethylene (HDPE) containers provided by the laboratory and analyzed by using Modified USEPA Method 537.1. The reporting limit for PFAS in soil is 0.5 microgram per kilogram (ug/kg). The laboratory standard operating procedures (SOP) for the analysis of PFAS is included in Attachment E. Soil samples analyzed for 1,4-dioxane will be collected in an 8 ounce jar provided by the laboratory and analyzed using USEPA Method 8270. The reporting limit for 1,4-dioxane in soil is 0.1 milligram per kilogram (mg/kg).

5.3.1.1 Sample Field Blanks and Duplicates

Use of dedicated sampling equipment is planned; therefore, collection of field blanks is not anticipated. If the use of reusable sampling equipment is required, proper decontamination procedures will be employed (as further described in Section 5.7) and field blanks will be collected for quality assurance purposes at a rate of one per 20 investigative soil samples. If required, field blanks will be obtained by

pouring laboratory-demonstrated analyte-free water on or through a decontaminated sampling device following use and implementation of decontamination protocols. The water will be collected off of the sampling device into a laboratory-provided sample container for analysis. Field blanks will be collected at a rate of one per 20 samples and will be analyzed for the complete list of analytes on the day of sampling. If less than 20 samples are collected during a particular sampling event, one field blank sample will be collected. Equipment blanks will be collected at a rate of one per day when soil samples are analyzed for PFAS. Trip blanks will be collected at a rate of one per day if soil samples are analyzed for VOCs during that day.

Duplicate soil samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative soil samples and will be submitted to the laboratory as "blind" samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. If less than 20 samples are collected during a particular sampling event, one MS/MSD sample will be collected. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes.

5.3.2 Groundwater Samples

Groundwater samples will be collected into laboratory-supplied containers and will be sealed, labeled, and placed in a cooler containing ice (to maintain a temperature of approximately 4 degrees Celsius) for delivery to a NYSDOH ELAP-certified analytical laboratory. Analysis and/or extraction and digestion of collected groundwater samples will meet the holding times required for each analyte as specified in Attachment C. In addition,

analysis of collected groundwater samples will meet all quality assurance criteria set forth by this QAPP and DER-10.

Groundwater samples analyzed for PFAS will be collected in two 250-mL HDPE containers provided by the laboratory and analyzed using Modified USEPA Method 537.1. The reporting limit for PFAS in groundwater is 2 nanograms per liter (ng/L). The laboratory SOP for the analysis of PFAS is included in Attachment E. Groundwater samples also be analyzed for 1,4-dioxane will be collected in a one-liter amber glass jar and analyzed using USEPA Method 8270 SIM. The reporting limit for 1,4-dioxane in groundwater is 0.35 micrograms per liter (ug/L).

5.3.2.1 Sample Field Blanks and Duplicates

Use of dedicated sampling equipment is planned; therefore, collection of field blanks is not anticipated. If the use of reusable sampling equipment is required, proper decontamination procedures will be employed (as further described in Section 5.7) and field blanks will be collected for quality assurance purposes at a rate of one per 20 investigative groundwater samples. If required, field blanks will be obtained by pouring laboratory-demonstrated analyte-free water on or through a decontaminated sampling device following use and implementation of decontamination protocols. The water will be collected off of the sampling device into a laboratory-provided sample container for analysis. Field blanks will be collected at a rate of one per 20 samples and will be analyzed for the complete list of analytes on the day of sampling. If less than 20 samples are collected during a particular sampling event, one field blank sample will be collected. Equipment blanks will be collected at a rate of one per day when groundwater samples are analyzed for PFAS. Trip blanks will be collected at a rate of one per day if groundwater samples are analyzed for VOCs during that day.

Duplicate groundwater samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative soil samples and will be submitted to the laboratory as "blind" samples. If

less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. If less than 20 samples are collected during a particular sampling event, one MS/MSD sample will be collected. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes.

5.3.3 Soil Vapor and Indoor Air Samples

Soil vapor and indoor air samples will be collected in accordance with the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH October 2006).

Soil vapor implants will be set at a depth of approximately 13-feet below current site grades which corresponds to the one-foot interval directly above the groundwater interface. Each vapor probe will consist of a new, dedicated stainless steel screen implant connected to polyethylene or Teflon™ tubing extending to the target depth. About 1 foot of clean sand filter pack will be placed around the screen implant, and the remaining annular space will be backfilled to grade with hydrated bentonite. Sub-slab soil vapor points will be installed using a portable hammer drill and will consist of Teflon™-lined tubing which will extend approximately 6-inches beneath the bottom of the basement concrete floor slab.

Soil vapor samples will be collected over a 2 hour sampling period and indoor air samples will be collected over an 8 hour sampling period. Samples will be collected in appropriate sized Summa canisters that have been certified clean by the laboratory and samples will be analyzed by using USEPA Method TO-15. Flow rate for both purging and sampling will not exceed 0.2 L/min. 24-hours following soil vapor probe installation, 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.

As part of the vapor intrusion evaluation, a tracer gas will be used in accordance with 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 will be performed a second time to confirm the integrity of the probe seals.

5.3.3.1 Soil Vapor Sample Duplicates

Duplicate soil vapor and indoor samples will be collected and analyzed for quality assurance purposes. Duplicate samples will be collected at a frequency of 1 per 20 investigative soil vapor samples and 1 per 20 investigative indoor air samples and will be submitted to the laboratory as "blind" samples. If less than 20 samples are collected during a particular sampling event, one duplicate sample will be collected.

5.3.4 PFAS Sampling Procedures

Soil sampling for PFAS analysis will be completed during the remedial action. All 66 confirmation soil samples collected during the proposed sampling event will be analyzed for PFAS. Field personnel conducting PFAS sampling will wear clothing and use equipment which does not contain PFAS materials including: powderless nitrile gloves, natural rubber overboots, and synthetic and natural fiber clothing. Clothing advertised as waterproof, water-repellant, and/or dirt and/or stain resistant will not be worn. Personal hygiene products with conditioning agents will be avoided prior to the sampling event. Insect repellent and sunscreen will be avoided. Consumption of food and/or beverages will be strictly prohibited during sampling activities, excluding bottled water for hydration. Ballpoint pens will be used as the sole writing instrument to complete labels and record field notes. Waterproof field books, including "Rite-in-Rain"™ will be avoided.

Only sampling equipment known to be devoid of PFAS containing materials will be used. Acceptable materials for sampling include stainless steel, HDPE, PVC, silicone, acetate, and polypropylene. In general, PFAS-free pumps, tubing, interface probes, soil sampling equipment, and bottleware will be considered prior to the sampling event. It is not anticipated that groundwater samples will be collected for PFAS analysis; however, if required, peristaltic pumps will be utilized as the depth of groundwater is less than 20-feet. If groundwater is determined to be greater than 20 feet deep, bladder pumps (QED Sample Pro, or equivalent) with a fluoropolymer-free bladder will be used. HDPE will be used for tubing, soil sampling equipment, and bottleware.

Field personnel will follow standard discrete soil sampling and low flow procedures when sampling for PFAS. When possible, disposable and dedicated equipment will be used for each sample location to avoid potential cross contamination and limit errors from inadequate decontamination between samples. Bladder pumps and/or peristaltic pump tubing will not be re-used and therefore decontamination of sampling equipment between samples will not be necessary. Nitrile gloves will be changed between each step during set up and sampling.

When sampling for PFAS, 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 plumbers tape and sample bottle cap liners with a PTFE layer.

Whenever an action occurs outside of procedure, such as the writing of field notes, nitrile gloves will be changed. Sampling equipment will be staged 5-feet away from the boring or open wellhead. Equipment not directly related to sampling will be staged in a separate area away from the boring or open wellhead. When inserting the tubing into the well, the surrounding platform will be avoided as a source of transference. While stabilizing the well, the pump will not be allowed to stop as backflow from the water quality meter can pose a risk to cross contamination. Once stability has been achieved, sampling will occur. PFAS sample bottleware must be made of HDPE and bottleware must be filled to the container neck. Soil sample bottleware must only be filled half-way. The PFAS field

and equipment blanks will be collected immediately following completion of PFAS sampling at the frequency discussed above (Sections 5.3.1.1 and 5.3.2.1).

The PFAS compounds to be analyzed includes: perfluorobutanesulfonic acid, perfluorohexanesulfonic acid, perfluoroheptanesulfonic acid, perfluorooctanessulfonic acid, perfluorodecanesulfonic acid, perfluorobutanoic acid, perfluoropentanoic acid, perfluorohexanoic acid, perfluoroheptanoic acid, perfluorooctanoic acid, perfluorononanoic acid, perfluorodecanoic acid, perfluoroundecanoic acid, perfluorododecanoic acid, perfluorotridecanoic acid, perfluorotetradecanoic acid, 6:2 fluorotelomer sulfonate, 8:2 fluorotelomer sulfonate, perfluroroctanesulfonamide, n-methyl perfluorooctanesulfonamidoacetic acid, and n-ethyl perfluorooctanesulfonamidoacetic acid.

5.4 Sample Containers and Handling

Certified, commercially clean sample containers will be obtained from the analytical laboratory. The laboratory will also prepare and supply the required field blank sample containers and reagent preservatives. Sample containers, including the field blank containers, will be placed in plastic coolers by the laboratory. These coolers will be received by the field sampling team within 24 hours of their preparation in the laboratory. Prior to the commencement of field work, Langan field personnel will fill the plastic coolers with regular ice only in Ziploc® bags (or equivalent) to maintain a temperature of 4°C±2° C.

Samples collected in the field for laboratory analysis will be placed directly into the laboratory-supplied sample containers. Samples will then be placed and stored on-ice in laboratory provided coolers until shipment to the laboratory. The temperature in the coolers containing samples and associated field blanks will be maintained at a temperature of 4°C±2°C while on-site and during sample shipment to the analytical laboratory.

Possession of samples collected in the field will be traceable from the time of collection until they are analyzed by the analytical laboratory or are properly disposed. Chain-of-custody procedures, described in Section 5.9, will be followed to maintain and document sample possession. Samples will be packaged and shipped as described in Section 5.6.

5.5 Sample Preservation

Sample preservation measures will be used in an attempt to prevent sample decomposition by contamination, degradation, biological transformation, chemical interactions and other factors during the time between sample collection and analysis. Preservation will commence at the time of sample collection and will continue until analyses are performed. Should chemical preservation be required, the analytical laboratory will add the preservatives to the appropriate sample containers before shipment to the office or field. Samples will be preserved according to the requirements of the specific analytical method selected, as shown in Attachment C.

5.6 Sample Shipment

5.6.1 Packaging

Sample containers will be placed in plastic coolers. Regular ice only in Ziploc® bags (or equivalent) will be placed around sample containers. Cushioning material will be added around the sample containers if necessary. Chains-of-custody and other paperwork will be placed in a Ziploc® bag (or equivalent) and placed inside the cooler and custody seals will be affixed to one side of the cooler at a minimum. If the samples are being shipped by an express delivery company (third-party courier, e.g., FedEx) then laboratory address labels will be placed on top of the cooler.

5.6.2 Shipping

Standard procedures to be followed for shipping environmental samples to the analytical laboratory are outlined below.

- All environmental samples will be transported to the laboratory from the site or Langan office by a laboratory provided courier under the chain-of-custody protocols described in Section 5.9. A third-party courier may be used if necessary.

- Prior notice will be provided to the laboratory regarding when to expect shipped samples. If the number, type or date of shipment changes due to site constraints or program changes, the laboratory will be informed.

5.7 Decontamination Procedures

Though not anticipated, decontamination procedures will be used if non-dedicated sampling equipment is utilized during the RI. Field sampling equipment that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and tap water scrub to remove visual contamination
2. Generous tap water rinse
3. Distilled/de-ionized water rinse

Field sampling equipment that will be used for the collection of PFAS samples that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and clean, PFAS-free water scrub to remove visual contamination
2. Generous clean, PFAS-free water rinse

5.8 Residuals Management

Debris (e.g., paper, plastic and disposable PPE) will be collected in plastic garbage bags and disposed of as non-hazardous industrial waste. Debris is expected to be transported to a local municipal landfill for disposal. If applicable, residual solids (e.g., leftover soil cuttings) will be placed back in the borehole from which it was sampled. If gross contamination is observed, soil will be collected and stored in Department of Transportation (DOT)-approved 55-gallon drums in a designated storage area at the site. The residual materials stored in a designated storage area at the site for further characterization, treatment or disposal.

5.9 Chain of Custody Procedures

A chain-of-custody protocol has been established for collected samples was and will be followed during sample handling activities in both field and laboratory operations. The primary purpose of the chain-of-custody procedures is to document the possession of the samples from collection through shipping, storage and analysis to data reporting and disposal. Chain-of-custody refers to actual possession of the samples. Samples are considered to be in custody if they are within sight of the individual responsible for their security or locked in a secure location. Each person who takes possession of the samples, except for third-party shipping couriers, is responsible for sample integrity and safe keeping. Chain-of-custody procedures are provided below:

- Chain-of-custody will be initiated by the laboratory supplying the pre-cleaned and prepared sample containers. Chain-of-custody forms will accompany the sample containers.
- Following sample collection, the chain-of-custody form will be completed for the samples collected. The sample identification number, date and time of sample collection, analysis requested and other pertinent information (e.g., preservatives) will be recorded on the form. Entries will be made in waterproof, permanent blue or black ink.
- Langan field personnel will be responsible for the care and custody of the samples collected until the samples are transferred to another party, dispatched to the laboratory, or disposed. The sampling/Field Team Leader will be responsible for enforcing chain-of-custody procedures during field work.
- When the form is full or when all samples have been collected that will fit in a single cooler, the sampling/Field Team Leader will check the form for possible errors and sign the chain-of-custody form. Any necessary corrections will be made to the record with a single strike mark, dated, and initialed.

Samples will be packaged for shipment or pickup via courier to the laboratory with the appropriate chain-of-custody form. If applicable, a shipping bill will be completed for each cooler and the shipping bill number recorded on the chain-of-custody form. A copy of the form will be retained by the Langan sampling team for the project file, and the original will be sent to the laboratory with the samples. Bills of lading will also be retained as part of the documentation for the chain-of-

custody records, if applicable. When transferring custody of the samples, the individuals relinquishing and receiving custody of the samples will verify sample numbers and condition and will document the sample acquisition and transfer by signing and dating the chain-of-custody form. This process documents sample custody transfer from the sampler to the analytical laboratory.

Laboratory chain-of-custody will be maintained throughout the analytical processes as described in the laboratory's Quality Assurance Manual. The analytical laboratory will provide a copy of the chain-of-custody in the analytical data deliverable package. The chain-of-custody becomes the permanent record of sample handling and shipment.

5.10 Laboratory Sample Storage Procedures

The subcontracted laboratory will use a laboratory information management system (LIMS) to track and schedule samples upon receipt by the analytical laboratories. Any sample anomalies identified during sample log-in must be evaluated on individual merit for the impact upon the results and the data quality objectives of the project. When irregularities do exist, Langan must be notified to discuss recommended courses of action and documentation of the issue must be included in the project file.

For samples requiring thermal preservation, the temperature of each cooler will be immediately recorded. Each sample and container will be assigned a unique laboratory identification number and secured within the custody room walk-in coolers designated for new samples. Samples will be, as soon as practical, disbursed in a manner that is functional for the operational team. The temperature of all coolers and freezers will be monitored and recorded using a certified temperature sensor. Any temperature excursions outside of acceptance criteria (i.e., below 2°C or above 6°C) will initiate an investigation to determine whether any samples may have been affected. Following analysis, the laboratory's specific procedures for retention and disposal will be followed as specified in the laboratory's SOPs and/or QA manual.

6.0 DATA REDUCTION, VALIDATION, AND REPORTING

6.1 Introduction

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the USEPA SW-846 appropriate for the analyses to be performed, and be reported in standard format.

The completed copies of the chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

6.2 Data Reduction

The Analytical Services Protocol (ASP) Category B data packages and an electronic data deliverable (EDD) will be provided by the laboratory after receipt of a complete sample delivery group. The Project Manager will immediately arrange for archiving the results and preparation of result tables. These tables will form the database for assessment of the site contamination condition.

Each EDD deliverable must be formatted using a Microsoft Windows operating system and the NYSDEC data deliverable format for EQuIS. To avoid transcription errors, data will be loaded directly into the American Standard Code for Information Interchange (ASCII) format from the LIMS. If this cannot be accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All EDDs must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

6.3 Data Validation

Data validation will be performed in accordance with the USEPA validation guidelines for organic and inorganic data review. Validation will include the following:

- Verification of the QC sample results,
- Verification of the identification of sample results (both positive hits and non-detects),
- Recalculation of 10 percent of all investigative sample results, and
- Preparation of Data Usability Summary Reports (DUSR).

A DUSR will be prepared and reviewed by the QAO before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and COC procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each SDG will follow. For each of the organic analytical methods, the following will be assessed:

- Holding times;
- Instrument tuning;
- Instrument calibrations;
- Blank results;
- System monitoring compounds or surrogate recovery compounds (as applicable);
- Internal standard recovery results;
- MS and MSD results;
- Target compound identification;
- Chromatogram quality;
- Pesticide cleanup (if applicable);
- Compound quantitation and reported detection limits;
- System performance; and
- Results verification.

For each of the inorganic compounds, the following will be assessed:

- Holding times;
- Calibrations;
- Blank results;
- Interference check sample;
- Laboratory check samples;
- Duplicates;
- Matrix Spike;
- Furnace atomic absorption analysis QC;
- Inductively couple plasma (ICP) serial dilutions; and
- Results verification and reported detection limits.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected. The associated number indicates the approximate sample concentration necessary to be detected significantly greater than the level of the highest associated blank;
- "UJ" - Not detected. Quantitation limit may be inaccurate or imprecise;
- "J" - Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the analytical method;
- "N" – Tentative identification. Analyte is considered present in the sample;
- "R" – Unreliable result; data is rejected or unusable. Analyte may or may not be present in the sample; and,
- No Flag - Result accepted without qualification.

7.0 QUALITY ASSURANCE PERFORMANCE AUDITS AND SYSTEM AUDITS

7.1 Introduction

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the QAO. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning as an independent body and reporting directly to corporate quality assurance management, the QAO may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

7.2 System Audits

System audits may be performed by the QAO or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may occur.

7.3 Performance Audits

The laboratory may be required to conduct an analysis of Performance Evaluation samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

7.4 Formal Audits

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management. Non-compliances will be logged, and documented through audit findings, which are attached to and are a part of the integral audit report. These audit-finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

8.0 CORRECTIVE ACTION

8.1 Introduction

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

8.2 Procedure Description

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and,
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 8.1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

FIGURE 8.1

CORRECTIVE ACTION REQUEST
Number: _____ Date: _____
TO: _____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____
CONDITION:
REFERENCE DOCUMENTS:
RECOMMENDED CORRECTIVE ACTIONS:
_____ _____ _____ _____ _____ _____ Originator Date Approval Date Approval Date
RESPONSE
CAUSE OF CONDITION
CORRECTIVE ACTION (A) RESOLUTION (B) PREVENTION (C) AFFECTED DOCUMENTS
C.A. FOLLOWUP: CORRECTIVE ACTION VERIFIED BY: _____ DATE:_____

9.0 REFERENCES

NYSDEC. Division of Environmental Remediation. DER-10/Technical Guidance for Site Investigation and Remediation, dated May 3, 2010.

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

Taylor, J. K., 1987. Quality Assurance of Chemical Measurements. Lewis Publishers, Inc., Chelsea, Michigan

USEPA, 1986. SW-846 "Test Method for Evaluating Solid Waste," dated November 1986. U.S. Environmental Protection Agency, Washington, D.C.

USEPA, 1987. Data Quality Objectives for Remedial Response Actions Activities: Development Process, EPA/540/G-87/003, OSWER Directive 9355.0-7 - U.S. Environmental Protection Agency, Washington, D.C.

USEPA, 1992a. CLP Organics Data Review and Preliminary Review. SOP No. HW-6, Revision #8, dated January 1992. USEPA Region II.

USEPA, 1992b. Evaluation of Metals Data for the Contract Laboratory Program (CLP) based on SOW 3/90. SOP No. HW-2, Revision XI, dated January 1992. USEPA Region II.

USEPA. Hazardous Waste Support Section. Analysis of Volatile Organic Compounds in Air Contained in Canisters by Method TO-15. SOP No. HW-31, Revision #6, dated June 2014.

FIGURES

Notes:
1. World topographic basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online.

LANGAN
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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

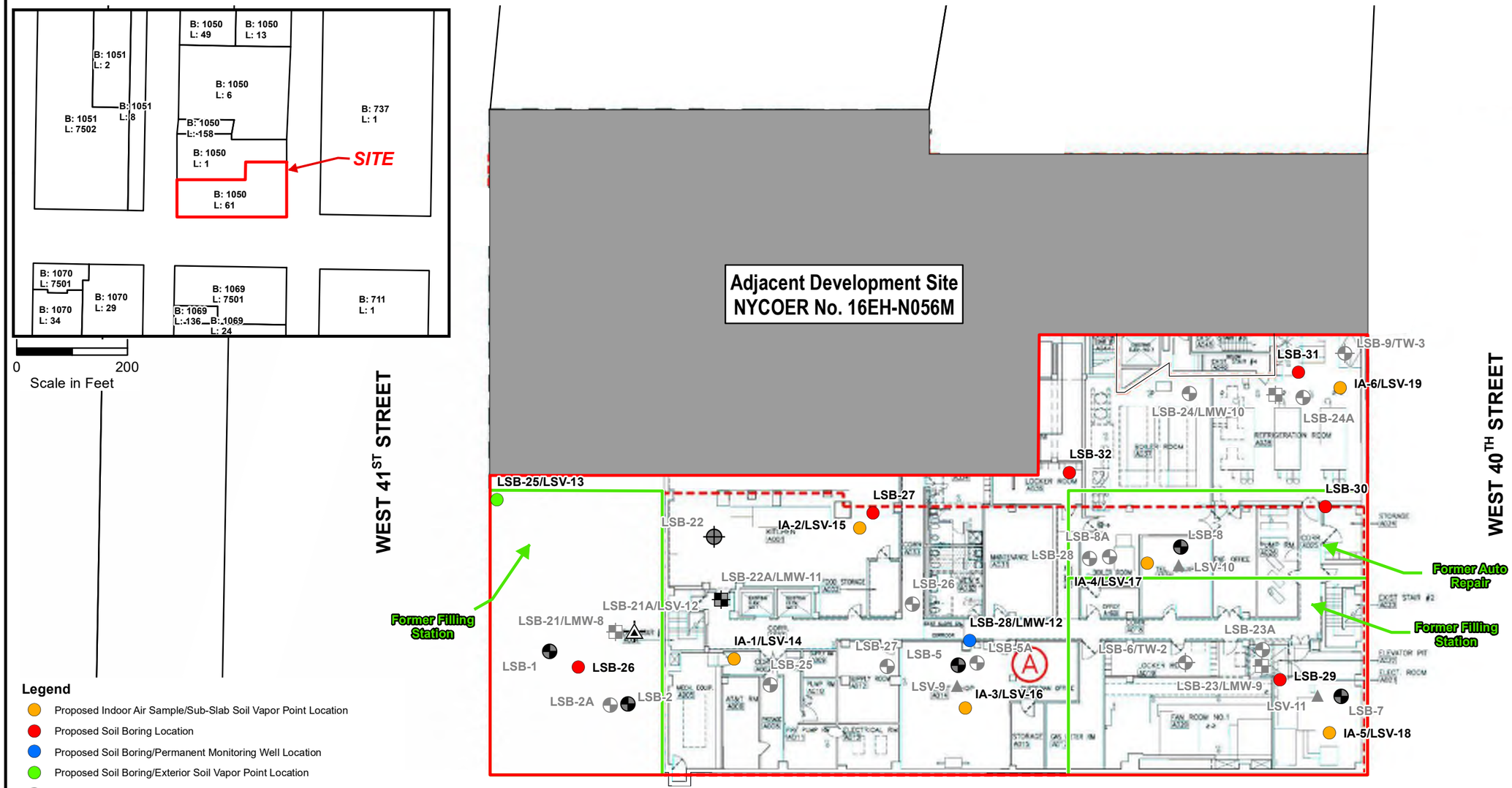
Project
550 10TH AVENUE REDEVELOPMENT

BLOCK No. 1050
LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
SITE LOCATION MAP

Project No. 100674402	Figure 1
Date 4/12/2021	
Scale 1"=2,000'	
Drawn By IHB	
Submission Date 4/12/2021	

Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\MXD\Environmental_Figures\2021-03 - Phase 2 RIR\Figure 1 - Site Location Map.mxd Date: 4/12/2021 User: ibaker Time: 11:38:22 AM



Legend

- Proposed Indoor Air Sample/Sub-Slab Soil Vapor Point Location
- Proposed Soil Boring Location
- Proposed Soil Boring/Permanent Monitoring Well Location
- Proposed Soil Boring/Exterior Soil Vapor Point Location
- Remedial Investigation Supplemental Soil Boring Location (2021)
- Remedial Investigation Supplemental Soil Boring/Permanent Monitoring Well Location (2021)
- Remedial Investigation Supplemental Soil Boring/Soil Vapor Location (2021)
- Langan Soil Vapor Location (2019)
- Langan Soil Boring Location (2018)
- Langan Soil Boring/Permanent Monitoring Well Location (2018)
- Langan Soil Boring Location (2017)
- Langan Soil Boring/Temporary Well Point Location (2017)
- Tax Lot 61 Proposed Redevelopment Extents (Phase 2)
- Tax Lot 1 Redevelopment Extents (Phase 1)
- Historical Use of Concern
- Existing Building Outline

Notes:
1. Property boundary digitized from basemap and measurements provided on the New York City Digital Tax Map maintained online by the Department of Finance
2. Building layout imagery provided in Covenant House Building Massing & Stacking, 8 May 2017, by F X Fowle, Denham, Wolf and CH Phase 2 plan, 14 July 2018, by Handel Architects, LLP.
3. Soil boring, monitoring well, and soil vapor sampling locations based on field measurements collected during November 2017, December 2019, May 2019, and February 2021 site investigations.
4. Historical filling station and automobile repair locations obtained from Sanborn Fire Insurance Maps provided in the Phase I Environmental Site Assessment prepared by TRC Engineers, Inc., dated September 2015.
5. Remediation of Tax Lot 1 (Phase 1) was completed in June 2020.

LANGAN
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Parsippany, NJ 07054
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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying, Geology and Landscape Architecture, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
550 10TH AVENUE REDEVELOPMENT
BLOCK No. 1050, LOT No. 61
MANHATTAN
NEW YORK COUNTY NEW YORK

Drawing Title
PROPOSED REMEDIAL INVESTIGATION LOCATIONS

Project No.	100674402
Date	5/17/2021
Scale	1"=25'
Drawn By	ATR
Last Revised	5/17/2021
Figure	2

Path: \\langan.com\data\PAR\data4\100674401\Project Data\ArcGIS\MXD\Environmental_Figures\2021-05 BCP RIWP\Figure 5 - Proposed Remedial Investigation Locations.mxd

ATTACHMENT A

Resumes

JOSEPH CONBOY

STAFF CHEMIST

ENVIRONMNETAL

Mr. Conboy has seven years of environmental chemistry, quality assurance, and environmental database management experience, with a current emphasis on validation of laboratory data for submittal to NJDEP via the New Jersey Data of Known Quality Protocols and to NYSDEC. Previous work experience includes performing validation of data for projects in USEPA Regions 2 and 3 while employing appropriate validation guidelines for each region, managing large data sets, updating appropriate regulatory limits, performing statistical evaluations, and preparing electronic data deliverables and report deliverables using the Earthsoft EQuIS database program, and acted as an intermediary between project managers, field staff, and laboratories. Mr. Conboy also has experience in field sampling techniques and maintains current OSHA HAZWOPER certification.

EDUCATION

B.Sc., Chemistry with a minor in Mathematics
Rowan University

CERTIFICATIONS & TRAINING

OSHA 40-Hour HAZWOPER 29 CFR 1910.120(e)(4) Certification

NJ Analytical Guidance and Data Usability Training

USEPA Data Validation Training

Earthsoft EQuIS Environmental Database Training

SELECTED PROJECTS

- 1400 Ferris, Bronx, NY – Completed validation of soil and groundwater data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOCs and SVOCs including 1,4-dioxane, and tangentially used based on professional judgment to perform validation of PFAS data.
- Broome Street Parking Lot, NY - Completed validation of waste characterization data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOCs, SVOCs, herbicides, PCBs, pesticides, metals including mercury, ignitability temperature, pH, reactive cyanide, reactive sulfide, cyanide, and hexavalent chromium. Toxicity characteristic leachate procedure extraction data for VOCs, SVOCs, herbicides, pesticides, metals, and mercury were also validated.
- 215 North 10th Street, Brooklyn, NY - Completed validation of soil and groundwater data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data.
- 35 Commercial Street, Brooklyn, NY - Completed validation of soil data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data, and tangentially used based on professional judgment to perform validation of PFAS data.
- Suffolk Street, Lower East Side, NY- Completed validation of soil, groundwater, and soil vapor data and prepared the Data Usability Summary Report for submittal to NYSDEC. USEPA Region II

guidelines, with aide from National Functional Guidelines, were employed to perform validation of VOC, VOCs by USEPA TO-15, SVOC, SVOC SIM, herbicide, PCB, pesticide, metals, mercury, cyanide, hexavalent chromium, trivalent chromium data, and tangentially used based on professional judgment to perform validation of PFAS data.

- Managed a database for a confidential client containing 10+ years of environmental chemical data from multiple laboratories, requiring select data validation in accordance with New Jersey Data of Known Quality Protocols and identifying areas of delineation from historic field information. Once identified, NJDEP designated groundwater, surface water, soil, sediment, soil vapor, and custom screening criteria were researched and applied to each area, requiring individualized flagging for reporting.*
- Prepared the New Jersey Data of Known Quality Protocol Data Usability Evaluation and managed the database for a confidential client for a data set greater than 20 years old. A DUE or any validation effort was not prepared in the 20 years prior to current. This included data from variations of methods for volatile organic compounds, semivolatile organic compounds, total and dissolved metals, pesticides, herbicides, natural attenuation parameters, and per- and polyfluoroalkyl substances in multiple media.*
- Performed 200+ Stage 2a validations for a combined 87-acre USEPA designated Corrective Action site under the Resource Conservation and Recovery Act, including a quick-turn USEPA required PCB by soxhlet extraction investigation across multiple plants. Once a former train car painting facility, USEPA required a quick-turn PCB by soxhlet extraction soil investigation.
- Preparation of a quality assurance program for a confidential client in West Virginia. A quick turn QAPP was prepared in a service location new to the consultant, resulting in research into state requirements for data usability and auditing newly employed laboratories. The QAPP was understood to be prepared for groundwater only, but the client did not reveal the need for sediment and soil. Two QAPPs were submitted for review to governing agencies.*
- Used statistical software to determine a localized background upper confidence limit of chromium for a confidential client's sand and gravel site. Validation was used to confirm laboratory procedures, and data was used in ProUCL calculations to compare to researched background chromium levels for Pennsylvania soils. *
- Prepared daily perimeter dust and air monitoring summaries and validation of low level mirex data for a confidential client's superfund site. Low level mirex data was generated by university laboratories and subject to validation following national functional guidelines to aide in river clean-up, including sediment, surface water, and treatment system water matrices.*

**Project completed prior to employment at LANGAN.*

DANA MONZ

DATA ANALYST

CAD/GIS

1 year in the industry

Proposed Title: Field Technician

Ms. Monz is a data analyst with experience in database design, management and visualization using EarthSoft's EQuIS™ database in support of environmental site characterizations for sites regulated under federal and state compliance programs. Her expertise includes integration of analytical databases and coordination with GIS users.

In her current role Dana, assists project teams with planning and implementation of project databases and data visualization. This includes coordinating with field staff and laboratories to define, workflows, SOPs and ensure the receipt of the proper deliverables for field and lab data; reviewing and managing project data and information using EQuIS™, Microsoft® Access, and Excel; generating data reports including tables, graphs, charts, and GIS compatible files; and generating and reviewing electronic data deliverables following project or agency specific formats.

Education

B.A., Environmental Studies
Colgate University

Professional Registration

OSHA 40-Hour HAZWOPER

OSHA 10-Hour Construction

Work History

Langan
Data Analyst
7/16/2018 – Present

SELECTED PROJECTS

Gowanus Canal Northside, Brooklyn, NY – Data Analyst. Loaded and maintained soil, groundwater, and soil vapor data in an EQuIS database for a remedial investigation of a New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) site. Provided final report deliverables including; sample summary; tags; and exceedance summary exports from EQuIS.

2 Ingraham Street, Brooklyn, NY – Data Analyst. Collected soil samples to investigate Areas of Concern (AOCs) established in the Supplemental Remedial Investigation Work Plan (SRIWP). Loaded and maintained soil, groundwater, and soil vapor data in an EQuIS database for a supplemental remedial investigation of a New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) site. Provided final report deliverables, including sample summary tables and tag tables. Submitted data to NYSDEC.

Willets Point, Brooklyn, NY – Data Analyst. Coordinated with project team and determined appropriate sample nomenclature for the site, which contained multiple areas of concern. Loaded and maintained soil, groundwater, and soil vapor data in an EQuIS database for a remedial investigation and waste characterization of a New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) site. Responsible for coordination with GIS team to get data from EQuIS into the site specific GIS web viewer. Provided final report deliverables including; sample summary; tags; and exceedance summary exports from EQuIS.

41 Kensico Drive, Mount Kisco, NY – Data Analyst. Loaded and maintained soil, groundwater, and soil vapor data in an EQuIS database for a remedial investigation and waste characterization of a New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) site. Review NYSDEC Screening and Assessment of Contaminated Sediment (SACS) Freshwater Sediment Guidance Values and NYSDEC Part 703.5, Division of Water Technical and Operational Guidance Series (TOGs) (1.1.1) Class C criteria and load both sets to EQuIS database to use as comparison criteria for the analysis of data.

550 W 20th Street, New York, NY – Data Analyst. Loaded and maintained soil, groundwater, and soil vapor data in an EQuIS database for a Phase II Environmental Site Investigation. Review New York City Department of Environmental Protection (NYCDEP) Limitations for Effluent to Sanitary or Combined Sewers and load comparison criteria to EQuIS for analysis of DEP Effluent Discharge Sample. Provided final report deliverables including; sample summary; tags; and exceedance summary exports from EQuIS.

EQuIS Management and NYSDEC deliverables – Data Analyst. Loaded and maintained soil, groundwater, and soil vapor data in an EQuIS database for a remedial investigation and waste characterization of a New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) site. Provided final report deliverables including; sample summary; tags; and exceedance summary exports from EQuIS. Completed this work for the following projects:

- **82 King Street, New York, NY**
- **416 Kent Avenue, Brooklyn, NY**
- **420 Kent Avenue, Brooklyn, NY**
- **702 Nostrand Avenue, Brooklyn, NY**
- **ABC Block 25, 4-40 44th Avenue, Long Island City, NY**
- **ABC Block 26, 5-25 46th Avenue, Long Island City, NY**
- **ABC Block 27, 5-46 46th Avenue, Long Island City, NY**
- **335 Bond Street, Brooklyn, NY**
- **29 53rd Street, Brooklyn, NY**
- **Kings Plaza Shopping Center, Brooklyn, NY**
- **DuPont Stauffer Landfill, Newburgh, NY**
- **175-225 Third Street, New York, NY**
- **Silvercup West - NYPA, Queens, NY**
- **Greenpoint Marina, Brooklyn, NY**
- **491 Wortman Avenue, Brooklyn, NY**
- **Gerard and 146th Street, The Bronx, NY**
- **12 Franklin Street, Brooklyn, NY**
- **27-01 Jackson Avenue, Long Island City, NY**
- **627 Smith Street, Brooklyn, NY**
- **561 Greenwich Avenue, New York, NY**
- **23-10 Queens Plaza South, Long Island City, NY**
- **473 President Street, Brooklyn, NY**
- **4650 Broadway, New York, NY**
- **2420 Amsterdam Avenue, New York, NY**
- **10-37 Beach Street, New York, NY**
- **538-544 Hudson Street, New York, NY**
- **26-32 Jackson Avenue, Long Island City, NY**
- **1095 Southern Boulevard, The Bronx, NY**
- **432 Rodney Street, Brooklyn, NY**
- **300 West 122nd, New York, NY**

Amanda Forsburg, CHMM

Project Scientist

Environmental Oversight, Remedial Investigation, Remedial Action

9 years in the industry ~ 9 years with Langan

Ms. Forsburg has over nine years of experience that includes working on environmental projects, particularly investigation and remediation of environmental contamination. She has assisted in remedial investigations and has been involved in the collection of field data and assisted in the preparation of reports and other environmental regulatory documents for projects in New Jersey and New York.

Ms. Forsburg's field experience includes investigation and remediation of contaminated sites including the collection of soil, groundwater, and air samples for environmental analysis, supervision of injections and remedial excavations, and the completion of air monitoring to ensure OSHA compliance on HAZWOPER sites. Office experience includes management of field investigation and remediation as well as completion of proposals, Phase I Environmental Site Assessments, remedial investigation reports, and remedial closure reports in support of these activities. Ms. Forsburg has worked on projects under regulatory oversight of the New Jersey Department of Environmental Protection (NJDEP), New York State Department of Environmental Conservation (NYSDEC), and New York City Office of Environmental Remediation (NYCOER).

Selected Projects

NYSDEC Brownfield Redevelopment, Remedial Investigation and Remediation Action – 363 and 365 Bond Street, Brooklyn, NY
NYSDEC Brownfield Redevelopment, Remedial Investigation – Fashion Outlets of Niagara Falls, NY
NYSDEC Spills Redevelopment, Remedial Action – 540 West 26th Street, New York, NY
NYSDEC Spills Redevelopment, Remedial Investigation and Remedial Action – 101 Murray Street, New York, NY
NYSDEC Spills Redevelopment, Remedial Investigation and Remedial Action – 110 University Place, New York, NY
NYSDEC Spills Redevelopment, Remedial Action, Lowe's Home Centers, Kings Plaza Site Redevelopment – Brooklyn, NY
NYSDEC Spills Remediation, Con Edison Soil Remediation - Bronx, NY
NYSDEC Spills Remediation, Con Edison NAPL Monitoring and Removal, Various Sites – Manhattan, NY
NYCOER E-Designation Remediation and Volunteer Cleanup Program Redevelopment, Remedial Investigation and Remedial Action – 400 Park Avenue South, New York, NY
NYCOER E-Designation Remediation and Volunteer Cleanup Program Redevelopment, Remedial Investigation and Remedial Action – 540 West 53rd Street, New York, NY
Remedial Action – 508 West 24th Street, New York, NY

Education

B.A., Environmental Studies
Bucknell University

B.A., Environmental Geology
Bucknell University

Professional Registration

Certified Hazardous Materials Manager (CHMM)

OSHA 29 CFR 1910.120 Certification (HAZWOPER)

Professional Affiliations

New Jersey Society of Women Environmental Professionals (NJSWEP)

Association of Environmental and Engineering Geologists – *New York-Philadelphia Chapter Secretary*

Professional Women in Construction - *New York Chapter Program Committee*

Alliance of Hazardous Materials Professionals New Jersey Chapter (AHMPNJ)

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NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 505 W 19th Street, New York, NY
NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 53 West 53rd Street (MoMA Expansion), New York, NY
NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 525 West 52nd Street, New York, NY
NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 412 Greenwich Street, New York, NY
NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 508 West 24th Street, New York, NY
NYCOER E-Designation Remediation, Remedial Investigation and Remedial Action – 68 Charlton Street, New York, NY
NYCDEP Remediation, Remedial Investigation and Remedial Action – 225 East 39th Street, New York, NY
Sky View Parc Mixed-Use Construction, Sub-Slab Vapor Ventilation System Construction – Flushing, NY
Liberty Plaza Redevelopment Site, Remedial Investigation and Remedial Action – Randallstown, MD
Former Penick Corporation Facility RCRA Site, Remedial Investigation and Remedial Action – Montville, NJ
Former Pan Graphics Facility, Soil and Groundwater Remediation – Garfield, NJ
Former Pan Graphics Facility, Sediment Investigation and Cap Construction – Lodi, NJ
Former Flintkote Facility, Soil and Groundwater Investigation – East Rutherford, NJ
Interport Site, Impacted Soils Delineation and Remediation – Newark, NJ
Lowe's Home Center Store, Sub-Slab Vapor Ventilation System O&M – Eatontown, NJ
Lowe's Home Center Store, Sub-Slab Methane Gas Ventilation System O&M – Woodbridge, NJ
Lowe's Home Center Store, Sub-Slab Vapor Barrier Construction – Rosedale, NY
Stop & Shop, Groundwater and Indoor Air Monitoring – Emerson, NJ
Stop & Shop, Methane Gas Ventilation System O&M – Raritan, NJ
Stop & Shop, Sub-Slab Vapor Ventilation System O&M – New Paltz, NY
Former First Aviation Services Facility, Groundwater Monitoring and Remediation, Teterboro, NJ
Phase I Environmental Site Assessments and Due Diligence Investigations, Various Sites – NJ and NY

Christopher McMahon, CHMM

Associate

Brownfield Redevelopment, Environmental Site Assessments, Site Investigation/Remedial Actions, Vapor Intrusion Investigations

15 years in the industry ~ 9 years with Langan

Mr. McMahon is a consulting geologist whose primary focus within his tenure at Langan has been in providing environmental support to redevelopment sites within the metropolitan New York area. He has experience with projects in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup, Voluntary Cleanup and Spill Programs, and New York City Office of Environmental Remediation E-Designated and New York City Voluntary Cleanup Program sites. These projects have included the completion of Phase I environmental site assessments, Phase II and remedial investigations, UST closures, NYSDEC closures and remedial excavation oversight for off-site disposal and/or treatment. Mr. McMahon also has significant field experience including implementation and management of all phases of environmental projects involving soil, sediment, groundwater, surface water, and soil vapor contamination including Phase I inspections, Phase II site investigations, Remedial Investigations, and Remedial Actions.

Many of these projects have included his oversight of remedial actions to clean up or mitigate hazardous waste sites in rural, urban, and industrial settings. These remedial action designs have included in-situ soil remedial injections, contaminated soil removal/disposal management plans, and soil vapor intrusion mitigation systems including advanced vapor barriers and sub-slab depressurization systems.

Selected Projects

NYSDEC Brownfield Redevelopment 363 and 365 Bond Street, Brooklyn, NY
NYSDEC Brownfield Redevelopment, Fashion Outlets of Niagara Falls, NY
NYSDEC Spills Redevelopment, 540 West 26th Street, New York, NY
NYSDEC Spills Redevelopment, 101 Murray Street, New York, NY
NYSDEC Spills Redevelopment, 110 University Place, New York, NY
NYSDEC Spills Redevelopment, Grant Park, Yonkers, NY
NYSDEC Spills Redevelopment, The Shops At Nanuet, Nanuet, NY
NYCOER E-Designation Remediation, 505 W 19th Street, New York, NY
NYCOER E-Designation Remediation, 53 West 53rd Street, New York, NY
NYCOER E-Designation Remediation, 525 West 52nd Street, New York, NY
NYCOER E-Designation Remediation, 412 Greenwich Street, New York, NY
NYCOER E-Designation Remediation, 508 West 24th Street, New York, NY
NYSDEC (Region 7) Site Remedial Investigation, Hillcrest, NY
Former Manufactured Gas Plant Site Remedial Investigation, Geneva, NY
NYSDEC (Region 2) Superfund Site Remedial Investigation, Jamaica, NY
NYSDEC (Region 5) Superfund Site Remedial Investigation, Whitehall, NY
Former Manufactured Gas Plant Site Investigation/Confidential Client, Mechanicville, NY
Remedial Investigation of Industrial Facility/Confidential Client, Batavia, NY
OGS Geotechnical Survey for Construction, Rome, NY

Education

B. A., Geology, State University of New York College at Potsdam
With Honors in Geology and Environmental Science

Professional Registration

Certified Hazardous Materials Manager (CHMM)

OSHA 29 CFR 1910.120 Certification for Hazardous Waste Operations and Emergency Response

OSHA Certification for Hazardous Waste Site Supervisor

Red Cross CPR & First Aid Training

LANGAN

Steven Ciambruschini, PG, LEP

Principal/Vice President
Environmental Site Assessments/Investigations, Brownfield Remediation, UST Management

33 years in the industry ~ 28 years with Langan

Mr. Ciambruschini has over 30 years of experience in hydrogeologic and environmental investigations including management of environmental and geotechnical investigations relating to petroleum and chlorinated solvent spill sites, underground storage tank sites, manufactured gas plant sites, landfills, wastewater treatment facilities and industrial/commercial sites. His experience includes managing environmental compliance audits, remedial investigation, pre-acquisition due diligence and permitting assessment, feasibility studies and design, construction and operation of complex innovative remediation systems to treat, contain and recover contaminated soil and groundwater. These projects are managed under various NJDEP, PADEP, NYDEC, NYCDEP and CTDEP programs. Mr. Ciambruschini provides consultation to a diverse group of clients including private developers, utilities, retail and industrial facilities and is expert in assessing remediation options and funding options under various state and federal grant, loan and tax reimbursement programs including Brownfield programs.

Selected Projects

- Brodson Property, Montville NJ, (RCRA, NJDEP ACO Cleanup)
- Carroll Gardens, Brooklyn, NY (NY Brownfield, EPA Superfund, OER E-designated Site)
- Con Edison Appendix B Spill Sites - Various Locations, NY
- Former MGP Site, Brooklyn, NY (VCP Site)
- Extell Development, Hudson Yards, New York, NY (NYC E-designated, NYS Brownfield Site)
- Pan Graphics, Bergen County, NJ (ISRA, LSRP)
- New Jersey Turnpike General Environmental Services Contract, Various Sites, NJ
- Liberty Science Center, Jersey City, NJ (EO 215)
- Blue Back Square, West Hartford, CT (UST, Transfer Act, Brownfield)
- Hershey, Act II Investigation (PA VCP)
- Hershey, Naugatuck, CT (CT Transfer Act)
- Halby Chemical Sites, Various Sites, DE (CERCLA)
- Unisys, Middletown CT, (CT Transfer Act, Brownfield)
- Ryder Rental, Various Sites in CT (CT Transfer Act)
- St. Marks Avenue, Brooklyn, NY (Vapor Mitigation)
- Pan Graphics, Lodi, NJ (Eco Risk Assessment, LSRP)

Education

M.S., Geology
Montclair State University

M.A., Environmental Science
Montclair University

B.S., Environmental Science
Cook College, Rutgers University

Professional Registration

Professional Geologist (PG) in NY, DE, KY

Licensed Environmental Professional (LEP) in CT

Underground Storage Tank License in NJ

Affiliations

National Ground Water Association

Association of Ground Water Scientists and Engineers

American Association of Petroleum Geologists

Environmental Professionals of Connecticut

American Bar Association (ABA)

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ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

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ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Water	1,1,1,2-Tetrachloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1,1-Trichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1,2,2-Tetrachloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.2	0.5	ug/L
EPA 8260C	Water	1,1,2-Trichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1-Dichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,1-Dichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	Bromochloromethane	0.2	0.5	ug/L
EPA 8260C	Water	1,2,3-Trichloropropane	0.2	0.5	ug/L
EPA 8260C	Water	1,2,4-Trichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,2,4-Trimethylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dibromo-3-chloropropane	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dibromoethane	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dichloroethane	0.2	0.5	ug/L
EPA 8260C	Water	1,2-Dichloropropane	0.2	0.5	ug/L
EPA 8260C	Water	1,3,5-Trimethylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,3-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	1,4-Dichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	Cyclohexane	0.2	0.5	ug/L
EPA 8260C	Water	2-Butanone	0.2	0.5	ug/L
EPA 8260C	Water	2-Hexanone	0.2	0.5	ug/L
EPA 8260C	Water	4-Methyl-2-pentanone	0.2	0.5	ug/L
EPA 8260C	Water	Acetone	1	2	ug/L
EPA 8260C	Water	Acrolein	0.2	0.5	ug/L
EPA 8260C	Water	Acrylonitrile	0.2	0.5	ug/L
EPA 8260C	Water	Benzene	0.2	0.5	ug/L
EPA 8260C	Water	Bromodichloromethane	0.2	0.5	ug/L
EPA 8260C	Water	Bromoform	0.2	0.5	ug/L

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Water	Bromomethane	0.2	0.5	ug/L
EPA 8260C	Water	Carbon disulfide	0.2	0.5	ug/L
EPA 8260C	Water	Carbon tetrachloride	0.2	0.5	ug/L
EPA 8260C	Water	Chlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	Chloroethane	0.2	0.5	ug/L
EPA 8260C	Water	Chloroform	0.2	0.5	ug/L
EPA 8260C	Water	Chloromethane	0.2	0.5	ug/L
EPA 8260C	Water	cis-1,2-Dichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	cis-1,3-Dichloropropylene	0.2	0.5	ug/L
EPA 8260C	Water	Dibromochloromethane	0.2	0.5	ug/L
EPA 8260C	Water	Dibromomethane	0.2	0.5	ug/L
EPA 8260C	Water	Dichlorodifluoromethane	0.2	0.5	ug/L
EPA 8260C	Water	Naphthalene	1	2	ug/L
EPA 8260C	Water	Ethyl Benzene	0.2	0.5	ug/L
EPA 8260C	Water	Methylcyclohexane	0.2	0.5	ug/L
EPA 8260C	Water	Hexachlorobutadiene	0.2	0.5	ug/L
EPA 8260C	Water	Isopropylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	Methyl acetate	0.2	0.5	ug/L
EPA 8260C	Water	Methyl tert-butyl ether (MTBE)	0.2	0.5	ug/L
EPA 8260C	Water	Methylene chloride	1	2	ug/L
EPA 8260C	Water	n-Butylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	n-Propylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	o-Xylene	0.2	0.5	ug/L
EPA 8260C	Water	p- & m- Xylenes	0.5	1	ug/L
EPA 8260C	Water	1,2,3-Trichlorobenzene	0.2	0.5	ug/L
EPA 8260C	Water	p-Isopropyltoluene	0.2	0.5	ug/L
EPA 8260C	Water	sec-Butylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	Styrene	0.2	0.5	ug/L
EPA 8260C	Water	tert-Butyl alcohol (TBA)	0.5	1	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Water	tert-Butylbenzene	0.2	0.5	ug/L
EPA 8260C	Water	Tetrachloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	Toluene	0.2	0.5	ug/L
EPA 8260C	Water	trans-1,2-Dichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	trans-1,3-Dichloropropylene	0.2	0.5	ug/L
EPA 8260C	Water	Trichloroethylene	0.2	0.5	ug/L
EPA 8260C	Water	Trichlorofluoromethane	0.2	0.5	ug/L
EPA 8260C	Water	Vinyl Chloride	0.2	0.5	ug/L
EPA 8260C	Water	Xylenes, Total	0.6	1.5	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Water	Acenaphthene	0.05	0.05	ug/L
EPA 8270D	Water	Acenaphthylene	0.05	0.05	ug/L
EPA 8270D	Water	Acetophenone	2.5	5	ug/L
EPA 8270D	Water	Aniline	2.5	5	ug/L
EPA 8270D	Water	Anthracene	0.05	0.05	ug/L
EPA 8270D	Water	Atrazine	0.5	0.5	ug/L
EPA 8270D	Water	Benzaldehyde	2.5	5	ug/L
EPA 8270D	Water	Benzidine	10	20	ug/L
EPA 8270D	Water	Benzo(a)anthracene	0.05	0.05	ug/L
EPA 8270D	Water	Benzo(a)pyrene	0.05	0.05	ug/L
EPA 8270D	Water	Benzo(b)fluoranthene	0.05	0.05	ug/L
EPA 8270D	Water	Benzo(g,h,i)perylene	0.05	0.05	ug/L
EPA 8270D	Water	Benzoic acid	25	50	ug/L
EPA 8270D	Water	Benzo(k)fluoranthene	0.05	0.05	ug/L
EPA 8270D	Water	Benzyl alcohol	2.5	5	ug/L
EPA 8270D	Water	Benzyl butyl phthalate	2.5	5	ug/L
EPA 8270D	Water	1,1'-Biphenyl	2.5	5	ug/L
EPA 8270D	Water	4-Bromophenyl phenyl ether	2.5	5	ug/L
EPA 8270D	Water	Caprolactam	2.5	5	ug/L
EPA 8270D	Water	Carbazole	2.5	5	ug/L
EPA 8270D	Water	4-Chloro-3-methylphenol	2.5	5	ug/L
EPA 8270D	Water	4-Chloroaniline	2.5	5	ug/L
EPA 8270D	Water	Bis(2-chloroethoxy)methane	2.5	5	ug/L
EPA 8270D	Water	Bis(2-chloroethyl)ether	2.5	5	ug/L
EPA 8270D	Water	Bis(2-chloroisopropyl)ether	2.5	5	ug/L
EPA 8270D	Water	2-Chloronaphthalene	2.5	5	ug/L
EPA 8270D	Water	2-Chlorophenol	2.5	5	ug/L
EPA 8270D	Water	4-Chlorophenyl phenyl ether	2.5	5	ug/L
EPA 8270D	Water	Chrysene	0.05	0.05	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Water	Dibenzo(a,h)anthracene	0.05	0.05	ug/L
EPA 8270D	Water	Dibenzofuran	2.5	5	ug/L
EPA 8270D	Water	Di-n-butyl phthalate	2.5	5	ug/L
EPA 8270D	Water	1,4-Dichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	1,2-Dichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	1,3-Dichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	3,3'-Dichlorobenzidine	2.5	5	ug/L
EPA 8270D	Water	2,4-Dichlorophenol	2.5	5	ug/L
EPA 8270D	Water	Diethyl phthalate	2.5	5	ug/L
EPA 8270D	Water	2,4-Dimethylphenol	2.5	5	ug/L
EPA 8270D	Water	Dimethyl phthalate	2.5	5	ug/L
EPA 8270D	Water	4,6-Dinitro-2-methylphenol	2.5	5	ug/L
EPA 8270D	Water	2,4-Dinitrophenol	2.5	5	ug/L
EPA 8270D	Water	2,4-Dinitrotoluene	2.5	5	ug/L
EPA 8270D	Water	2,6-Dinitrotoluene	2.5	5	ug/L
EPA 8270D	Water	Di-n-octyl phthalate	2.5	5	ug/L
EPA 8270 SIM	Water	1,4-Dioxane	0.2	0.3	ug/L
EPA 8270D	Water	1,2-Diphenylhydrazine (as Azobenzene)	2.5	5	ug/L
EPA 8270D	Water	Bis(2-ethylhexyl)phthalate	0.5	0.5	ug/L
EPA 8270D	Water	Fluoranthene	0.05	0.05	ug/L
EPA 8270D	Water	Fluorene	0.05	0.05	ug/L
EPA 8270D	Water	Hexachlorobenzene	0.02	0.02	ug/L
EPA 8270D	Water	Hexachlorobutadiene	0.5	0.5	ug/L
EPA 8270D	Water	Hexachlorocyclopentadiene	2.5	5	ug/L
EPA 8270D	Water	Hexachloroethane	0.5	0.5	ug/L
EPA 8270D	Water	Indeno(1,2,3-cd)pyrene	0.05	0.05	ug/L
EPA 8270D	Water	Isophorone	2.5	5	ug/L
EPA 8270D	Water	2-Methylnaphthalene	2.5	5	ug/L
EPA 8270D	Water	2-Methylphenol	2.5	5	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Water	3- & 4-Methylphenols	2.5	5	ug/L
EPA 8270D	Water	Naphthalene	0.05	0.05	ug/L
EPA 8270D	Water	3-Nitroaniline	2.5	5	ug/L
EPA 8270D	Water	4-Nitroaniline	2.5	5	ug/L
EPA 8270D	Water	2-Nitroaniline	2.5	5	ug/L
EPA 8270D	Water	Nitrobenzene	0.25	0.25	ug/L
EPA 8270D	Water	4-Nitrophenol	2.5	5	ug/L
EPA 8270D	Water	2-Nitrophenol	2.5	5	ug/L
EPA 8270D	Water	N-nitroso-di-n-propylamine	2.5	5	ug/L
EPA 8270D	Water	N-Nitrosodimethylamine	0.5	0.5	ug/L
EPA 8270D	Water	N-Nitrosodiphenylamine	2.5	5	ug/L
EPA 8270D	Water	Pentachlorophenol	0.25	0.25	ug/L
EPA 8270D	Water	Phenanthrene	0.05	0.05	ug/L
EPA 8270D	Water	Phenol	2.5	5	ug/L
EPA 8270D	Water	Pyrene	0.05	0.05	ug/L
EPA 8270D	Water	Pyridine	2.5	5	ug/L
EPA 8270D	Water	1,2,4,5-Tetrachlorobenzene	2.5	5	ug/L
EPA 8270D	Water	2,3,4,6-Tetrachlorophenol	2.5	5	ug/L
EPA 8270D	Water	1,2,4-Trichlorobenzene	2.5	5	ug/L
EPA 8270D	Water	2,4,6-Trichlorophenol	2.5	5	ug/L
EPA 8270D	Water	2,4,5-Trichlorophenol	2.5	5	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Pesticides					
EPA 8081B	Water	Aldrin	0.004	0.004	ug/L
EPA 8081B	Water	alpha-BHC	0.004	0.004	ug/L
EPA 8081B	Water	beta-BHC	0.004	0.004	ug/L
EPA 8081B	Water	delta-BHC	0.004	0.004	ug/L
EPA 8081B	Water	gamma-BHC (Lindane)	0.004	0.004	ug/L
EPA 8081B	Water	gamma-Chlordane	0.01	0.01	ug/L
EPA 8081B	Water	alpha-Chlordane	0.004	0.004	ug/L
EPA 8081B	Water	Chlordane, total	0.04	0.04	ug/L
EPA 8081B	Water	4,4'-DDD	0.004	0.004	ug/L
EPA 8081B	Water	4,4'-DDE	0.004	0.004	ug/L
EPA 8081B	Water	4,4'-DDT	0.004	0.004	ug/L
EPA 8081B	Water	Dieldrin	0.002	0.002	ug/L
EPA 8081B	Water	Endosulfan I	0.004	0.004	ug/L
EPA 8081B	Water	Endosulfan II	0.004	0.004	ug/L
EPA 8081B	Water	Endosulfan sulfate	0.004	0.004	ug/L
EPA 8081B	Water	Endrin	0.004	0.004	ug/L
EPA 8081B	Water	Endrin aldehyde	0.01	0.01	ug/L
EPA 8081B	Water	Endrin ketone	0.01	0.01	ug/L
EPA 8081B	Water	Heptachlor	0.004	0.004	ug/L
EPA 8081B	Water	Heptachlor epoxide	0.004	0.004	ug/L
EPA 8081B	Water	Methoxychlor	0.004	0.004	ug/L
EPA 8081B	Water	Toxaphene	0.1	0.1	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PCBs					
EPA 8082A	Water	Aroclor 1016	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1221	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1232	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1242	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1248	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1254	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1260	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1262	0.05	0.05	ug/L
EPA 8082A	Water	Aroclor 1268	0.05	0.05	ug/L
EPA 8082A	Water	Total PCBs	0.05	0.05	ug/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Metals					
EPA 6010C	Water	Aluminum	0.01	0.01	mg/L
EPA 6010C	Water	Antimony	0.005	0.005	mg/L
EPA 6010C	Water	Arsenic	0.004	0.004	mg/L
EPA 6010C	Water	Barium	0.01	0.01	mg/L
EPA 6010C	Water	Beryllium	0.001	0.001	mg/L
EPA 6010C	Water	Cadmium	0.003	0.003	mg/L
EPA 6010C	Water	Calcium	0.05	0.05	mg/L
EPA 6010C	Water	Chromium	0.005	0.005	mg/L
EPA 6010C	Water	Cobalt	0.005	0.005	mg/L
EPA 6010C	Water	Copper	0.003	0.003	mg/L
EPA 6010C	Water	Iron	0.02	0.02	mg/L
EPA 6010C	Water	Lead	0.003	0.003	mg/L
EPA 6010C	Water	Magnesium	0.05	0.05	mg/L
EPA 6010C	Water	Manganese	0.005	0.005	mg/L
EPA 7473	Water	Mercury	0.002	0.002	mg/L
EPA 6010C	Water	Nickel	0.005	0.005	mg/L
EPA 6010C	Water	Potassium	0.05	0.05	mg/L
EPA 6010C	Water	Selenium	0.01	0.01	mg/L
EPA 6010C	Water	Silver	0.005	0.005	mg/L
EPA 6010C	Water	Sodium	0.1	0.1	mg/L
EPA 6010C	Water	Thallium	0.005	0.005	mg/L
EPA 6010C	Water	Vanadium	0.01	0.01	mg/L
EPA 6010C	Water	Zinc	0.01	0.01	mg/L

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PFAS					
Modified EPA 537	Water	Perfluorobutanesulfonic acid (PFBS)	0.294	2	ng/L
Modified EPA 537	Water	Perfluorohexanoic acid (PFHxA)	0.471	2	ng/L
Modified EPA 537	Water	Perfluoroheptanoic acid (PFHpA)	0.635	2	ng/L
Modified EPA 537	Water	Perfluorohexanesulfonic acid (PFHxS)	0.281	2	ng/L
Modified EPA 537	Water	Perfluorooctanoic acid (PFOA)	0.531	2	ng/L
Modified EPA 537	Water	Perfluorooctanesulfonic acid (PFOS)	0.292	2	ng/L
Modified EPA 537	Water	Perfluorononanoic acid (PFNA)	0.574	2	ng/L
Modified EPA 537	Water	Perfluorodecanoic acid (PFDA)	0.524	2	ng/L
Modified EPA 537	Water	Perfluoroundecanoic acid (PFUnA)	0.657	2	ng/L
Modified EPA 537	Water	Perfluorododecanoic acid (PFDoA)	0.777	2	ng/L
Modified EPA 537	Water	Perfluorotridecanoic acid (PFTrDA)	1.37	2	ng/L
Modified EPA 537	Water	Perfluorotetradecanoic acid (PFTA)	0.531	2	ng/L
Modified EPA 537	Water	N-MeFOSAA	0.529	2	ng/L
Modified EPA 537	Water	N-EtFOSAA	0.557	2	ng/L
Modified EPA 537	Water	Perfluoropentanoic acid (PFPeA)	0.452	2	ng/L
Modified EPA 537	Water	Perfluoro-1-octanesulfonamide (FOSA)	0.296	2	ng/L
Modified EPA 537	Water	Perfluoro-1-heptanesulfonic acid (PFHpS)	0.415	2	ng/L
Modified EPA 537	Water	Perfluoro-1-decanesulfonic acid (PFDS)	0.574	2	ng/L
Modified EPA 537	Water	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.492	5	ng/L
Modified EPA 537	Water	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.399	2	ng/L
Modified EPA 537	Water	Perfluoro-n-butanoic acid (PFBA)	1.63	2	ng/L

Notes

* = The contract labs has indicated that they are not able to achieve the reporting limits of 2 ng/L for 1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS). Site specific decisions will need to be made by the DEC project manager in consultation with the DEC remedial program chemist

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Soil	1,1,1,2-Tetrachloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1,1-Trichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1,2,2-Tetrachloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	2.5	5	ug/kg
EPA 8260C	Soil	1,1,2-Trichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1-Dichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,1-Dichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	Bromochloromethane	2.5	5	ug/kg
EPA 8260C	Soil	1,2,3-Trichloropropane	2.5	5	ug/kg
EPA 8260C	Soil	1,2,4-Trichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2,4-Trimethylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dibromo-3-chloropropane	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dibromoethane	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dichloroethane	2.5	5	ug/kg
EPA 8260C	Soil	1,2-Dichloropropane	2.5	5	ug/kg
EPA 8260C	Soil	1,3,5-Trimethylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,3-Dichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,4-Dichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,4-Dioxane	10	10	ug/kg
EPA 8260C	Soil	Cyclohexane	2.5	5	ug/kg
EPA 8260C	Soil	2-Butanone	2.5	5	ug/kg
EPA 8260C	Soil	2-Hexanone	2.5	5	ug/kg
EPA 8260C	Soil	4-Methyl-2-pentanone	2.5	5	ug/kg
EPA 8260C	Soil	Acetone	5	10	ug/kg
EPA 8260C	Soil	Acrolein	5	10	ug/kg
EPA 8260C	Soil	Acrylonitrile	2.5	5	ug/kg
EPA 8260C	Soil	Benzene	2.5	5	ug/kg
EPA 8260C	Soil	Bromodichloromethane	2.5	5	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Soil	Bromoform	2.5	5	ug/kg
EPA 8260C	Soil	Bromomethane	2.5	5	ug/kg
EPA 8260C	Soil	Carbon disulfide	2.5	5	ug/kg
EPA 8260C	Soil	Carbon tetrachloride	2.5	5	ug/kg
EPA 8260C	Soil	Chlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	Chloroethane	2.5	5	ug/kg
EPA 8260C	Soil	Chloroform	2.5	5	ug/kg
EPA 8260C	Soil	Chloromethane	2.5	5	ug/kg
EPA 8260C	Soil	cis-1,2-Dichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	cis-1,3-Dichloropropylene	2.5	5	ug/kg
EPA 8260C	Soil	Dibromochloromethane	2.5	5	ug/kg
EPA 8260C	Soil	Dibromomethane	2.5	5	ug/kg
EPA 8260C	Soil	Dichlorodifluoromethane	2.5	5	ug/kg
EPA 8260C	Soil	Naphthalene	2.5	10	ug/kg
EPA 8260C	Soil	Ethyl Benzene	2.5	5	ug/kg
EPA 8260C	Soil	Methylcyclohexane	2.5	5	ug/kg
EPA 8260C	Soil	Hexachlorobutadiene	2.5	5	ug/kg
EPA 8260C	Soil	Isopropylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	Methyl acetate	2.5	5	ug/kg
EPA 8260C	Soil	Methyl tert-butyl ether (MTBE)	2.5	5	ug/kg
EPA 8260C	Soil	Methylene chloride	5	10	ug/kg
EPA 8260C	Soil	n-Butylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	n-Propylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	1,2,3-Trichlorobenzene	2.5	5	ug/kg
EPA 8260C	Soil	o-Xylene	2.5	5	ug/kg
EPA 8260C	Soil	p- & m- Xylenes	5	10	ug/kg
EPA 8260C	Soil	p-Isopropyltoluene	2.5	5	ug/kg
EPA 8260C	Soil	sec-Butylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	Styrene	2.5	5	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA 8260C	Soil	tert-Butyl alcohol (TBA)	2.5	5	ug/kg
EPA 8260C	Soil	tert-Butylbenzene	2.5	5	ug/kg
EPA 8260C	Soil	Tetrachloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	Toluene	2.5	5	ug/kg
EPA 8260C	Soil	trans-1,2-Dichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	trans-1,3-Dichloropropylene	2.5	5	ug/kg
EPA 8260C	Soil	Trichloroethylene	2.5	5	ug/kg
EPA 8260C	Soil	Trichlorofluoromethane	2.5	5	ug/kg
EPA 8260C	Soil	Vinyl Chloride	2.5	5	ug/kg
EPA 8260C	Soil	Xylenes, Total	7.5	15	ug/kg

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Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Soil	Acenaphthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Acenaphthylene	20.9	41.7	ug/kg
EPA 8270D	Soil	Acetophenone	20.9	41.7	ug/kg
EPA 8270D	Soil	Aniline	83.5	167	ug/kg
EPA 8270D	Soil	Anthracene	20.9	41.7	ug/kg
EPA 8270D	Soil	Atrazine	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzaldehyde	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzidine	83.5	167	ug/kg
EPA 8270D	Soil	Benzo(a)anthracene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(a)pyrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(b)fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(g,h,i)perylene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzoic acid	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzo(k)fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzyl alcohol	20.9	41.7	ug/kg
EPA 8270D	Soil	Benzyl butyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	1,1'-Biphenyl	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Bromophenyl phenyl ether	20.9	41.7	ug/kg
EPA 8270D	Soil	Caprolactam	41.7	83.3	ug/kg
EPA 8270D	Soil	Carbazole	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Chloro-3-methylphenol	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Chloroaniline	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-chloroethoxy)methane	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-chloroethyl)ether	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-chloroisopropyl)ether	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Chloronaphthalene	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Chlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Chlorophenyl phenyl ether	20.9	41.7	ug/kg
EPA 8270D	Soil	Chrysene	20.9	41.7	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Soil	Dibenzo(a,h)anthracene	20.9	41.7	ug/kg
EPA 8270D	Soil	Dibenzofuran	20.9	41.7	ug/kg
EPA 8270D	Soil	Di-n-butyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	1,2-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	1,3-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	1,4-Dichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	3,3'-Dichlorobenzidine	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4-Dichlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Diethyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4-Dimethylphenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Dimethyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	4,6-Dinitro-2-methylphenol	41.7	83.3	ug/kg
EPA 8270D	Soil	2,4-Dinitrophenol	41.7	83.3	ug/kg
EPA 8270D	Soil	2,4-Dinitrotoluene	20.9	41.7	ug/kg
EPA 8270D	Soil	2,6-Dinitrotoluene	20.9	41.7	ug/kg
EPA 8270D	Soil	Di-n-octyl phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	1,2-Diphenylhydrazine (as Azobenzene)	20.9	41.7	ug/kg
EPA 8270D	Soil	Bis(2-ethylhexyl)phthalate	20.9	41.7	ug/kg
EPA 8270D	Soil	Fluoranthene	20.9	41.7	ug/kg
EPA 8270D	Soil	Fluorene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachlorobutadiene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachlorocyclopentadiene	20.9	41.7	ug/kg
EPA 8270D	Soil	Hexachloroethane	20.9	41.7	ug/kg
EPA 8270D	Soil	Indeno(1,2,3-cd)pyrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Isophorone	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Methylnaphthalene	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Methylphenol	20.9	41.7	ug/kg
EPA 8270D	Soil	3- & 4-Methylphenols	20.9	41.7	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
SVOC					
EPA 8270D	Soil	Naphthalene	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Soil	2-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Soil	3-Nitroaniline	41.7	83.3	ug/kg
EPA 8270D	Soil	Nitrobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	2-Nitrophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	4-Nitrophenol	41.7	83.3	ug/kg
EPA 8270D	Soil	N-nitroso-di-n-propylamine	20.9	41.7	ug/kg
EPA 8270D	Soil	N-Nitrosodimethylamine	20.9	41.7	ug/kg
EPA 8270D	Soil	N-Nitrosodiphenylamine	20.9	41.7	ug/kg
EPA 8270D	Soil	Pentachlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Phenanthrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Phenol	20.9	41.7	ug/kg
EPA 8270D	Soil	Pyrene	20.9	41.7	ug/kg
EPA 8270D	Soil	Pyridine	83.5	167	ug/kg
EPA 8270D	Soil	1,2,4,5-Tetrachlorobenzene	41.7	83.3	ug/kg
EPA 8270D	Soil	2,3,4,6-Tetrachlorophenol	41.7	83.3	ug/kg
EPA 8270D	Soil	1,2,4-Trichlorobenzene	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4,6-Trichlorophenol	20.9	41.7	ug/kg
EPA 8270D	Soil	2,4,5-Trichlorophenol	20.9	41.7	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Pesticides					
EPA 8081B	Soil	Aldrin	0.33	0.33	ug/kg
EPA 8081B	Soil	alpha-BHC	0.33	0.33	ug/kg
EPA 8081B	Soil	beta-BHC	0.33	0.33	ug/kg
EPA 8081B	Soil	delta-BHC	0.33	0.33	ug/kg
EPA 8081B	Soil	gamma-BHC (Lindane)	0.33	0.33	ug/kg
EPA 8081B	Soil	gamma-Chlordane	0.33	0.33	ug/kg
EPA 8081B	Soil	alpha-Chlordane	0.33	0.33	ug/kg
EPA 8081B	Soil	Chlordane, total	1.32	1.32	ug/kg
EPA 8081B	Soil	4,4'-DDD	0.33	0.33	ug/kg
EPA 8081B	Soil	4,4'-DDE	0.33	0.33	ug/kg
EPA 8081B	Soil	4,4'-DDT	0.33	0.33	ug/kg
EPA 8081B	Soil	Dieldrin	0.33	0.33	ug/kg
EPA 8081B	Soil	Endosulfan I	0.33	0.33	ug/kg
EPA 8081B	Soil	Endosulfan II	0.33	0.33	ug/kg
EPA 8081B	Soil	Endosulfan sulfate	0.33	0.33	ug/kg
EPA 8081B	Soil	Endrin	0.33	0.33	ug/kg
EPA 8081B	Soil	Endrin aldehyde	0.33	0.33	ug/kg
EPA 8081B	Soil	Endrin ketone	0.33	0.33	ug/kg
EPA 8081B	Soil	Heptachlor	0.33	0.33	ug/kg
EPA 8081B	Soil	Heptachlor epoxide	0.33	0.33	ug/kg
EPA 8081B	Soil	Methoxychlor	1.65	1.65	ug/kg
EPA 8081B	Soil	Toxaphene	16.7	16.7	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PCBs					
EPA 8082A	Soil	Aroclor 1016	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1221	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1232	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1242	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1248	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1254	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1260	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1262	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Aroclor 1268	0.0167	0.0167	mg/kg
EPA 8082A	Soil	Total PCBs	0.0167	0.0167	mg/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
Metals					
EPA 6010C	Soil	Aluminum	1	1	mg/kg
EPA 6010C	Soil	Antimony	0.5	0.5	mg/kg
EPA 6010C	Soil	Arsenic	1	1	mg/kg
EPA 6010C	Soil	Barium	1	1	mg/kg
EPA 6010C	Soil	Beryllium	0.1	0.1	mg/kg
EPA 6010C	Soil	Cadmium	0.3	0.3	mg/kg
EPA 6010C	Soil	Calcium	0.5	5	mg/kg
EPA 6010C	Soil	Chromium	0.5	0.5	mg/kg
EPA 6010C	Soil	Cobalt	0.5	0.5	mg/kg
EPA 6010C	Soil	Copper	0.5	0.5	mg/kg
EPA 6010C	Soil	Iron	2	2	mg/kg
EPA 6010C	Soil	Lead	0.3	0.3	mg/kg
EPA 6010C	Soil	Magnesium	5	5	mg/kg
EPA 6010C	Soil	Manganese	0.5	0.5	mg/kg
EPA 7473	Soil	Mercury	0.03	0.03	mg/kg
EPA 6010C	Soil	Nickel	0.5	0.5	mg/kg
EPA 6010C	Soil	Potassium	5	5	mg/kg
EPA 6010C	Soil	Selenium	1	1	mg/kg
EPA 6010C	Soil	Silver	0.5	0.5	mg/kg
EPA 6010C	Soil	Sodium	10	10	mg/kg
EPA 6010C	Soil	Thallium	1	1	mg/kg
EPA 6010C	Soil	Vanadium	1	1	mg/kg
EPA 6010C	Soil	Zinc	1	1	mg/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
PFAS					
Modified EPA 537	Soil	Perfluorobutanesulfonic acid (PFBS)	0.2	0.25	ug/kg
Modified EPA 537	Soil	Perfluorohexanoic acid (PFHxA)	0.0659	0.25	ug/kg
Modified EPA 537	Soil	Perfluoroheptanoic acid (PFHpA)	0.0455	0.25	ug/kg
Modified EPA 537	Soil	Perfluorohexanesulfonic acid (PFHxS)	0.031	0.25	ug/kg
Modified EPA 537	Soil	Perfluorooctanoic acid (PFOA)	0.0772	0.25	ug/kg
Modified EPA 537	Soil	Perfluorooctanesulfonic acid (PFOS)	0.0438	0.25	ug/kg
Modified EPA 537	Soil	Perfluorononanoic acid (PFNA)	0.0598	0.25	ug/kg
Modified EPA 537	Soil	Perfluorodecanoic acid (PFDA)	0.0512	0.25	ug/kg
Modified EPA 537	Soil	Perfluoroundecanoic acid (PFUnA)	0.116	0.25	ug/kg
Modified EPA 537	Soil	Perfluorododecanoic acid (PFDoA)	0.075	0.25	ug/kg
Modified EPA 537	Soil	Perfluorotridecanoic acid (PFTrDA)	0.0435	0.25	ug/kg
Modified EPA 537	Soil	Perfluorotetradecanoic acid (PFTA)	0.0747	0.25	ug/kg
Modified EPA 537	Soil	N-MeFOSAA	0.104	0.25	ug/kg
Modified EPA 537	Soil	N-EtFOSAA	0.104	0.25	ug/kg
Modified EPA 537	Soil	Perfluoropentanoic acid (PFPeA)	0.0919	0.25	ug/kg
Modified EPA 537	Soil	Perfluoro-1-octanesulfonamide (FOSA)	0.0467	0.25	ug/kg
Modified EPA 537	Soil	Perfluoro-1-heptanesulfonic acid (PFHpS)	0.0493	0.25	ug/kg
Modified EPA 537	Soil	Perfluoro-1-decanesulfonic acid (PFDS)	0.0512	0.25	ug/kg
Modified EPA 537	Soil	1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.066	0.25	ug/kg
Modified EPA 537	Soil	1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.0256	0.25	ug/kg
Modified EPA 537	Soil	Perfluoro-n-butanoic acid (PFBA)	0.183	0.25	ug/kg

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA TO-15	Soil Vapor	1,1,1,2-Tetrachloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,1-Trichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,2,2-Tetrachloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1,2-Trichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1-Dichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,1-Dichloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	1,2,4-Trichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2,4-Trimethylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dibromoethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichloropropane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,2-Dichlorotetrafluoroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,3,5-Trimethylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,3-Butadiene	0.3	0.3	ppb
EPA TO-15	Soil Vapor	1,3-Dichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,3-Dichloropropane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,4-Dichlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	1,4-Dioxane	0.2	0.2	ppb
EPA TO-15	Soil Vapor	2-Butanone	0.1	0.1	ppb
EPA TO-15	Soil Vapor	2-Hexanone	0.2	0.2	ppb
EPA TO-15	Soil Vapor	3-Chloropropene	0.5	0.5	ppb
EPA TO-15	Soil Vapor	4-Methyl-2-pentanone	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Acetone	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Acrolein	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Acrylonitrile	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Benzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Benzyl chloride	0.1	0.1	ppb

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA TO-15	Soil Vapor	Bromodichloromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Bromoform	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Bromomethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Carbon disulfide	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Carbon tetrachloride	0.025	0.025	ppb
EPA TO-15	Soil Vapor	Chlorobenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Chloroethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Chloroform	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Chloromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	cis-1,2-Dichloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	cis-1,3-Dichloropropylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Cyclohexane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Dibromochloromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Dichlorodifluoromethane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Ethanol	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Ethyl acetate	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Ethyl Benzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Hexachlorobutadiene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Isopropanol	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Isopropylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Methyl Methacrylate	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Methyl tert-butyl ether (MTBE)	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Methylene chloride	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Naphthalene	0.2	0.2	ppb
EPA TO-15	Soil Vapor	n-Butylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	n-Heptane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	n-Hexane	0.1	0.1	ppb
EPA TO-15	Soil Vapor	n-Propylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	o-Xylene	0.1	0.1	ppb

ATTACHMENT B

Laboratory Reporting Limits and Method Detection Limits

Method	Matrix	Analyte	MDL	RL	Units
VOC					
EPA TO-15	Soil Vapor	p- & m- Xylenes	0.2	0.2	ppb
EPA TO-15	Soil Vapor	p-Ethyltoluene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	p-Isopropyltoluene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Propylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	sec-Butylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Styrene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	tert-Butylbenzene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Tetrachloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	Tetrahydrofuran	0.2	0.2	ppb
EPA TO-15	Soil Vapor	Toluene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	trans-1,2-Dichloroethylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	trans-1,3-Dichloropropylene	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Trichloroethylene	0.025	0.025	ppb
EPA TO-15	Soil Vapor	Trichlorofluoromethane (Freon 11)	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Vinyl acetate	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Vinyl bromide	0.1	0.1	ppb
EPA TO-15	Soil Vapor	Vinyl Chloride	0.025	0.025	ppb

Analytical Method Information

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PFAS, NYSDEC Target List in Soil (EPA 537m)

Preservation: Cool 4°C

Container: 10_250mL Plastic Cool to 4° C **Amount Required:** 250 mL **Hold Time:** 14 days

Analyte	MDL	Reporting Limit	Surrogate %Rec	Duplicate RPD	----Matrix Spike---- %Rec	RPD	--Blank Spike / LCS-- %Rec	RPD
Perfluorobutanesulfonic acid (PFBS)	0.200	0.250 ug/kg		30	25-150	35	50-130	30
Perfluorohexanoic acid (PFHxA)	0.0659	0.250 ug/kg		30	25-150	35	50-130	30
Perfluoroheptanoic acid (PFHpA)	0.0455	0.250 ug/kg		30	25-150	35	50-130	30
Perfluorohexanesulfonic acid (PFHxS)	0.0310	0.250 ug/kg		30	25-150	35	50-130	30
Perfluorooctanoic acid (PFOA)	0.0772	0.250 ug/kg		30	25-150	35	50-130	30
Perfluorooctanesulfonic acid (PFOS)	0.0438	0.250 ug/kg		30	25-150	35	50-130	30
Perfluorononanoic acid (PFNA)	0.0598	0.250 ug/kg		30	25-150	35	50-130	30
Perfluorodecanoic acid (PFDA)	0.0512	0.250 ug/kg		30	25-150	35	50-130	30
Perfluoroundecanoic acid (PFUnA)	0.116	0.250 ug/kg		30	25-150	35	50-130	30
Perfluorododecanoic acid (PFDoA)	0.0750	0.250 ug/kg		30	25-150	35	50-130	30
Perfluorotridecanoic acid (PFTrDA)	0.0435	0.250 ug/kg		30	25-150	35	50-130	30
Perfluorotetradecanoic acid (PFTA)	0.0747	0.250 ug/kg		30	25-150	35	50-130	30
N-MeFOSAA	0.104	0.250 ug/kg		30	25-150	35	50-130	30
N-EtFOSAA	0.104	0.250 ug/kg		30	25-150	35	50-130	30
Perfluoropentanoic acid (PFPeA)	0.0919	0.250 ug/kg		30	25-150	35	50-130	30
Perfluoro-1-octanesulfonamide (FOSA)	0.0467	0.250 ug/kg		30	25-150	35	50-130	30
Perfluoro-1-heptanesulfonic acid (PFHpS)	0.0493	0.250 ug/kg		30	25-150	35	50-130	30
Perfluoro-1-decanesulfonic acid (PFDS)	0.0512	0.250 ug/kg		30	25-150	35	50-130	30
1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTS)	0.0660	0.250 ug/kg		30	25-200	35	50-200	30
1H,1H,2H,2H-Perfluorodecanesulfonic acid (8:2 FTS)	0.0256	0.250 ug/kg		30	25-200	35	50-200	30
Perfluoro-n-butanoic acid (PFBA)	0.183	0.250 ug/kg		30	25-150	35	50-130	30
Surr: M3PFBS			25-150					
Surr: M5PFHxA			25-150					
Surr: M4PFHpA			25-150					
Surr: M3PFHxS			25-150					
Surr: Perfluoro-n-[13C8]octanoic acid (M8PFOA)			25-150					
Surr: M6PFDA			25-150					
Surr: M7PFUdA			25-150					
Surr: Perfluoro-n-[1,2-13C2]dodecanoic acid (MPFDoA)			25-150					
Surr: M2PFTeDA			10-150					
Surr: Perfluoro-n-[13C4]butanoic acid (MPFBA)			25-150					
Surr: Perfluoro-1-[13C8]octanesulfonic acid (M8PFOS)			25-150					
Surr: Perfluoro-n-[13C5]pentanoic acid (M5PFPeA)			25-150					
Surr: Perfluoro-1-[13C8]octanesulfonamide (M8FOSA)			10-150					
Surr: d3-N-MeFOSAA			25-150					
Surr: d5-N-EtFOSAA			25-150					
Surr: M2-6:2 FTS			25-200					
Surr: M2-8:2 FTS			25-200					
Surr: M9PFNA			25-150					
MPFOA								

ATTACHMENT C

Analytical Methods / Quality Assurance Summary Table

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ATTACHMENT C
ANALYTICAL METHODS/QUALITY ASSURANCE SUMMARY TABLE

Matrix Type	Field Parameters	Laboratory Parameters	Analytical Methods	Sample Preservation	Sample Container Volume and Type	Sample Hold Time	Number of Samples to be Collected	Field Duplicate Samples	Equipment Blank Samples	Trip Blank Samples	Ambient Air Samples	MS/MSD Samples
Soil	Total VOCs via PID	Part 375 + TCL VOCs / CP-51 VOCs	EPA 8260C	Cool to 4°C	Two 40-ml VOC vials with 5ml H_2O, one with MeOH or 3 Encore Samplers (separate container for % solids)	14 days, freeze at lab within 48 hours	16	1 per 20 samples (minimum 1)	1 per 20 samples, if needed (minimum 1, if needed)	1 per shipment of VOC samples	NA	1 per 20 samples (minimum 1)
		Part 375 + TCL SVOCs / CP-51 SVOCs	EPA 8270D	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
		1,4-Dioxane	EPA 8270D	Cool to 4°C	8 oz. jar	14 days extract, 40 days after extraction to analysis						
		Part 375 + TAL Metals	EPA 6010C, EPA 7470, EPA 7196A, EPA 9014/9010C	Cool to 4°C	2 oz. jar*	6 months, except Mercury 28 days						
		Hexavalent Chromium	EPA 7196A	Cool to 4°C	2 oz. jar*	28 days						
		Perfluoroalkyl Substances (PFAs)	EPA 537.1	Cool to 4°C	1/2 filled 250mL HDPE container	14 days extract, 40 days after extraction to analysis						
		Part 375 + TCL Herbicides	EPA 8151A	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
		Part 375 + TCL Pesticides	EPA 8081B	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
		Part 375 + TCL PCBs	EPA 8082A	Cool to 4°C	4 oz. jar*	14 days extract, 40 days after extraction to analysis						
Groundwater	Headspace VOCs via PID, synoptic groundwater level measurement, Temperature, Turbidity, pH, ORP, Conductivity	Part 375 + TCL VOCs	EPA 8260C	Cool to 4°C; HCl to pH <2;no headspace	Three 40-mL VOC vials with Teflon®-lined cap	14 days	5	1 per 20 samples (minimum 1)	1 per 20 samples, if needed (minimum 1, if needed)	1 per shipment of VOC samples	NA	1 per 20 samples (minimum 1)
		Part 375 + TCL SVOCs / CP-51 SVOCs	EPA 8270D	Cool to 4°C	Two 1-Liter Amber Glass	7 days to extract, 40 days after extraction to analysis						
		1,4-Dioxane	EPA 8270D SIM	Cool to 4°C	1-L Amber Glass	7 days to extract, 40 days after extraction to analysis						
		Part 375 + TAL Metals	EPA 6010C, EPA 7470, EPA 7196A, EPA 9014/9010C	Cool to 4°C	Two 1-Liter Amber Glass	6 months, except Mercury 28 days						
		Hexavalent Chromium	EPA 7196A	Cool to 4°C	250 mL Plastic	24 hours						
		Perfluoroalkyl Substances (PFAs)	EPA 537.1	Cool to 4°C	Two 250mL HDPE containers	14 days extract, 40 days after extraction to analysis						
		Part 375 + TCL Herbicides	EPA 8151A	Cool to 4°C	Two 1-Liter Amber Glass	7 days to extraction, 40 days after extraction to analysis						
		Part 375 + TCL Pesticides	EPA 8081B	Cool to 4°C	Two 1-Liter Amber Glass	7 days extract, 40 days after extraction to analysis						
		Part 375 + TCL PCBs	EPA 8082A	Cool to 4°C	Two 1-Liter Amber Glass	7 days extract, 40 days after extraction to analysis						
Soil Vapor	Total VOCs via PID	Part 375 + TCL VOCs	EPA TO-15	NA	6L Summa Cannister	30 days	7	1 per 20 samples (minimum 1)	NA	NA	1 per day	NA
Indoor Air	Total VOCs via PID	Part 375 + TCL VOCs	EPA TO-15	NA	6L Summa Cannister	30 days	6	1 per 20 samples (minimum 1)	NA	NA	1 per day	NA

Notes:
*can be combined in one or more 8 oz. jars
mL = milliliter
VOC = Volatile organic compound
SVOC = Semi-volatile organic compound
PCB = Polychlorinated biphenyls
TAL = Total Analyte List
TCL = Target Criteria List
PID = Photoionization detector
Part 375 = New York State Department of Environmental Conservation (NYSDEC) Title 6 New York City Rules and Regulation (NYCRR) Part 375 List.
ORP = Oxidation reduction potential
EPA = U.S. Environmental Protection Agency
NA = Not applicable
ºC = degree Celsius
The PFAS compounds to be analyzed includes: perfluorobutanesulfonic acid, perfluorohexanesulfonic acid, perfluoroheptanesulfonic acid, perfluorooctanessulfonic acid, perfluorodecanesulfonic acid, perfluorobutanoic acid, perfluoropentanoic acid, perfluorohexanoic acid, perfluoroheptanoic acid, perfluorooctanoic acid, perfluorononanoic acid, perfluorodecanoic acid, perfluoroundecanoic acid, perfluorododecanoic acid, perfluorotridecanoic acid, perfluorotetradecanoic acid, 6:2 fluorotelomer sulfonate, 8:2 fluorotelomer sulfonate, perfluorooctanesulfonamide, n-methyl perfluorooctanesulfonamidoacetic acid, and n-ethyl perfluorooctanesulfonamidoacetic acid.

ATTACHMENT D

Sample Nomenclature

SOP #01 – Sample Nomenclature

INTRODUCTION

The Langan Environmental Group conducts an assortment of site investigations where samples (Vapor, Solids, and Aqueous) are collected and submitted to analytical laboratories for analysis. The results of which are then evaluated and entered into a data base allowing quick submittal to the state regulatory authority (New York State Division of Environmental Conservation [NYSDEC]). In addition, Langan is linking their data management system to graphic and analytical software to enable efficient evaluation of the data as well as creating client-ready presentational material.

SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the general framework for labeling vapor, solid (soil) and aqueous (groundwater) samples that will be submitted for laboratory analysis. The nomenclature being introduced is designed to meet the NYSDEC EQuIS standard and has been incorporated into Langan software scripts to assist project personnel in processing the data. While this SOP is applicable to all site investigation; unanticipated conditions may arise which may require considerable flexibility in complying with this SOP. Therefore, guidance provided in this SOP is presented in terms of general steps and strategies that should be applied; but deviation from this SOP must be reported to the Project Manager (PM) immediately.

GENERAL SAMPLE IDENTIFICATION CONSIDERATIONS

Sample Labels

All sample ware must have a label. Recall that when you are using the Encore™ samples (see below); they are delivered in plastic lined foil bags. You are to label the bags[1]:

All other samples containers including Terra Cores™ must be labeled with laboratory provided self-adhesive labels.

Quick Breakdown of Sample Format

The general format for sample nomenclature is:

[1]Both Alpha and York laboratories permit the combining of the three Encore™ into a single bag. This may not be appropriate for all laboratories so please confirm with the labs themselves

LLNN_ID

Where

LL is a grouping of two (2) to four (4) letters signifying the sample media source. In older nomenclature SOPs this portion of the sample identification is commonly referred to as the *Sample Investigation Code*

NN represents a two digit number identifying the specific sample location or sample sequence number

_ ***(underscore)*** is required between the sample lettering and numeric identification and additional modifying data that determines the date of sampling or the depth of the sample interval

ID is a modifier specific to the sample type media (depth of soil sample or date of groundwater sample)

LL – Sample Investigation Code

Langan has devised a list of two to four letters to insure a quick ability to identify the sample investigation.

Code	Investigation
AA	Ambient Air
DS	Drum
EPB	Endpoint Location - Bottom (Excavation)
EPSW	Endpoint Location - Sidewall (Excavation)
FP	Free Product
IA	Indoor Air
IDW	Investigation Derived Waste (Soil Pile)
MW	Monitoring Well (Permanent)
SB	Soil Boring
SG	Staff Gauge (Stream Gauging)
SL	Sludge
SV	Soil Vapor Point
SVE	Soil Vapor Extraction Well
SW	Surface Water
TMW	Temporary Monitoring Well
TP	Test Pit (Excavated Material from Test Pit Not Associated With Sidewall or Bottom Samples)
WC	Waste Characterization Boring
COMP	Composite Sample
TB	Trip Blank (QA/QC Sampling – All Investigations)
FB	Field Blank (QA/QC Sampling – All Investigations)
DUP	Duplicate (QA/QC Sampling – All Investigations)

NN – Numeric Identifier

The two digit number that follows the sample investigation code (LL) identifies the specific sample based on the soil boring, monitoring well, endpoint or other location identification. For a subset of samples

where there is no specific location identifier, the two digit number is the sequence number for the sample submitted. For example, an aqueous sample from a monitoring well identified as MW-1 would have the sample investigation code of MW and the numeric identifier as 01. Note there is no hyphen. The same can be done for soil borings, a soil sample collected from soil boring 9 (SB-9) would be have the LLNN identification of SB09 (again, no hyphen).

Note however that there is a subset of samples related to laboratory analytical quality assurance, among these includes TB, FB, and DUP. On many investigations, the Scope will require multiple collections of these types of samples, therefore the numerical number represents the sequence sample count where the first sample is 01, the second sample is 02, and the third sample is 03 and so on.

_ Underscore
The underscore is required. It separates the investigation code and numeric identifier from the modifier specific to the sample itself. Note that every effort should be made to insure that the underscore is clear on the sample label and chain of custody (COC).

ID – Modifier Specific to Type Media
Each sample investigation code and numeric identifier is further modified by an ID specific to the sample type media. In general, soil samples (soil borings or endpoint samples) use an ID that indicates the depth at which the sample was taken. Aqueous samples (groundwater or surface water samples) are identified by the date the sample was collected. Other types of samples including quality control (TB, FB, and DUP), Vapor samples (AA, IA, SV or SVE), other soil type samples (IDW, sludge, free product, drum, and others) are also identified by a date. The following rules apply to the ID when using sample depth or sample date.

Sample Depth
The sample depth must be whole numbers (no fractions) separated by a hyphen. Thus for a soil sample collected from the soil boring SB-1 from a depth of 6 feet to 8 feet, the sample would be identified as:

SB01_6-8

Unfortunately, the NYSDEC EQuIS system does not accept fractions. Therefore, if your sample interval is a fraction of a foot (6.5-7.5), round up to the larger interval (6-8).

Sample Date
The sample date is always in the format of MMDDYY. Note that the year is two digits. Thus for a groundwater sample collected on July 1, 2015 from the monitoring well MW-1, the sample would be identified as:

MW01_070115

Special Cases
There are a couple of specific sample types that require further explanation.

Endpoint Sampling
End point sidewall samples are sometimes modified by magnetic direction (N, S, E, and W). For example, the first sidewall endpoint sample from the north wall of an excavation at a depth of 5 feet would be written as:

EPSW01_N_5

Again, note that the N in the identification refers to north and is separated from the prefix investigation code/numeric identifier and ID modifier suffix by underscores.

Vapor Extraction Well Sample
As with the sidewall endpoint samples, the sample name is altered by inserting a middle modifier between the prefix and suffix of the sample name. The middle modifier is used to identify the source of the sample (inlet sample port, midpoint sample port or outlet sample port). For example the midpoint port of the vapor extraction well number 1 sampled on July 1, 2015 would be written as;

SVE01_MID_070115

Matrix Spike and Matrix Spike Duplicate
On occasion, a Langan investigation will collect a sample to be used to provide the lab with a site specific medium to spike to determine the quality of the analytical method. This special case of sampling requires additional information to be used in the sample name, specifically, a suffix specifying whether the sample is the matrix spike (MS) or the matrix spike duplicate (MSD). In the following example, the sample is collected from soil boring number 1 at a depth of 2-4 feet. For the matrix spike sample:

SB01_2-4_MS

and for the matrix spike duplicate sample:

SB01_2-4_MSD

Multiple Interval Groundwater Sampling
Although not currently a common practice, low flow sampling facilitates stratigraphic sampling of a monitoring well. If the scope requires stratigraphic sampling then groundwater samples will be labeled with a lower case letter following the well number. For example, placing the pump or sampling tube at 10 feet below surface in MW01 on July 1, 2015 would require the sample to be labeled as:

MW01a_070115

While a second sample where the pump or tubing intake is placed at 20 feet would be labeled as:

MW01b_070115

Note that it is important that you record what depth the intake for each sample represents in your field notes; as this information is going to be critical to interpreting the results.

ATTACHMENT E

Laboratory Standard Operating Procedures for PFAS Analysis

LANGAN

Standard Operating Procedure

Analysis of Target Per- and Polyfluorinated Alkyl Substances (PFAS) in Potable Water by EPA Method 537.1 using HPLC/MS-MS

Approvals

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Controlled Copy No. PFAS_LCMSMS112518, Rev 1.3-____

Issued to: NA

Target PFAS in Potable Water Matrices

1. SCOPE AND APPLICATION

This method is used to identify and quantitate specific PFAS compounds in extracts of Potable water samples using HPLC/MS-MS (high pressure liquid chromatography/ tandem mass spectrometry. Currently the compounds (18) that are measured by this methodology by EPA 537.1 are listed in the table below.

Analyte[a]	**Acronym ***	**CAS Number**
Hexafluoropropylene oxide dimer acid (GenX)	HFPO-DA	13252-13-6[b]
N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6
N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluorodecanoic acid	PFDA	335-76-2
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluorononanoic acid	PFNA	375-95-1
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorooctanoic acid	PFOA	335-67-1
Perfluorotetradecanoic acid	PFTA	376-06-7
Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluoroundecanoic acid	PFUnA	2058-94-8
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	763051-92-9[c]
9-chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	9Cl-PF3ONS	756426-58-1[d]
4,8-dioxa-3H-perfluorononanoic acid	ADONA	919005-14-4[e]

[a] Some PFAS are commercially available as ammonium, sodium and potassium salts. This method measures all forms of the analytes as anions while the counterion is inconsequential. Analytes may be purchased as acids or as any of the corresponding salts.
[b] HFPO-DA and the ammonium salt of HFPO-DA are components of the GenX processing aid technology and both are measured as the anion of HFPO-DA by this method.
[c] 11Cl-PF3OUdS is available in salt form (e.g. CASRN of potassium salt is 83329-89-9).
[d] 9Cl-PF3ONS analyte is available in salt form (e.g. CASRN of potassium salt is 73606-19-6)
[e] ADONA is available as the sodium salt (no CASRN) and the ammonium salt (CASRN is 958445-44-8).

* These acronyms are those listed in EPA Method 537.1. The listed acronyms are also those in our LIMS database.

The estimated reporting limit based upon the preparation/analysis parameters herein at the time of this revision are 2.0 ng/L (ppt) for aqueous samples. The linear range for these PFAS can be extended by dilution. This RL is based upopn a minimum volume of 0.125 L extracted.

2. SUMMARY

2.1 This procedure is based upon EPA method 537.1 without modification when used for potable water sample preparation or analysis.

2.2 A 125-290 mL(depending upon the volume submitted by the client sample field preserved with 1.25 g/250 mL Trizma is extracted using automated or manual Solid Phase Extraction (SPE). The compounds are eluted from the solid phase using methanol. The extract is then slowly evaporated to dryness using a nitrogen evaporation system. The resulting extract residue is reconstituted in 95%/5% Methanol/water to a final volume of 1.0 mL.

2.3 A portion of the extract is then used for analysis of PFAS using a C18 LC column using a gradient program with 5mM ammonium acetate/water and methanol to effect separation followed by analysis using AJI-ESI (Electrospray) injection into a triple Quadrupole MS operated in negative ion mode.

2.4 Quantitation is done by internal standard technique and peak response is measured as the area of the peaks from the dynamic MRM (Multiple Reaction Monitoring) run.

3. DEFINITIONS

3.1 ANALYSIS BATCH – A set of samples that is analyzed on the same instrument during a 24-hour period, including no more than 20 Field Samples, that begins and ends with the analysis of the appropriate Continuing Calibration Check (CCC) standards. Additional CCCs may be required depending on the length of the analysis batch and/or the number of Field Samples.

3.2 CALIBRATION STANDARD (CAL) – A solution prepared from the primary dilution standard solution and/or stock standard solution, internal standard(s), and the surrogate(s). The CAL solutions are used to calibrate the instrument response with respect to analyte concentration.

3.3 COLLISIONALLY ACTIVATED DISSOCIATION (CAD) – The process of converting the precursor ion's translational energy into internal energy by collisions with neutral gas molecules to bring about dissociation into product ions.

3.4 CONTINUING CALIBRATION CHECK (CCC) – A calibration standard containing the method analytes, internal standard(s) and surrogate(s). The CCC is analyzed periodically to verify the accuracy of the existing calibration for those analytes.

3.5 DETECTION LIMIT (DL) – The minimum concentration of an analyte that can be identified, measured, and reported with 99% confidence that the analyte concentration is greater than zero. This is a statistical determination of precision (Sect. 9.2.7), and accurate quantitation is not expected at this level.[2]

3.6 EXTRACTION BATCH – A set of up to 20 Field Samples (not including QC samples) extracted together by the same person(s) during a work day using the same lot of SPE devices, solvents, surrogate, internal standard and fortifying solutions. Required QC samples include Laboratory Reagent Blank, Laboratory Fortified Blank, Laboratory Fortified Sample Matrix, and either a Field Duplicate or Laboratory Fortified Sample Matrix Duplicate.

3.7 FIELD DUPLICATES (FD1 and FD2) – Two separate samples collected at the same time and place under identical circumstances, and treated exactly the same throughout field and laboratory procedures. Analyses of FD1 and FD2 give a measure of the precision associated with sample collection, preservation, and storage, as well as lab procedures.

3.8 FIELD REAGENT BLANK (FRB) – An aliquot of reagent water that is placed in a sample container in the laboratory and treated as a sample in all respects, including shipment to the sampling site, exposure to sampling site conditions, storage, preservation, and all analytical procedures. The purpose of the FRB is to determine if method analytes or other interferences are present in the field environment.

3.9 INTERNAL STANDARD (IS) – A pure chemical added to an extract or standard solution in a known amount(s) and used to measure the relative response of other method analytes and surrogates that are components of the same solution. The internal standard must be a chemical that is structurally similar to the method analytes, has no potential to be present in samples, and is not a method analyte.

3.10 LABORATORY FORTIFIED BLANK (LFB) – A volume of reagent water or other blank matrix to which known quantities of the method analytes and all the preservation compounds are added in the laboratory. The LFB is analyzed exactly like a sample, and its purpose is to determine whether the methodology is in control, and whether the laboratory is capable of making accurate and precise measurements.

3.11 LABORATORY FORTIFIED SAMPLE MATRIX (LFSM) – A preserved field sample to which known quantities of the method analytes are added in the laboratory. The LFSM is processed and analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate sample extraction and the measured values in the LFSM corrected for background concentrations.

3.12 LABORATORY FORTIFIED SAMPLE MATRIX DUPLICATE (LFSMD) – A

duplicate of the Field Sample used to prepare the LFSM. The LFSMD is fortified, extracted, and analyzed identically to the LFSM. The LFSMD is used instead of the Field Duplicate to assess method precision when the occurrence of method analytes is low.

3.13 LABORATORY REAGENT BLANK (LRB) – An aliquot of reagent water or other blank matrix that is treated exactly as a sample including exposure to all glassware, equipment, solvents and reagents, sample preservatives, internal standard, and surrogates that are used in the analysis batch. The LRB is used to determine if method analytes or other interferences are present in the laboratory environment, the reagents, or the apparatus.

3.14 LOWEST CONCENTRATION MINIMUM REPORTING LEVEL (LCMRL) – The single laboratory LCMRL is the lowest true concentration for which a future recoveryis expected, with 99% confidence, to be between 50 and 150% recovery.[1]

3.15 MINIMUM REPORTING LEVEL (MRL) – The minimum concentration that can be reported as a quantitated value for a method analyte in a sample following analysis. This defined concentration can be no lower than the concentration of the lowest calibration standard for that analyte and can only be used if acceptable QC criteria for this standard are met. A procedure for verifying a laboratory's MRL is provided in Section 9.2.5.

3.16 PRECURSOR ION – For the purpose of this method, the precursor ion is the deprotonated molecule ($[M-H]^-$) of the method analyte. In MS/MS, the precursor ion is mass selected and fragmented by collisionally activated dissociation to produce distinctive product ions of smaller *m/z*.

3.17 PRIMARY DILUTION STANDARD (PDS) SOLUTION – A solution containing the analytes prepared in the laboratory from stock standard solutions and diluted as needed to prepare calibration solutions and other needed analyte solutions.

3.18 PRODUCT ION – For the purpose of this method, a product ion is one of the fragment ions produced in MS/MS by collisionally activated dissociation of the precursor ion.

3.19 QUALITY CONTROL SAMPLE (QCS) – A solution of method analytes of known concentrations that is obtained from a source external to the laboratory and different from the source of calibration standards. The second source SSS is used to fortify the QCS at a known concentration. The QCS is used to check calibration standard integrity.

3.20 STOCK STANDARD SOLUTION (SSS) – A concentrated solution containing one or more method analytes prepared in the laboratory using assayed reference materials or purchased from a reputable commercial source.

3.21 SURROGATE ANALYTE (SUR) – A pure chemical which chemically resembles method analytes and is extremely unlikely to be found in any sample. This

chemical is added to a sample aliquot in known amount(s) before processing and is measured with the same procedures used to measure other method analytes. The purpose of the SUR is to monitor method performance with each sample.

4. INTERFERENCES

LC-MS/MS data from blanks, samples, and spikes must be evaluated for interferences. If any interferences are present, take corrective action if necessary. Do not use aluminum foil because PFAAs can be potentially transferred from the aluminum foil to the glassware. Only aluminum foil rinsed with LC/MS grade methanol can be used where necessary.

4.1 PFAS have been used in a wide variety of manufacturing processes, and laboratory supplies should be considered potentially contaminated until they have been tested and shown to be otherwise. The materials and supplies used during the method validation process have been tested and shown to be clean. These items are listed in the Reagents section.

4.2 Method interferences may be caused by contaminants in solvents, reagents (including DI water), sample bottles and caps, and other sample processing hardware that lead to discrete artifacts and/or elevated baselines in the chromatograms. All items such as these must be routinely demonstrated to be free from interferences (less than 1/2 the Reporting Limit), under the conditions of the analysis by analyzing Method Blanks. Subtracting blank values from sample results is not permitted.

4.3 PTFE products can be a source of PFAS (PFOA) contamination. The use of PTFE in the procedure should be avoided. Polypropylene (PP) or polyethylene (PE, HDPE) products may be used in place of PTFE products to minimize PFOA contamination.

4.3.1 Standards and samples are injected from polypropylene autosampler vials with polypropylene snap caps, once. Multiple injections may be performed on Primers when conditioning the instrument for analysis.

4.3.2 Random evaporation losses have been observed with the polypropylene caps causing high Internal Std. recovery after the vial was punctured and sample re-injected. For this reason, it is best to inject standards and samples once in the analytical sequence.

4.3.2 Teflon-lined screw caps have detected PFAS at low concentrations. Repeated injection from the same teflon-lined screw cap have detected PFNA at increasing concentration as each repeated injection was performed, therefore, it is best to use polypropylene

snap caps.

4.4 LC/MS grade methanol must be used for all steps where methanol is used in this method.

4.5 Matrix interferences may be caused by contaminants that are co-extracted from the sample. The extent of matrix interferences will vary considerably from source to source, depending upon the nature of the water.

4.6 Solid phase extraction cartridges may be a source of interferences. The analysis of field and laboratory reagent blanks can provide important information regarding the presence or absence of such interferences. The Biotage Isolute 101 500 mg/6mL cartidges (SDVB) brand or Phenomenex SDVB have shown no interfering peaks/ions at the retention times of interest. Each new lot of SPE cartidges must be tested to ensure that contamination does not preclude analyte identification and quantitation.

4.6 Contamination by carryover can occur whenever a high-concentration and low concentration samples are sequentially analyzed. To reduce carryover, the sample syringe in automatically rinsed with solvent between injections. These operations are programmed into the LC multi-sampler system.

4.7 Volumetric glassware and syringes are difficult to clean after being used for solutions containing high levels of PFOA. These items should be labeled for use only with similarly concentrated solutions or verified clean prior to re-use. To the extent possible, disposable labware is used.

4.8 Both branched and linear PFAS isomers can potentially be found in the environment. Linear and branched isomers are known to exist for PFOS, PFOA, PFHxS, PFBS, Et-FOSAA, and MeFOSAA based upon the scientific literature. If multiple isomers are present for one of these PFAS they might be adjacent peaks that completely resolve or not, but usually with a deflection point resolved during peak integration. The later of these peaks matches the retention time of its labeled linear analog. In general, earlier peaks are the branched isomers and are not the result of peak splitting.

Currently, all these species are available as linear isomers. Reference standards of the technical mixtures for these specific PFAS are used to ensure that all appropriate peaks are included during peak integration. <u>These branched isomers elute before the linear isomer and are integrated and reported as total for those species.</u>

4.9 In an attempt to reduce PFOS bias, it is required that *m/z* 499>80 transition be used as the quantitation transition.

5. SAMPLE HANDLING

5.1 Aqueous samples are collected by our clients in 250 mL polypropylene bottles with polypropylene caps. For potable water samples the containers are charged with preservative: TRIZMA PRESET CRYSTALS, pH 7.0 Trizma® functions as a buffer, and removes free chlorine in chlorinated finished waters. Approx. 1.25 g. are added to 250 mL samples (5g/L).

5.2 FIELD REAGENT BLANKS (FRB)
A FRB must be handled along with each sample set. The sample set is composed of samples collected from the same sample site and at the same time. At the laboratory, fill the field blank sample bottle with reagent water and preservatives, seal, and ship to the sampling site along with the sample bottles. For each FRB shipped, an empty sample bottle (no preservatives) must also be shipped. At the sampling site, the sampler must open the shipped FRB and pour the preserved reagent water into the empty shipped sample bottle, seal and label this bottle as the FRB. The FRB is shipped back to the laboratory along with the samples and analyzed to ensure that PFAAs were not introduced into the sample during sample collection/handling.

5.3 SAMPLE SHIPMENT AND STORAGE – Samples must be chilled during shipment and must not exceed 10 °C during the first 48 hours after collection. Sample temperature must be confirmed to be at or below 10 °C when the samples are received at the laboratory. Samples stored in the lab must be held at or below 6 °C until extraction, but should not be frozen.

NOTE: Samples that are significantly above 10° C, at the time of collection, may need to be iced or refrigerated for a period of time, in order to chill them prior to shipping. This will allow them to be shipped with sufficient ice to meet the above requirements.

5.4 SAMPLE AND EXTRACT HOLDING TIMES – Results of the sample storage stability study (Table 10) indicated that all compounds listed in the EPA 537.1 method have adequate stability for 14 days when collected, preserved, shipped and stored as described. Therefore, water samples should be extracted within 14 days of collection. Extracts must be stored at room temperature and analyzed within 28 days after extraction.

6. APPARATUS AND MATERIALS

6.1 250 mL polypropylene bottles with polypropylene caps. VWR Scientific or equivalent: Part no. 414004-125, 12 pk. Alternate: White PP unlined lid L238WH and 8 oz. clarified PP single wall jar 70-400 neck, item J066-Containers and Packaging.com or equivalent.

6.2 Transport Tube: Virgin Polypropylene, White, Plastic, 10 mL Capacity, 16 mm OD, 93 mm Overall Lg, Self-Standing, 250 PK, Item 710Z420, Gamut.com (Grainger), with PP cap or equivalent.

6.3 Graduated cylinders, 50, 100, 250, 500 and 1000mL, Polypropylene, VWR Scientific or equivalent

6.4 Analytical Balance, 0.0001g., checked for accuracy each day of use with Class S weights, certified annually by an outside service

6.5 Extract concentrator: Organomation Model N-EVAP 112, 24 position concentrator with water batch control and nitrogen supply controls.

6.6 Syringes, polypropylene, luer lock, 50-100 mL for filtration of turbid groundwater samples. Merck XX110500 Fisher Scientific or equivalent

6.6 3.1 Micron in-line filters, Promochrom only

6.7 1.0 mL polypropylene snap cap vials, Agilent part no. 5182-0567

6.8 Snap caps, polypropylene, 11 mm, 11/9k, Agilent Part no. 5182-0542

6.9 Solid Phase Extraction Tubes: for EPA 537.1-Potable Water: SDVB- Biotage Isolute 101 500 mg/6mL cartidges (SDVB) part no. 101-0050-C or equivalent

6.10 Syringes, Hamilton or equivalent 5.0 uL, 10 uL 25 uL, 100 uL, 250 uL, 500 uL, teflon free

6.11 Solid Phase Extraction System-automated-Promochrom 8 position autosampler system for 6 mL capacity SPE tubes. System retrofit to remove all PTFE components and replaced with PEEK tubing or PFAS free tubing. Automated bottle rinsing feature required.

6.12 Nitrogen Evaporation System- Organomation Model N-EVAP 112-24 position evaporator with water bath and individual nitrogen delivery control. Water bath capable of ambient temperature to 85 C, but used at 55-60C.

6.13 LC/MS-MS system- Agilent 1260 HPLC system interfaced to an Agilent 6470A Triple Quadrupole system. The instrument control and qualitative/quantitative software is Mass Hunter versions B.8.0 and B.9.0 or later.

6.13.1 HPLC System-Agilent 1260 Infinity II

6.13.1.1 The Agilent 1260 Infinity II HPLC system is configured with temperature controlled column oven compartment. 4 column configuration, temperature controlled (refrigerated) auto sampler

compartments, injection valve, proportioning valves, variable flow controls and variable injection capabilities.

6.13.1.2 The delay column (PFAS and other interference removal) is an Agilent Eclipse Plus C18, 4.6mm x 50 mm, 3.5 um-Part no. 959943-902

6.13.1.3 The analytical column is an Agilent ZORBAX Eclipse Plus C18, 3.0 x 50 mm, 1.8 um- part no. 959757-302

6.13.2 Agilent LC/MS-MS- Agilent 6470AAR

6.14.2.1 Agilent model 6470AAR triple Quadruploe system with Agilent Jet Stream ESI source. UHP nitrogen is used as cell gas and High purity nitrogen is delivered for the sheath gas from a Peak Scientific nitrogen generator system.

6.14 Vortex Mixer- Benchmark Industries or equivalent

6.15 SenSafe Free Chlorine test strips- VWR Scientific or equivalent

7. REAGENTS AND STANDARDS

ALL REAGENTS and STANDARDS MUST BE LOGGED INTO THE ELEMENT LIMS SYSTEM. This includes lot numbers, expiration, open and prepared dates, recipe, Certification/traceability documents from supplier(s) if provided and preparer.

7.1 Methanol, hypergrade for LC/MS. (Merck) from Sigma Aldrich Part no. 1060354000 or equivalent

7.2 Water, hypergrade for LC/MS. (Merck) from Sigma Aldrich Part no. 1153334000 or equivalent

7.3 Isopropanol-for rinsing valve seats, etc.- Sigma Aldrich Part no. 650447-1L

7.4 Ammonium Acetate, LC-MSMS grade. Sigma Aldrich Part no. 73594-100-G-F

7.5 Agilent Tuning Solution-ESI-L-Agilent Part no. G1969-85000

7.5 Stock Standards

Stock Standards are purchased in mid to high concentration form from Wellington Laboratories, Inc. Guelph, ONT, CA. Currently, Wellington is the only supplier of these materials. Second source standards to serve as an initial calibration verification are available for some of the target compounds from Absolute Standards, Hamden, CT in a

2000 ng/mL mix of linear isomers. If unavailable, use a separate preparation/lot from Wellington Labs.

7.5.1 Internal Standards used for the method described are M2PFOA, MPFOS and d3-N-MeFOSAA. These are purchased at 50,000 ng/mL levels and mixed for use. These are purchased from Wellington Labs in 1.2 mL volumes with the following part nos.: MPFOA, MPFOS, and d3-N-MeFOSAA.

7.5.2 Surrogate Materials are purchased for the method described from Wellington Labs at 50000 ng/mL levels. The part nos. are MPFHxA, MPFDA, and d5-N-EtFOSAA.

7.5.3 Stock Standard mixtures of both linear and branched plus linear isomers of the EPA 537 mix are purchase from Wellington Labs at 2000 ng/mL concentrations under part nos. EPA537PDS-L and EPA537-PDS.

The summary below details the procurement requirements for this method-All from Wellington Laboratories, Inc.:

Description	Part no.	Comes in
2000 ng/mL EPA 537.1 list targets	EPA 537 PDSL-R1	4 Days – 1.2 mL
1000-4000 ng/mL EPA 537 Surrogates	EPA 537-SS-R1	4 Days – 1.2 mL
1000, 3000, 4000 ug/mL EPA 537 Internal Stds	EPA-537IS	4 Days – 1.2 mL
Individual Standards @ 50 ug/mL for IS and SURR as alternative		4 Days – 1.2 mL
ISTD –MPFOS	MPFOS	
ISTD - M2PFOA	M2PFOA	
ISTD - d3-N-MeFOSAA	d3-N-MeFOSAA	
SURR – MPFHxA	MPFHxA	
SURR - M3HFPO-DA	M3HFPO-DA	
SURR – MPFDA	MPFDA	
SURR - d5-N-EtFOSAA	d5-N-EtFOSAA	

7.6 Preparation of Standards

7.6.1 Preparation of Working Standards and Intermediates from STOCK Materials

All stock standards are prepared by the vendor in methanol containing a bit of sodium hydroxide to prevent losses of target PFAS compounds due to potential esterification in methanolic solution. The stocks come prepared with 4 molar equivalents (a 3x excess) of sodium hydroxide for stocks at the 50 ug/mL levels. This insures their stability with respect to potential loss due to esterification. The basic solution insures that any acidic sites on the glass ampules or acidic impurities in the methanol are neutralized to prevent ester formation and forms the sodium salt of the PFAS to stabilize it.

When preparing any intermediate or working level standards, the dilution must be prepared in alkaline methanol to prevent the above from occurring.

In order to do this, prepare a 5.0 mM NaOH in Hypergrade Methanol (or LC/MSMS grade) by dissolving 0.02 g. of sodium hydroxide into 100 mL of MeOH. This has a 2 week life.

For standards that are made to 10 mL final volume, add 100 uL of 5.0 mM NaOH/MeOH as part of the preparation. This results in a final concentration of NaOH at 0.05 mM.

For Standards prepared to a final volume of 1.0 mL. add 10 uL of the 5.0 mM NaOH/MeOH.

For working calibration standards/CCVB/SVC made to 500 uL final volume, add 5 uL of the 5.0 mM NaOH/MeOH to each.

7.6.2 Storage of Standards

All working standards should be stored at room temperature provided the container are sealed properly.
Stock Standards may be stored at <10 deg. C but before using must sit to allow equilibration to room temperature followed by either vigorous vortex mixing or sonication for 3-5 mins.

7.6.3 Detailed Preparation Procedure-EPA 537.1 R1

7.6.4 Internal Standards

Option 1 -Internal Standards-purchased as a stock mixture at 1000-4000 ng/mL

These as transferred to a snap cap vial that has been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry. Use as is adding 5 uL to 500 uL volumes or 3 uL to 300 uL volumes for samples or calibration.

Option 2- Internal standards-purchased at 50,000 ng/mL individual components

These as transferred to a snap cap vial that has been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry. Then, dilutions are made to yield 1000, 3000 and 4000 ng/mL Levels for use. Dilutions are prepared as directed below.

For 1.0 mL final volume:

ISTD component	uL of 50,000 ng/mL Stock	uLof 5 mM NaOH/MeOH	uL MeOH
MPFOS, 2870 ng/mL	60 uL	10 uL	830 uL
M2PFOA, 1000 ng/mL	20 uL		
d3-N-MeFOSAA , 4000 ng/mL	80 uL		

7.6.5 Surrogates

7.6.5.1 Option 1 -Stock Surrogates purchased as a mixture at 1000-4000 ng/mL. These are transferred to a snap cap vial that has been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry.
Prepare a 15 mL PP screw cap vial by pre-rinsing with 5 mM NaOH/MeOH then allowing to dry.

Prepare 10 mL of a 1:10 dilution to yield 100-400 ng/mL for use as follows:
Take 1.0 mL of the Surrogate Stock, plus 100 uL of 5 mM NaOH/MeOH and 8900 uL MeOH to give 10 mL final volume.

This results in the following concentrations of working surrogate mix which is used for all samples/QC (100 uL added) or used for calibration as directed under the Calibration section.

SURR – MPFHxA – 100 ng/mL
SURR - M3HFPO-DA - 100 ng/mL
SURR – MPFDA - 100 ng/mL
SURR - d5-N-EtFOSAA- 400 ng/mL

2.3.2.2 Option 2 – Stock individual Surrogates purchased at 50,000 ng/mL levels

SURR – MPFHxA – 50,000 ng/mL
SURR - M3HFPO-DA - 50,000 ng/mL
SURR – MPFDA - 50,000 ng/mL
SURR - d5-N-EtFOSAA- 50,000 ng/mL

These are received in glass ampules. The contents are transferred to snap cap vials that have been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry.

The working surrogate mixture at 100-400 ng/mL is prepared in 10.0 mL quantity by diluting as directed below:

Surrogate	Amount	uL- Amount 5 mM NaOH/MeOH	uL MeOH
MFPHxA	20 uL	100	9760
M3HFPO-DA	20		
MPFDA	20		
d5-N-EtFOSAA	80		

7.6.6 Target Analytes- EPA 537.1 R1

The target analytes for this method are purchased commercially from Wellington Labs under part no. EPA 537 PDSL-R1 which contains the method target analytes as linear isomers only at a nominal concentration of 2000 ng/mL. This mixture is transferred from its glass ampule to a snap cap vial that has been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry. Again these are the nominal concentrations and the actual anion concentrations for those present as salts is listed in the documentation and are reflected in both Mass Hunter and Element.

Preparation of a 10.0 mL volume for use at 100 ng/mL for both Laboratory Fortified Blanks (LFB/BS) and Laboratory Fortified Matrix (LFM/MS) and calibration is detailed below.

Rinse a 15 mL PP centrifuge tube with 5 mM NaOH/MeOH. Allow to dry. Add 100 uL of 5 mM NaOH/MeOH and 9400 uL of MeOH to the tube. Mix, then add 500 uL of the 2000 ng/mL EPA 537 PDSL-R1. Mix fully and this results in the 100 ng/mL solution used for BS/MS and Calibration for the analytes.

7.6.7 Calibration

Calibration of the LC-MSMS systems is done by a seven level calibration covering the range 0.25 ng/mL to 20 ng/mL, nominal. Various PFAS species are present as salts and at differing concentrations and these are reflected in Mass Hunter and Element as their actual concentrations. These are the nominal levels prepared: 0.25, 0.5, 1.0, 2.5, 5.0, 10.0, 20.0 ng/mL. These levels are prepared as directed below using the internal standards, surrogates and target analytes from above as directed below.

This is made to a final volume of 500 uL as shown below in 2 mL snap cap vials that have been pre-rinsed with 5 mM NaOH/MeOH then allowed to dry completely.

It is suggested that the stated volumes of methanol, 5mM NaOH/MeOH are mixed first in the snap caps, then the ISTD is added to each. Then the Surrogates added and finally the target analytes.

Based upon a final volume of 500 uL

Calibration Curve Preparation

Calibration Level	uL 100 ng/mL	uL 100 ng/mL Target Linear	uL 5 mM NaOH/	uL Methanol	uL ISTD at 1000-4000

	Surrogate mix	PFAS Analytes	MeOH		ng/mL
1 (0.25 ng/mL)*	1.25 uL	1.25 uL	5 uL	492.5 uL	5 uL
2 (0.50 ng/mL)	2.5	2.5	5	490.0	5
3 (1.0 ng/mL)	5.0	5.0	5	485.0	5
4 (2.5 ng/mL)	12.5	12.5	5	475.0	5
5 (5.0 ng/mL)*	25.0	25.0	5	445.0	5
6 (10.0 ng/mL)	50.0	50.0	5	395.0	5
7 (20.0 ng/mL)*	100.0	100.0	5	295.0	5

*These levels are also used as the LCV, CCV and HCV for each analysis sequence. Multiple vials should be prepared for these 3 levels.

7.6.8 Checking the Efficacy of the Surrogate/Spike Mixes

On a weekly basis the surrogate and spike mixes at 100 ng/mL are assayed to ensure stability. These are prepared for the analysis by taking 30 uL of the surrogate mix and 30 uL of the spike mix for a final volume of 300 uL as shown below. This yields a 1:10 dilution of the material.

Assay Preparation at 10 ng/mL nominal-prepare in PP auto sampler vial-final volume 300 uL + ISTD:

uL Methanol	uL 5 mM NaOH/MeOH	uL Surrogate at 100 ng/mL	uL Spike at 100 ng/mL	uL ISTD @ 1000-4000 ng/mL
237 uL	3 uL	30 uL	30 uL	3.0

7.6.9 Second Source - Initial Calibration Verification
EPA 537 mix at 2000 ng/mL is currently available form Absolute Standards, Hamden, CT , part no. 99206. This is prepared as an ICV as follows:

Initial Calibration Verification Preparation

Source-Absolute Standards EPA 537 Mix @ 2000 ng/mL

Preparation of Intermediate 100 ng/mL
Take 50 uL of Stock up to 1000 uL in MeOH = 100 ng/mL Intermediate

ICV Level @ 5.0 ng/mL
Take 25 uL of 100 ng/mL ICV Intermediate + 475 uL 95/5 MeOH/H2O + 5uL ISTDs-no Surrogates

8. PROCEDURE

8.1 Preventative and Routine Maintenance

HPLC/MS/MS Preventative Maintenance	
As Needed: Change pump seals. Change in-line filters in autosampler (HPLC). Check/replace in-line frit if excessive pressure or poor performance. Replace column if no change following in-line frit change. Clean needle. Replace or clean Capillary Replace fused silica tube in ESI interface. Clean lenses. Clean skimmer. Ballast rough pump 30 minutes. Check Nozzle flow pattern	**Daily (When in use)** Check solvent reservoirs for sufficient level of solvent. Verify that pump is primed, operating pulse free. (ripple < 1%) Check needle wash reservoir for sufficient solvent. Verify capillary heater temperature functioning. Verify vaporizer heater temperature. Verify rough pump oil levels. Verify turbo-pump functioning. Verify nitrogen pressure for auxiliary and sheath gasses. Possible Checktune
Semi-Annually Replace oil mist and odor elements. Replace activated alumina filter if applicable	**Annually** Vacuum system components including fans and fan covers. Clean/replace fan filters, if applicable.

8.2 Sample Preparation (Extraction and Concentration)

8.2.1 To measure sample initial volume mark a line at the meniscus present in the container. For each lab QC sample required, a clean sample bottle with Trizma® preservative should be filled to the near top and marked for initial volume measurement. Trizma is only used for potable water samples. This measurement serves as a backup since the Horizon Smart Prep II automatically measures the amount of aqueous sample processed and details the volume in the run report.

8.2.2 For every 20 field samples, a blank, a blank spike, and a blank spike duplicate must be extracted. (Field blanks are considered field samples in this consideration as they are treated as such) Ideally, if adequate sample volume is available, a duplicate and a matrix spike should be included on every batch.

8.2.3 All polypropylene equipment including graduated cylinders and sample transfer lines/reservoirs should be washed prior to using with extraction solvent (95:5 Methanol:water).

8.2.4 Add 100uL of surrogate to each sample and QC sample, recap and invert to mix well.

8.2.5 Add, 5, 50 or 100uL of spike to all BS (LFB) and 100 uL MS (LFM) samples included in the extraction batch.

8.2.6 Using the Promochrom automated system, run a cleaning run.

Be sure the reservoirs of LC/MS grade methanol and HPLC plus grade water are full. Prime all lines and align all components.

8.2.7. Load in the EPA537 method.

8.2.8 The SPE method parameters are listed in Figure 1.

Figure 1.0- Promochrom 537.1 SPE Parameters

Step	Action	Inlet	Flow (mL/Min)	Volume (mL)	Time (Mins)
1	Elute W2	CH3OH	5	5	
2	Wait (Soak)				1
3	Elute W2	CH3OH	3	5	
4	Wait (Soak)				1
5	Elute W2	CH3OH	3	5	
6	Wait (Soak)				2
7	Elute W1	H2O	5	18	
8	Wait (Soak)				1
9	Elute W1	H2O	5	5	
10	Wait				2
11	Add Sample W1	Sample	10	285*	
12	Rinse W1 (bottle rinse)	H2O	10	7.5	
13	Rinse W1 (bottle rinse)	H2O	10	7.5	
14	Add Sample W1 (line rinse)	Sample	10	4.5	
15	Elute W1 (prime)	CH3OH	10	0.2	
16	Air-Purge1 (dry tube)	Air	10	5	
17	Blow N_2 (dry tube)				5 @ (2.0 L/min)
18	Rinse 1 (Elute PFAS)	CH3OH	5	6	
19	Wait (Soak)				2
20	Rinse 1 (Elute)	CH3OH	5	6	
21	Wait (soak)				2
22	Collect 1 (final Elute step)	Sample	5	6	
23	Air-Purge1 (purge into collect)	Air	5	10	

*Maximum volume is based upon highest volume of sample in extraction batch

8.2.9 Place labeled 15 mL collection vessels in the sample collection tray and use Element labels to identify the vials at this point. Print 2 sets of labels for each since they will be used after the concentration step as well. These are graduated.

8.2.10 For Potable waters, check for free chlorine levels upon receipt using SenSafe free chlorine strips and show to be <0.1 ppm free chlorine before extraction. All samples above this limit should be rejected.

8.2.12 Add 100uL of Surrogate to each sample and QC sample and mix. Add 5 uL, 50 uL and 100 uL of the LFB (BS) depending upon the rotation of low, mid to high LFB. For LFM (MS) add 100 uL as the LFM for the batch.

8.2.13 Connect the bottles to the automated system..

8.2.14 Initiate the EPA537.1 Extraction Program as defined in Figure 1.0. Each run is approximately 1 hour 15 minutes. Draw a mark on each bottle and later measure the volume with a graduated cylinder. The actual sample volume extracted then entered into the Element Bench Sheet.

8.2.14 The resulting 10-14 mL extracts are transferred to the N-EVAP concentrator system operated at 50-55 degrees C (never more than 65C) in their original collection vials. The nitrogen flow is initiated and adjusted on each individual sample to provide a gentle stream causing a slight disturbance at the surface of the methanol extracts.

8.2.15 As this evaporation proceeds the walls of each vessel are rinsed with methanol when the volume is approximately 5 mls and then again when the volume is reduced to just below 1.0 mL. After these rinses, the evaporation is allowed to proceed until near dryness. At that point the walls of each sample vial are rinsed again with LC/MS grade Methanol and concentration allowed to proceed to dryness.

8.2.16 To each vial, add 1000 uL of 96%/4%Methanol/Water mix by swirling and using a disposable polypropylene pipet, vortex to mix, allow to settle then carefully transfer to a 2 mL PP snap cap.

8.2.17 Withdraw an aliquot of 300 uL into a 500 uL autos ampler vial (PP) and add 3.0 uL of ISTD mix. .

8.2.18 Cap with polyolefin flexible caps and vortex to mix.

8.2.19 Store Extracts at room temperature until analysis. If analysis is to proceed the next day or later, refrigerate at <10C.

8.3 Running Samples/QC - Acquisition Method

The acquisition method is detailed in Attachment 1 (HPLC) and Attachment 2 (MS/MS) of this SOP. The method is a HPLC with dynamic MRM method with precursor and

product ions with specific acquisition parameters to maximize sensitivity and specificity. This list may be modified to add other PFAS target analytes as necessary.
The Solid Phase Extraction Method (SPE) is detailed as Attachment 3.

8.3.1 The triple Quadrupole (QQQ) system must be optimized for each target analyte (including surrogates and internal standards) using the Mass Hunter Optimizer program. This program determines the most abundant precursor and product ions for each compound and their abundances. These data are then used to build an MRM (multiple reaction monitor) method for acquisition. This is done initially or after any major maintenance procedures are performed to the triple quadrupole system. A high level standard is used for this in the $[M-H]^-$ mode.

8.3.2 The QQQ is checked for tuning on a weekly basis before analysis using the Tune context by selecting the CHECKTUNE radio button. This is done only in negative ion mode since that what we are operating under. If the Checktune fails, run the Autotune program-note: this takes approx. 45 mins. in negative mode. This will require a calibration of the instrument.

8.3.3 Before any QC or samples can be run, the HPLC must be allowed to purge for at least thirty minutes. This purge must be done using the initial mobile phase conditions used in the method must be allowed to run for 15 minutes or until pressure has stabilized (ripple must be < 1%)

8.3.4 An instrument sequence (Worklist) is then made. It should begin with two primers (5 ng/mL) followed by a blank.

8.5.5 Those will be followed by the opening Low level CCC then mid level CCV. Then, the worklist can start running. Every 10 field samples (excluding QC and FRBs) a subsequent CCC must be run, alternating between medium and high CCVs (medium = 5 ng/mL, High = 20 ng/mL; Low CCV = 0.25 ng/mL). The sequence must end with a CCC in the rotation.

8.5.6 Following the run, a store column run must be entered, to ensure the column is stored in a high ratio of solvent.

8.5.7 The run can end with a script to put the instrument into standby mode.

8.4 Daily Sample Preparation/Analysis Sequence

- Prepare extracts for analysis by placing a 500 ul aliquot of sample extract containing internal standards into a PP auto-sampler vial. Apply snap cap.
- Confirm that the samples loaded on the auto-sampler were entered correctly in the injection log. Make any necessary corrections.

- Run instrument CCV checks at the RL (0.25 ng/mL), then at a mid level and high level rotating every ten samples (5, 20 ng/mL) and ending with a mid level CCV.
- Prepare samples by placing 100 ul of extract (diluted if necessary) into an auto-sampler vial. Add 2.0 ul 25 ppm Internal Standard to each.
- Enter the Worklist (injection sequence)into the instrument software and load samples onto the auto-sampler in the following order,

    - 2 Primers and a blank with ISTD
    - CCV conditioner @ 5 ng/mL
    - Low Level CCV (0.25 ng/mL)
    - Batch Method Blank
    - LFB
    - Sample Dup/LFM/LFMD
    - Samples to fill the 12-hour clock or 10 sample injections whichever is more frequent
    - CCV (ending or continuing) at 5.0 ng/mL
    - 10 injections
    - Ending CCV -High level, etc.

8.5 Data Review

The Agilent Mass Hunter Quantitation program is used to review all data. All identifications are based upon acceptable ion ratios for the abundance of both precursor and product ions along with retention time information.

8.5.1 Since certain PFAS species are manufactured by different processes the presence of branched as well as linear isomers may be found. In order to properly quantitate these species, the analyst must sum the related branched and linear isomers. This affects the following species: PFOS, PFHxS, N-EtFOSAA and N-MeFOSAA. These should be annotated as total in the quantitation report and subsequent Element outputs. This is accomplished by adding a Qualifier to these specific analytes. The specific qualifier is PFAS-T which says: "For this PFAS compound, the reported result is the Total of the linear and branched isomers".

EPA guidance on this is as follows:

1. Calibrate instrumentation using a certified quantitative standard containing only the linear isomer.

2. Identify the branched isomers by analyzing a “qualitative/semi-quantitative” PFOA mixed standard that includes both linear and branched isomers (Wellington Laboratories, cat#: T-PFOA or equivalent) and compare retention times and tandem mass spectrometry transitions.

3. Quantitate PFOA and the others by integrating the total response (i.e., accounting for peaks that are identified as linear and branched isomers) and relying on the initial calibration with the linear-isomer quantitative standard.

8.5.2 Any detection greater than the upper limit of the calibration curve requires dilution into the upper half of the curve, where possible.

9. CALIBRATION

9.1 Initial Calibration

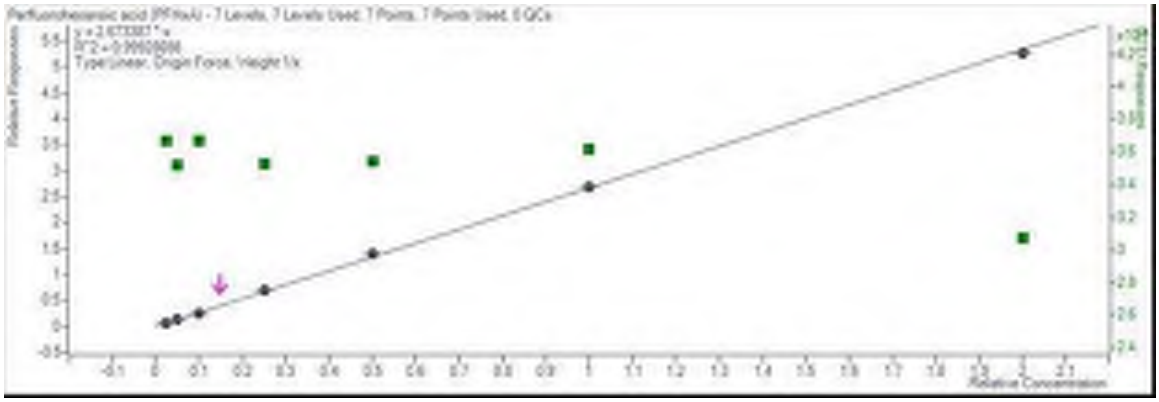
The initial calibration covers the range 0.25 ng/mL to 20 ng/mL or higher depending upon the linearity of the PFAS species. After acquisition, the data are quantitated in Mass Hunter and the default calibration model is generated using Quadratic regression , FORCED through the origin. Depending upon the response and accuracy at each level as shown in the Mass Hunter program, use Linear, Forced, weighted (1/x) or quadratic, Forced, with or without weighting to achieve the best fit which is based upon the best accuracy on a compound by compound basis. In any case, the correlation coefficient must be greater than 0.990.

9.1.1 The calibration levels as shown in Section 7.6.3 use 7 levels. All points are included in the calibration.

9.1.2 A typical calibration for a single compound showing responses and accuracy when quantitated against the curve is shown in Figure 2.0 below.

Figure 2.0 - Typical Calibration Accuracy Report and Curve

Initial Calibration	Perfluorohexanoic acid (PFHxA) Results			MPFOA (ISTD)
Name	RT, mins	Final Conc.	Accuracy	Area
SEQ-CAL1 0.25 ng/mL	10.3302	0.23	90.4	366519
SEQ-CAL2 0.50 ng/mL	10.2801	0.48	95.7	351967
SEQ-CAL3 1.00 ng/mL	10.3886	0.95	95.1	366588
SEQ-CAL4 2.50 ng/mL	10.3886	2.57	102.7	352457
SEQ-CAL5 5.00 ng/mL	10.3886	5.26	105.1	353774
SEQ-CAL6 10.0 ng/mL	10.3886	10.01	100.1	361544
SEQ-CAL7 20.0 ng/mL	10.3552	19.76	98.8	307426
BLANK	ND	ND < 0.25)	NA	365583
SEQ-SCV1 5.0 ng/mL	10.2801	5.12	102.5	360505



9.2 ICV/QCS

A second-source Initial Calibration Verification must be run immediately following initial calibration. The concentration of this standard should be in the middle of the calibration range (e.g. 5.0 ng/mL). Unless project-specific data quality objectives are required, the values from the second-source check should be within 30% of the expected concentration.

Corrective Action: Quantitative sample analyses should not proceed for a failing ICV. Recalibrate and re-run the ICV if necessary.

9.3 Continuing Calibration Verification

The first CCV must be at a level of 0.25 ng/mL (the RL level), followed by rotating mid-level (2.5-5.0 ng/mL) and high-level (10-20 ng/mL) CCVs every 10 client samples including a closing CCV.

The low level (MRL) CCV must be ± 50% of the true value (0.125-0.375 ng/mL). The mid-Level CCV must be ± 30% of the true value.

Corrective Action: If any of the required calibration check criteria fail, the system must be evaluated and any appropriate instrument repair or maintenance must be performed. Sample data are unacceptable and must be rerun. Reinjection the standard may be done. If the calibration check standard still fails, the system must be recalibrated.

10. Quality Control

10.1 Initial Demonstration of Capability (IDOC)

The initial demonstration requirement of EPA 537.1 must be acceptable before analysis of samples may begin. The IDOC includes the

following key elements that are detailed in Sections 9.2.1 et seq. for EPA 537.1:

10.1.1 Initial Demonstration of Branched vs. Linear Isomer profile for PFOA

10.1.2 Initial Demonstration of Low system background

10.1.3 Initial Demonstration of Precision

10.1.4 Initial Demonstration of Accuracy

10.1.5 Initial Demonstration of Asymmetry Factor

10.1.6 MRL Confirmation

10.1.7 MDL Determination (initial and on-going). This is detailed in Section 10.1.7.1 below.

10.1.7.1 MDL Determination-Spike at 4 ng/L

MDL Determination –In order to perform the MDL study, 7 total extractions are performed on 3 different days (Extraction day 1= 3 LRBs and 3 LFBs); Extraction day 2 is 2 of each, and Extraction day 3 is also 2 of each). Once extracted, the analyses are conducted on 3 separate days (we use only QQQ1 so all runs are on that system). The MDL is determined according to the EPA MDL protocol defined in Definition and Procedure of the Determination of the Method Detection Limit, Revision 2 Dec. 2016 as detailed below:

Make all computations as specified in the analytical method and express the final results in the method-specified reporting units.

Calculate the sample standard deviation (SD) of the replicate spiked sample measurements and the sample standard deviation of the replicate method blank measurements from all instruments to which the MDL will be applied.

Compute the MDLs (the MDL based on spiked samples) as follows:

MDL_s = 3.143 x SD (for seven replicates; SD = Standard Deviation)

Compute the MDLb (MDL based on method blanks-LRBs) as follows:

- If none of the blanks give numerical results then the MDLb does not apply
- If only some of the blanks (but not all) give a result, set the MDLb to the highest result found
- If ALL method blanks show a detections then use the following calculation to determine MDLb:

MDLb = Average of Blank Detections + (3.143 x Std. Dev.)

Calculate the final MDL by selecting the greater of MDLs or MDLb.

10.2 Batches are defined at the sample preparation step. Batches should be kept together through the whole analytical process as far as possible, but it is not mandatory to analyze prepared extracts on the same instrument or in the same sequence.

10.2.1 The quality control batch is a set of up to 20 samples of the same matrix processed using the same procedure and reagents within the same time period. The quality control batch must contain a matrix spike/matrix spike duplicate (MS/MSD), a laboratory control sample (LCS) and a method blank. Laboratory generated QC samples (Blank, LCS, MS/MSD) do not count toward the maximum 20 samples in a batch. Field QC samples are included in the batch count. In some cases, at client request, the MS/MSD may be replaced with a matrix spike and sample duplicate. If insufficient sample is available for an MS/MSD, an LCSD may be substituted if batch precision is required by the program or client. In the event that multiple MS/MSDs are run with a batch due to client requirements, the additional MS/MSDs do not count toward the maximum 20 samples in a batch.

10.3 METHOD BLANK- One method blank (MB, laboratory reagent blank) must be extracted with every process batch of similar matrix, not to exceed twenty (20) samples. For aqueous samples, the method blank is an aliquot of laboratory reagent water. For solid samples, the method blank is an aliquot of Ottawa sand. The method blank is processed in the same manner and at the

same time as the associated samples. Corrective actions must be documented on a Non-Conformance memo, and then implemented when target analytes are detected in the method blank above the reporting limit or when IDA recoveries are outside of the control limits. Re-extraction of the blank, other batch QC, and the affected samples are required when the method blank is deemed unacceptable.

10.3.1 If the MB produces a peak within the retention time window of any of the analytes, determine the source of the contamination and eliminate the interference before processing samples.

10.3.2 The method blank must not contain any analyte at or above 1/3 the reporting limit- for EPA 537.1 potable waters.

10.3.3 If there is no target analyte greater than the RL in the samples associated with an unacceptable method blank, the data may be reported with qualifiers. Such action should be taken in

consultation with the client.

10.3.4 Re-extraction and reanalysis of samples associated with an unacceptable method blank is required when reportable concentrations are determined in the samples.

10.3.5 Results are acceptable if the blank contamination is less than ½ of the reporting limit/LOQ for each analyte, or less than 1/10 of the regulatory limit, or less than 1/10 of the sample result for the same analyte, whichever is greater. If the method blank does not meet the acceptance criteria, the source of contamination must be investigated and measures taken to correct, minimize or eliminate the problem. Reprepare and reanalyze all field and QC samples associated with the contaminated method blank.

10.4 LABORATORY CONTROL SAMPLE (LCS) must be extracted with every process batch of similar matrix, not to exceed twenty (20) samples. The LCS is an aliquot of laboratory matrix (e.g. water for aqueous samples and Ottawa sand for solids) spiked with analytes of known identity and concentration. The LCS must be processed in the same manner and at the same time as the associated samples. Corrective actions must be documented on a Non-Conformance memo, then implemented when recoveries of any spiked analyte is outside of the control limits. Re-extraction of the blank, other batch QC, and all associated samples are required if the LCS is deemed unacceptable. The control limits for the LCS are stored in Element unless the method preempts this (537 limits).

10.5 A matrix spike/matrix spike duplicate (MS/MSD or MS/SD) pair must be extracted with every process batch of similar matrix, not to exceed twenty (20) samples. An MS/MSD pair is aliquots of a selected field sample spiked with analytes of known identity and concentration. The MS/MSD pair must be processed in the same manner and at the same time as the associated samples. Spiked analytes with recoveries or precision outside of the control limits must be within the control limits in the LCS. Corrective actions must be documented on a nonconformance memo, then implemented when recoveries of any spiked analyte are outside of the control limits provided by ELEMENT or by the client. Again if a specific method has required limits, this is preempted. Any outliers must be qualified accordingly.

10.6 A duplicate control sample (LCSD or DCS) may be added when insufficient sample volume is provided to process an MS/MSD pair, or is requested by the client. The LCSD is evaluated in the same manner as the LCS.

10.7 Initial calibration verification (ICV) –A second source standard is analyzed with the initial calibration curve. The concentration should be at the mid range of

the curve and must recover within 80-120 % of expected value.

Corrective actions for the ICV include:

- Rerun the ICV.
- Remake or acquire a new ICV.
- Evaluate the instrument conditions.
- Evaluate the initial calibration standards.
- Rerun the initial calibration.

10.8 Internal Standard- The Internal Standard (IS) is added to each field and QC sample prior to analysis. The IS response (peak area) must not deviate by more than 50% from the average response (peak area) of the initial calibration.

10.8.1 Sample IS response (peak area) must be within 70-140% of the response (peak area) in the most recent CCV.

10.9 Specific QC requirements for EPA Method 537.1 are detailed in Table 1.0 as follows.

Table 1.0 QC Criteria-EPA 537.1

Requirement	Specification and Frequency	Acceptance Criteria
Sample Holding Time	14 days with appropriate preservation and storage as described in Sections 8.1-8.5.	Sample results are valid only if samples are extracted within sample hold time.
Extract Holding Time	28 days when stored room temp. in polypropylene centrifuge tubes	Sample results are valid only if extracts are analyzed within extract hold time.
Laboratory Reagent Blank (LRB)	One MBLK with each extraction batch of up to 20 Field Samples.	Demonstrate that the method analyte concentration < 1/3 the MRL, and confirm that possible interferences do not prevent quantification. If the background concentration exceeds 1/3 the MRL, results for the extraction batch are invalid.
Laboratory Fortified Blank (LFB)	One LFB is required for each extraction batch of up to 20 Field Samples. Rotate between low, mid, high levels	Results of LFB analyses at medium and High fortification for the analyte and SUR. Results of a low-level LFB must be 50-150% of the true value.
Internal Standard (IS)	Compare IS area to the average IS area in the initial calibration and the most recent CCC.	Peak area counts for all injections must be within ± 50% of the average peak area calculated during the initial cal. and 70–140% from the most recent CCC. If the IS does not meet this criterion, target analyte results are invalid.
Surrogate(SUR) Standard	The SUR standard added to all calibration standards and samples, including QC samples. Calculate SUR recoveries.	SUR recovery must be 70-130% of the true value. If a SUR fails this criterion, report all results for sample as suspect/SUR recovery with appropriate qualifier.

Sample Matrix Spike (LFSM)	Analyze one MS per extraction batch (of up to 20 Field Samples) fortified target analytes. Calculate LFSM recoveries.	Recoveries at mid-high levels should be 70-130%. For low level LFSM 50-150% is acceptance range. Qualify any outliers using appropriate flags.
MSD (LFSMD) or Field Duplicates (FD)	Extract at least one FD or LFSMD with each extraction batch of 20 field samples or less. Calculate RPD.	RPD should be ≤30% at mid-high spike levels and at low levels ≤ 50% RPD. If not met, qualify data accordingly.
Field Reagent Blank (FRB)	Required when any target analyte is detected above the MRL. Processed as a sample.	IF any target analyte is detected at > 1/3 the MRL, all samples collected are invalid and must be recollected/reanalyzed.
Peak Asymmetry Factor	Calc. this factor each time a new ICAL is done by evaluating the 1st two chromatographic peaks in the mid point of the curve.	The Peak asymmetry factor must be 0.8-1.5-Agilent Mass Hunter calculates this as a Symmetry Factor
Quality Control Sample (QCS)-SCV	Analyzed Quarterly or when preparing new standards as well as during initial demonstration.	70-130% of true value
Initial Calibration	Use ISTD technique first order or second order FORCED through zero (origin). Use minimum of 5 points or 6 points for 2nd order	When each standard is calculated against the curve, the accuracy should be 70-130%, except for the lowest standard which should be 50-150% of the true value.
Continuing Calibration Check (CCC) (or CCV)	Verify by running low std 1st then after every 10 runs, rotating between mid and high levels	Surrogates and analyte recovery 70-130% except for low level. For low level: 50-150% recovery for analytes and 70-130% recovery for surrogates.

10.10 Initial Demonstration of Capability (IDC)

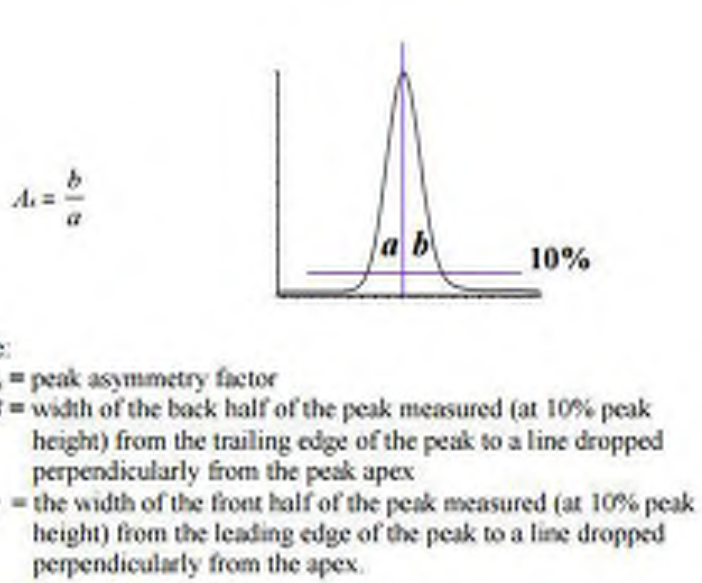
Initial Demonstration of Capability involves the following processes listed ion Table 2.0 as follows.

Table 2.0 - Initial Demonstration of Capability (IDC)

Requirement	**Specification**	**Acceptance Criteria**
Initial Demonstration of Low System Background *See EPA 537.1 Section 9.2.1*	Analyze LRB prior to any Other IDC steps	Demonstrate that all method analytes are < 1/3 MRL and possible interferences form extraction media do not prevent identification and quantification of method analytes.
Initial Demonstration of Precision (IDP) *See Section 9.2.2-*	Analyze 4-7 replicate LFBs at mid-cal level	%RSD must be < 20%
Initial Demonstration of Accuracy (IDA) *See Section 9.2.3-537.1*	Using the IDP runs above, Calc. average % Recovery	Mean Recovery ± 30% of true value

Initial Demonstration of Peak Asymmetry Factor	Calc. by evaluating the 1st two chromatographic peaks in the mid point of the curve. Equation in *Section 9.3.9 of EPA 537.1*	The Peak asymmetry factor must be 0.8-1.5 SEE FIGURE 3.0
Minimum Reporting Limit (MRL) Confirmation *See Section 9.2.5-537.1*	Fortify, extract and analyze seven replicates at the proposed MRL level. Calc. mean and the half range (HR). Confirm that the upper and lower limits for the prediction interval of result (Upper PIR and Lower PIR) meet recovery criteria.	Upper PIR $\leq$ 150% Lower PIR $\geq$ 50% SEE BELOW section 10.10.1 FOR CALCULATIONS

Figure 3.0 Peak Asymmetry Factor Determination



Agilent Mass Hunter performs this calculation automatically as shown below:

			Perfluorobutanesulfonic acid (PFBS) Results				MPFOS (ISTD)...		MPFHxA Results			
Acq. Date-Time	Dil.	Pos.	RT	Final Conc.	Accuracy	Symmetry	RT	Area	RT	Final Conc.	Accuracy	Symmetry
3/31/2021 7:06 PM	1.0	Vial 2	8.715	4.7078		1.17	13.954	96552	10.318	5.3196		1.40

10.10.1 MINIMUM REPORTING LEVEL (MRL) CONFIRMATION – Establish a target concentration for the MRL (0.25-0.5 ng/mL in extract- 1.0-2.0 ng/L in sample)for PFAS based on the intended use of the method. Fortify, extract, and analyze seven replicate LFBs at the proposed MRL concentration. Calculate the mean (*Mean*) and standard deviation for these replicates. Determine the Half Range for the prediction interval of results (*HRPIR*) using the equation below

$HR_{PIR} = 3.963S$

where *S* is the standard deviation, and 3.963 is the constant value for seven replicates.

NOTE: The mass spectrum (either SIM or full scan) for the method analyte in the LFBs must meet all the analyte identification criteria the MRL verification may not be performed on LFBs where only the base peak is observed. If during MRL confirmation all identification ions are not observed, the MRL selected is too low.

Confirm that the upper and lower limits for the Prediction Interval of Result (*PIR = Mean + HRPIR*) meet the upper and lower recovery limits as shown below.

The Upper PIR Limit must be ≤ 150% recovery.

$$\textit{Upper PIR Limit} = \frac{\textit{Mean} + \textit{HRPIR}}{\textit{Fortified Concentration}} \times 100\%$$

The Lower PIR Limit must be ≥ 50% recovery.

$$\textit{Lower PIR Limit} = \frac{\textit{Mean} - \textit{HRPIR}}{\textit{Fortified Concentration}} \times 100\%$$

The MRL is validated if both the Upper and Lower PIR Limits meet the criteria described above. If these criteria are not met, the MRL for PFAS has been set too low and must be re-evaluated at a higher concentration.

11.0 DATA REVIEW, CALCULATIONS AND REPORTING

Samples concentrations are determined using either or linear regression or quadratic regression FORCED through the origin. Weighted (1/x or $1/x^2$) may assist with low level accuracy and is recommended where necessary. All calibration curves have greater than 6 points and no points can be removed. Any target analyte exceeding the calibration range will require dilution.

11.1 Data interpretation

All sample data calculations are performed by the Agilent Mass Hunter software in ng/mL and then final data are calculated taking into account final extract volumes and the initial sample volumes extracted which are entered into the Element bench sheet.

11.2 Linear and Branched Isomers are addressed in Section 8.5 and are reported for the noted species as Total which is a sum of the linear and branched isomers for affected species.

12. HEALTH AND SAFETY

12.1 General safety considerations and requirements are detailed in the York Laboratory Safety and Health Standard Operating Procedure No. Safety011600.

Specific safety rules applying to the conduct of this analysis requiring the following:

- When handling standards and samples, latex gloves are required.
- Also, when handling neat materials, a fume hood and safety glasses are required.
- When handling samples, gloves and glasses are required.
- Highly odorous samples must be handled in a fume hood.
- Refer to SDSs for specific safety/health information.

12.2 The analysts must exercise normal care and be supervised and trained to work in an analytical chemistry laboratory. The analysts will be handling fragile glassware, needles, syringes, volatile and flammable chemicals, toxic chemicals and corrosive chemicals.

- No smoking or open flames are allowed.
- No food or food products may be brought into the laboratory.

Solvents should not be left uncovered on the laboratory benches.
All solvent transfers should be done in the hoods.

Hood doors must be kept in the position which yields approx. 100 fpm face velocity.
Solvent evaporation must be done in the hood with exhaust elevated and in the rear.

Waste containers that had solvents must be vented to a hood until all solvents have evaporated.

Safety glasses are provided and must be worn at all times in the laboratory.
Gloves are provided and must be worn when working with chemicals.
Laboratory coats are provided and should be worn to protect the analysts' clothes.
Syringes and needles must be kept in their original cases when not in use.
Care must be exercised in using and handling syringes to avoid injury.
Report any sticking with a needle immediately to your supervisor.

12.3 Specific Safety Concerns

12.3.1 Preliminary toxicity studies indicate that PFAS could have significant toxic effects. In the interest of keeping exposure levels as low as reasonably achievable, PFAS must be handled in the laboratory as hazardous and toxic chemicals.

12.3.2 Exercise caution when using syringes with attached filter disc assemblies. Application of excessive force has, upon occasion, caused a filter disc to burst during the process.

12.3.3 Laboratory procedures such as repetitive use of pipets, repetitive transferring of extracts and manipulation of filled separatory funnels and other glassware represent a significant potential for repetitive motion or other ergonomic injuries. Laboratory associates performing these procedures are in the best position to realize when they are at risk for these types of injuries.

12.3.4 Eye protection, laboratory coat, and nitrile gloves must be worn while handling samples, standards, solvents, and reagents. Disposable gloves that have been contaminated will be removed and discarded; other gloves will be cleaned immediately.

12.3.5 Perfluorocarboxylic acids are acids and are not compatible with strong bases.

12.3.6 Primary Materials Used- The following is a list of the materials used in this method, which have a serious or significant hazard rating. NOTE: This list does not include all materials used in the method. The table contains a summary of the primary hazards listed in the SDS for each of the materials listed in the table. A complete list of materials used in the method can be found in the reagents and materials section. Employees must review the information in the SDS for each material before using it for the first time or when there are major changes to the SDS.

Methanol (2-3-0)	Flammable Poison Irritant	200 ppm (TWA)	A slight irritant to the mucous membranes. Toxic effects exerted upon nervous system, particularly the optic nerve. Symptoms of overexposure may include headache, drowsiness and dizziness. Methyl alcohol is a defatting agent and may cause skin to become dry and cracked. Skin absorption can occur; symptoms may parallel inhalation exposure. Irritant to the eyes.

13. WASTE MANAGEMENT/POLLUTION PREVENTION

Neat Materials

Waste management procedures require the prudent use of neat materials. The ordering of neat standards and materials must be done to minimize unused material which would result in storage or handling of excess material. Quantities ordered should be sufficient to provide for necessary standards with consideration to shelf life. When ordering a unique material for a standard, be sure to order the smallest practical quantity.

Solvents

The solvents used at York for this procedure include isopropanol and Methanol. These solvents are used for sample extraction or LC cleanup, All amounts are either consumed during concentration or placed in one liter amber jars in the hood areas for evaporation. Any remaining solvent/water is transferred to a drum designated for solvent waste.

Samples

Unused or remaining soil and water samples are returned to the sample control room for continued storage for proper disposal by the sample control group.

14. REFERENCES

1. US EPA, "Method 537.1 - Determination of Selected Per- and Polyfluorinated alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometery (LC/MS/MS)", Version 1.0, November 2018, J.A. Shoemaker, P.E. Grimmett, B.K. Boutin, EPA Document #: EPA/600/R-18/352, and Version 2.0, March 2020 (the only updates were editorial and did not include any technical revisions).

2. Method ISO 25101:2009, "Determination of perfluorooctanesulfonate (PFOS) and perfluorooctanoate (PFOA) – Method for unfiltered samples using solid phase extraction and liquid chromatography/mass spectrometry", April 30, 2009.

3. EPA Technical Advisory-Laboratory Analysis of Drinking Water Samples for Perfluorooctanoic Acid (PFOA) using EPA Method 537 Rev. 1.1 EPA 815-B-16-021 September 2016

15. REVISION HISTORY

Revision 1.0	11/25/2018	First issue.
Revision 1.1	01/09/2019	Modified Cover page
Revision 1.2	03/30/2021	Modified Stds prep. Section 7 to reflect updated procedures
Revision 1.3	04/22/2021	Modified Reference 1 to reflect EPA 537.1

Attachment 1 -HPLC Method Parameters

Acquisition Method Report

	Channel	Name 1	Name 2	Selected	Used	Percent
1	A	Water 5mM ammonium acetate		Ch. 1	Yes	10.0 %
2	B	95% MeOH 5mM ammonium acetate		Ch. 1	Yes	90.0 %

Timetable

	Time	A	B	Flow
1	0.50 min	90.0 %	10.0 %	--- mL/min
2	2.00 min	70.0 %	30.0 %	--- mL/min
3	14.00 min	5.0 %	95.0 %	--- mL/min
4	14.50 min	0.0 %	100.0 %	--- mL/min

Name: Column Comp. **Module:** G7116A

Left Temperature Control	
Temperature Control Mode	Temperature Set
Temperature	50.0 °C
Enable Analysis Left Temperature	
Enable Analysis Left Temperature On	Yes
Enable Analysis Left Temperature Value	0.8 °C
Left Temp. Equilibration Time	1.0 min
Right Temperature Control	
Right temperature Control Mode	Temperature Set
Right temperature	50.0 °C
Enable Analysis Right Temperature	
Enable Analysis Right Temperature On	Yes
Enable Analysis Right Temperature Value	0.8 °C
Right Temp. Equilibration Time	1.0 min
Enforce column for run	
Enforce column for run enabled	No
Stop Time	
Stoptime Mode	As pump/injector
Post Time	
Posttime Mode	Off
Timetable	
Valve Position	Position 1 (Port 1 -> 1')
Position Switch After Run	Do not switch

Attachment 2 - Triple Quadrupole Acquisition Method

Acquisition Method Report

YORK

Acquisition Method Info

Method Name	EPA537.1_041720_ACQ.m
Method Path	D:\MassHunter\Methods\EPA537.1_041720_ACQ.m
Method Description	Target PFAS Acquiston EPA537.1 PW

Device List

Multisampler
Binary Pump
Column Comp.
QQQ

MS QQQ Mass Spectrometer

Ion Source	AJS ESI	**Tune File**	D:\MassHunter\Tune\QQQ\G6470A\Autotune_20210106_152612\atunes_20210106_154847.TUNE.XML
Stop Mode	No Limit/As Pump	**Stop Time (min)**	1
Time Filter	On	**Time Filter Width (min)**	0.07
LC->Waste Pre Row	N/A	**LC->Waste Post Row**	N/A

Time Segments

Index	Start Time (min)	Scan Type	Ion Mode	Div Valve	Delta EMV	Store	Cycle Time (ms)	Triggered?	MRM Repeats
1	0	DynamicMRM	ESI+Agilent Jet Stream	To MS	325	Yes	500	No	3

Time Segment 1

Scan Segments

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
11CL-PF3OUdS	No	630.89	Unit/Enh (6490)	450.7	Unit/Enh (6490)	176	33	4	15.711	3	Negative
9CL-PF3ONS	No	530.89	Unit/Enh (6490)	350.7	Unit/Enh (6490)	175	29	4	14.471	3	Negative
ADONA	No	378.97	Unit/Enh (6490)	250.9	Unit/Enh (6490)	103	9	4	12.108	3	Negative
ADONA	No	378.97	Unit/Enh (6490)	84.9	Unit/Enh (6490)	103	37	4	12.108	3	Negative
d3-N-MeFOSAA	Yes	572.99	Unit/Enh (6490)	418.7	Unit/Enh (6490)	148	21	4	15.092	3	Negative
d5-N-EtFOSAA	No	589.02	Unit/Enh (6490)	530.8	Unit/Enh (6490)	156	21	4	15.427	3	Negative
d5-N-EtFOSAA	No	588.99	Unit/Enh (6490)	418.8	Unit/Enh (6490)	156	21	4	15.427	3	Negative
HFPO-DA (GenX)	No	285	Unit/Enh (6490)	169	Unit/Enh (6490)	100	20	4	11.076	3	Negative
M2PFOA	Yes	414.99	Unit/Enh (6490)	369.8	Unit/Enh (6490)	84	9	4	13.067	3	Negative
M3HFPO-DA	No	287	Unit/Enh (6490)	169	Unit/Enh (6490)	100	20	4	11.075	3	Negative
MPFDA	No	514.99	Unit/Enh (6490)	469.8	Unit/Enh (6490)	78	9	4	14.774	3	Negative
MPFHxA	No	314.99	Unit/Enh (6490)	269.8	Unit/Enh (6490)	68	5	4	10.601	3	Negative
MPFOS	Yes	502.99	Unit/Enh (6490)	79.8	Unit/Enh (6490)	180	40	4	14.009	3	Negative
N-EtFOSAA	No	584	Unit/Enh (6490)	526.9	Unit/Enh (6490)	130	20	4	15.436	3	Negative
N-EtFOSAA	No	584	Unit/Enh (6490)	418.8	Unit/Enh (6490)	130	20	4	15.436	3	Negative
N-MeFOSAA	No	570	Unit/Enh (6490)	511.9	Unit/Enh (6490)	150	20	4	15.101	3	Negative
N-MeFOSAA	No	570	Unit/Enh (6490)	418.9	Unit/Enh (6490)	150	20	4	15.101	3	Negative
Perfluorobutanesulfonic acid (PFBS)	No	298.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	150	36	4	9.091	3	Negative
Perfluorodecanoic acid (PFDA)	No	513	Unit/Enh (6490)	468.8	Unit/Enh (6490)	90	8	4	14.775	3	Negative
Perfluorodecanoic acid (PFDA)	No	513	Unit/Enh (6490)	268.8	Unit/Enh (6490)	92	16	4	14.775	3	Negative

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Acquisition Method Report

YORK

Cpd Name	ISTD?	Prec Ion	MS1 Res	Prod Ion	MS2 Res	Frag (V)	CE (V)	Cell Acc (V)	Ret Time (min)	Ret Window	Polarity
Perfluorododecanoic acid (PFDoA)	No	613	Unit/Enh (6490)	568.8	Unit/Enh (6490)	90	12	4	15.964	3	Negative
Perfluorododecanoic acid (PFDoA)	No	613	Unit/Enh (6490)	168.7	Unit/Enh (6490)	90	28	4	15.964	3	Negative
Perfluoroheptanoic acid (PFHpA)	No	363	Unit/Enh (6490)	318.8	Unit/Enh (6490)	90	8	4	11.968	3	Negative
Perfluoroheptanoic acid (PFHpA)	No	363	Unit/Enh (6490)	168.9	Unit/Enh (6490)	90	16	4	11.968	3	Negative
Perfluorohexanesulfonic acid (PFHxS)	No	398.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	150	40	4	12.015	3	Negative
Perfluorohexanesulfonic acid (PFHxS)	No	398.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	150	44	4	12.015	3	Negative
Perfluorohexanoic acid (PFHxA)	No	313	Unit/Enh (6490)	268.9	Unit/Enh (6490)	70	4	4	10.595	3	Negative
Perfluorohexanoic acid (PFHxA)	No	313	Unit/Enh (6490)	119	Unit/Enh (6490)	70	20	4	10.595	3	Negative
Perfluorononanoic acid (PFNA)	No	463	Unit/Enh (6490)	418.8	Unit/Enh (6490)	90	8	4	14.002	3	Negative
Perfluorononanoic acid (PFNA)	No	463	Unit/Enh (6490)	218.8	Unit/Enh (6490)	90	16	4	14.002	3	Negative
Perfluorooctanesulfonic acid (PFOS)	No	498.9	Unit/Enh (6490)	98.9	Unit/Enh (6490)	150	44	4	14.01	3	Negative
Perfluorooctanesulfonic acid (PFOS)	No	498.9	Unit/Enh (6490)	79.9	Unit/Enh (6490)	150	84	4	14.01	3	Negative
Perfluorooctanoic acid (PFOA)	No	413	Unit/Enh (6490)	368.8	Unit/Enh (6490)	90	8	4	13.067	3	Negative
Perfluorooctanoic acid (PFOA)	No	413	Unit/Enh (6490)	168.9	Unit/Enh (6490)	90	16	4	13.067	3	Negative
Perfluorotetradecanoic acid (PFTA)	No	713	Unit/Enh (6490)	669	Unit/Enh (6490)	110	12	4	16.843	3	Negative
Perfluorotetradecanoic acid (PFTA)	No	713	Unit/Enh (6490)	168.8	Unit/Enh (6490)	110	28	4	16.843	3	Negative
Perfluorotridecanoic acid (PFTrDA)	No	663	Unit/Enh (6490)	618.8	Unit/Enh (6490)	90	12	4	16.433	3	Negative
Perfluoroundecanoic acid (PFUnA)	No	563	Unit/Enh (6490)	519	Unit/Enh (6490)	90	8	4	15.421	3	Negative
Perfluoroundecanoic acid (PFUnA)	No	563	Unit/Enh (6490)	169	Unit/Enh (6490)	90	24	4	15.421	3	Negative

Scan Parameters

Data Stg	Threshold
Centroid	0

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Acquisition Method Report

YORK

Source Parameters

Parameter	Value (+)	Value (-)
Gas Temp (°C)	230	230
Gas Flow (l/min)	5	5
Nebulizer (psi)	15	15
SheathGasHeater	350	350
SheathGasFlow	12	12
Capillary (V)	3500	2500
VCharging	500	0

Chromatograms

Chrom Type	Label	Offset	Y-Range
TIC	TIC	0	30000000

Instrument Curves

Actual

Name: Multisampler — **Module:** G7167A

Sampling Speed	
Draw Speed	100.0 µL/min
Eject Speed	400.0 µL/min
Wait Time After Drawing	1.2 s
Injection	
Needle Wash Mode	Standard Wash
Injection Volume	5.00 µL
Standard Needle Wash	
Needle Wash Mode	Flush Port
Duration	10 s
High Throughput	
Injection Valve to Bypass for Delay Volume Reduction	No
Sample Flush-Out Factor	5.0
Overlapped Injection	
Overlap Injection Enabled	No
Needle Height Position	
Draw Position Offset	1.5 mm
Use Vial/Well Bottom Sensing	Yes
Stop Time	
Stoptime Mode	No Limit
Post Time	
Posttime Mode	Off

Name: Binary Pump — **Module:** G7112B

Flow	0.400 mL/min
Use Solvent Types	No
Low Pressure Limit	0.00 bar
High Pressure Limit	600.00 bar
Maximum Flow Gradient	100.000 mL/min²
Stroke A	
Automatic Stroke Calculation A	Yes
Stroke B	
Automatic Stroke Calculation B	Yes
Compress A	
Compressibility Mode A	Compressibility Value Set
Compressibility A	70 10e-6/bar
Compress B	
Compressibility Mode B	Compressibility Value Set
Compressibility B	90 10e-6/bar
Stop Time	
Stoptime Mode	Time set

Report generation date: 05-Apr-2021 07:54:20 AM

ATTACHMENT F

ELAP Certification
(York Analytical Laboratories, Inc.)

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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Issued April 01, 2021

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. ROBERT Q. BRADLEY
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

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All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 8260D
	EPA 8260C
	EPA 624.1
Acrylonitrile	EPA 8260D
	EPA 8260C
	EPA 624.1
Methyl methacrylate	EPA 8260D
	EPA 8260C
Amines	
1,2-Diphenylhydrazine	EPA 8270D
	EPA 8270E
2-Nitroaniline	EPA 8270D
	EPA 8270E
3-Nitroaniline	EPA 8270D
	EPA 8270E
4-Chloroaniline	EPA 8270D
	EPA 8270E
4-Nitroaniline	EPA 8270D
	EPA 8270E
Aniline	EPA 625.1
	EPA 8270D
	EPA 8270E
Carbazole	EPA 625.1
	EPA 8270D
	EPA 8270E
Amines	
Diphenylamine	EPA 8270D
	EPA 8270E
Pyridine	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzidines	
3,3'-Dichlorobenzidine	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzidine	EPA 625.1
	EPA 8270D
	EPA 8270E
Chlorinated Hydrocarbon Pesticides	
4,4'-DDD	EPA 8081B
	EPA 608.3
4,4'-DDE	EPA 8081B
	EPA 608.3
4,4'-DDT	EPA 8081B
	EPA 608.3
Aldrin	EPA 8081B
	EPA 608.3
alpha-BHC	EPA 8081B
	EPA 608.3
alpha-Chlordane	EPA 8081B
beta-BHC	EPA 8081B

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Chlorinated Hydrocarbon Pesticides	
beta-BHC	EPA 608.3
Chlordane Total	EPA 8081B
	EPA 608.3
delta-BHC	EPA 8081B
	EPA 608.3
Dieldrin	EPA 8081B
	EPA 608.3
Endosulfan I	EPA 8081B
	EPA 608.3
Endosulfan II	EPA 8081B
	EPA 608.3
Endosulfan sulfate	EPA 8081B
	EPA 608.3
Endrin	EPA 8081B
	EPA 608.3
Endrin aldehyde	EPA 8081B
	EPA 608.3
Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
	EPA 608.3
Heptachlor epoxide	EPA 8081B
	EPA 608.3
Lindane	EPA 8081B
	EPA 608.3
Methoxychlor	EPA 8081B

Chlorinated Hydrocarbon Pesticides	
Methoxychlor	EPA 608.3
Mirex	EPA 8081B
Toxaphene	EPA 8081B
	EPA 608.3

Chlorinated Hydrocarbons	
1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
1,2,4,5-Tetrachlorobenzene	EPA 8270D
	EPA 8270E
1,2,4-Trichlorobenzene	EPA 625.1
	EPA 8270D
	EPA 8270E
2-Chloronaphthalene	EPA 625.1
	EPA 8270D
	EPA 8270E
Hexachlorobenzene	EPA 625.1
	EPA 8270D
	EPA 8270E
Hexachlorobutadiene	EPA 625.1
	EPA 8270D
	EPA 8270E
Hexachlorocyclopentadiene	EPA 625.1
	EPA 8270D
	EPA 8270E
Hexachloroethane	EPA 625.1

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Chlorinated Hydrocarbons	
Hexachloroethane	EPA 8270D
	EPA 8270E
Pentachlorobenzene	EPA 8270D
	EPA 8270E
Chlorophenoxy Acid Pesticides	
2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A
	SM 6640B-2006
2,4-D	EPA 8151A
Dicamba	EPA 8151A
Demand	
Biochemical Oxygen Demand	SM 5210B-2011
Carbonaceous BOD	SM 5210B-2011
Chemical Oxygen Demand	SM 5220D-2011
Fuel Oxygenates	
Di-isopropyl ether	EPA 8260D
	EPA 8260C
Ethanol	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-amyl alcohol	EPA 8260D
	EPA 8260C
tert-amyl methyl ether (TAME)	EPA 8260D

Fuel Oxygenates	
tert-amyl methyl ether (TAME)	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
tert-butyl ethyl ether (ETBE)	EPA 8260D
	EPA 8260C
Haloethers	
2,2'-Oxybis(1-chloropropane)	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Bromophenylphenyl ether	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Chlorophenylphenyl ether	EPA 625.1
	EPA 8270D
	EPA 8270E
Bis(2-chloroethoxy)methane	EPA 625.1
	EPA 8270D
	EPA 8270E
Bis(2-chloroethyl)ether	EPA 625.1
	EPA 8270D
	EPA 8270E
Low Level Halocarbons	
1,2,3-Trichloropropane, Low Level	EPA 8011
1,2-Dibromo-3-chloropropane, Low Level	EPA 8011
1,2-Dibromoethane, Low Level	EPA 8011

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Low Level Polynuclear Aromatics	
Acenaphthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Acenaphthylene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Anthracene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(a)anthracene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(a)pyrene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(b)fluoranthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(g,h,i)perylene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Benzo(k)fluoranthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Chrysene Low Level	EPA 8270D
	EPA 8270E

Low Level Polynuclear Aromatics	
Chrysene Low Level	EPA 8270E SIM
Dibenzo(a,h)anthracene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Fluoranthene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Fluorene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Indeno(1,2,3-cd)pyrene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Naphthalene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Phenanthrene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Pyrene Low Level	EPA 8270D
	EPA 8270E
	EPA 8270E SIM
Metals I	
Barium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C

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Metals I		Metals I	
Barium, Total	EPA 6010D	Iron, Total	EPA 6010C
	EPA 6020A		EPA 6010D
	EPA 6020B		EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)		EPA 6020B
Cadmium, Total	EPA 200.7, Rev. 4.4 (1994)		EPA 200.8, Rev. 5.4 (1994)
	EPA 6010C	Lead, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D		EPA 6010C
	EPA 6020A		EPA 6010D
	EPA 6020B		EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)		EPA 6020B
Calcium, Total	EPA 200.7, Rev. 4.4 (1994)		EPA 200.8, Rev. 5.4 (1994)
	EPA 6010C	Magnesium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D		EPA 6010C
Chromium, Total	EPA 200.7, Rev. 4.4 (1994)		EPA 6010D
	EPA 6010C	Manganese, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D		EPA 6010C
	EPA 6020A		EPA 6010D
	EPA 6020B		EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)		EPA 6020B
Copper, Total	EPA 200.7, Rev. 4.4 (1994)		EPA 200.8, Rev. 5.4 (1994)
	EPA 6010C	Nickel, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010D		EPA 6010C
	EPA 6020A		EPA 6010D
	EPA 6020B		EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)		EPA 6020B
Iron, Total	EPA 200.7, Rev. 4.4 (1994)		EPA 200.8, Rev. 5.4 (1994)

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Metals I	
Potassium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
Silver, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Sodium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
Metals II	
Aluminum, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Antimony, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)

Metals II	
Arsenic, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Beryllium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Chromium VI	EPA 7196A
	SM 3500-Cr B-2011
Mercury, Total	EPA 245.1, Rev. 3.0 (1994)
	EPA 245.2 (Issued 1974, Rev. 1
	EPA 7470A
	EPA 7473
Selenium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Vanadium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C

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Metals II	
Vanadium, Total	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Zinc, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Metals III	
Cobalt, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Molybdenum, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Thallium, Total	EPA 200.7, Rev. 4.4 (1994)
	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
	EPA 200.8, Rev. 5.4 (1994)
Metals III	
Tin, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Titanium, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Mineral	
Alkalinity	SM 2320B-2011
Calcium Hardness	EPA 200.7, Rev. 4.4 (1994)
Chloride	EPA 300.0, Rev. 2.1 (1993)
Fluoride, Total	EPA 300.0, Rev. 2.1 (1993)
Hardness, Total	EPA 200.7, Rev. 4.4 (1994)
Sulfate (as SO4)	EPA 300.0, Rev. 2.1 (1993)
Miscellaneous	
Boron, Total	EPA 6020A
	EPA 200.8, Rev. 5.4 (1994)
Bromide	EPA 300.0, Rev. 2.1 (1993)
Color	SM 2120B-2011
Cyanide, Total	SM 4500-CN E-2011
Oil and Grease Total Recoverable (HEM)	EPA 1664A
Organic Carbon, Total	SM 5310C-2011
Phenols	EPA 420.1 (Rev. 1978)
Specific Conductance	EPA 120.1 (Rev. 1982)
Sulfide (as S)	SM 4500-S2- F-2011
Surfactant (MBAS)	SM 5540C-2011
Turbidity	EPA 180.1, Rev. 2.0 (1993)

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Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 625.1
	EPA 8270D
	EPA 8270E
2,6-Dinitrotoluene	EPA 625.1
	EPA 8270D
	EPA 8270E
Isophorone	EPA 625.1
	EPA 8270D
	EPA 8270E
Nitrobenzene	EPA 625.1
	EPA 8270D
	EPA 8270E
Nitrosoamines	
N-Nitrosodimethylamine	EPA 625.1
	EPA 8270D
	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 625.1
	EPA 8270D
	EPA 8270E
N-Nitrosodiphenylamine	EPA 625.1
	EPA 8270D
	EPA 8270E
Nutrient	
Ammonia (as N)	SM 4500-NH3 D-2011 or E-2011
Kjeldahl Nitrogen, Total	SM 4500-N Org D-2011
Nutrient	
Kjeldahl Nitrogen, Total	SM 4500-NH3 D-2011 or E-2011
Nitrate (as N)	EPA 300.0, Rev. 2.1 (1993)
Nitrate-Nitrite (as N)	EPA 300.0, Rev. 2.1 (1993)
Nitrite (as N)	EPA 300.0, Rev. 2.1 (1993)
Orthophosphate (as P)	EPA 300.0, Rev. 2.1 (1993)
	SM 4500-P E-2011
Phosphorus, Total	SM 4500-P E-2011
Organophosphate Pesticides	
Atrazine	EPA 8270D
	EPA 8270E
Parathion ethyl	EPA 8270D
	EPA 8270E
Petroleum Hydrocarbons	
Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D
Phthalate Esters	
Benzyl butyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Bis(2-ethylhexyl) phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Diethyl phthalate	EPA 625.1
	EPA 8270D

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Phthalate Esters	
Diethyl phthalate	EPA 8270E
Dimethyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Di-n-butyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Di-n-octyl phthalate	EPA 625.1
	EPA 8270D
	EPA 8270E
Polychlorinated Biphenyls	
Aroclor 1016 (PCB-1016)	EPA 8082A
	EPA 608.3
Aroclor 1221 (PCB-1221)	EPA 8082A
	EPA 608.3
Aroclor 1232 (PCB-1232)	EPA 8082A
	EPA 608.3
Aroclor 1242 (PCB-1242)	EPA 8082A
	EPA 608.3
Aroclor 1248 (PCB-1248)	EPA 8082A
	EPA 608.3
Aroclor 1254 (PCB-1254)	EPA 8082A
	EPA 608.3
Aroclor 1260 (PCB-1260)	EPA 8082A
	EPA 608.3

Polychlorinated Biphenyls	
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A
Polynuclear Aromatics	
Acenaphthene	EPA 625.1
	EPA 8270D
	EPA 8270E
Acenaphthylene	EPA 625.1
	EPA 8270D
	EPA 8270E
Anthracene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(a)anthracene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(a)pyrene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(b)fluoranthene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(g,h,i)perylene	EPA 625.1
	EPA 8270D
	EPA 8270E
Benzo(k)fluoranthene	EPA 625.1

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Polynuclear Aromatics		Priority Pollutant Phenols	
Benzo(k)fluoranthene	EPA 8270D	2,3,4,6 Tetrachlorophenol	EPA 8270D
	EPA 8270E		EPA 8270E
Chrysene	EPA 625.1	2,4,5-Trichlorophenol	EPA 625.1
	EPA 8270D		EPA 8270D
	EPA 8270E		EPA 8270E
Dibenzo(a,h)anthracene	EPA 625.1	2,4,6-Trichlorophenol	EPA 625.1
	EPA 8270D		EPA 8270D
	EPA 8270E		EPA 8270E
Fluoranthene	EPA 625.1	2,4-Dichlorophenol	EPA 625.1
	EPA 8270D		EPA 8270D
	EPA 8270E		EPA 8270E
Fluorene	EPA 625.1	2,4-Dimethylphenol	EPA 625.1
	EPA 8270D		EPA 8270D
	EPA 8270E		EPA 8270E
Indeno(1,2,3-cd)pyrene	EPA 625.1	2,4-Dinitrophenol	EPA 625.1
	EPA 8270D		EPA 8270D
	EPA 8270E		EPA 8270E
Naphthalene	EPA 625.1	2-Chlorophenol	EPA 625.1
	EPA 8270D		EPA 8270D
	EPA 8270E		EPA 8270E
Phenanthrene	EPA 625.1	2-Methyl-4,6-dinitrophenol	EPA 625.1
	EPA 8270D		EPA 8270D
	EPA 8270E		EPA 8270E
Pyrene	EPA 625.1	2-Methylphenol	EPA 625.1
	EPA 8270D		EPA 8270D
	EPA 8270E		EPA 8270E

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WADSWORTH CENTER

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CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. ROBERT Q. BRADLEY
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Priority Pollutant Phenols

2-Nitrophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Chloro-3-methylphenol	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Methylphenol	EPA 625.1
	EPA 8270D
	EPA 8270E
4-Nitrophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
Cresols, Total	EPA 8270D
	EPA 8270E
Pentachlorophenol	EPA 625.1
	EPA 8270D
	EPA 8270E
Phenol	EPA 625.1
	EPA 8270D
	EPA 8270E

Residue

Settleable Solids	SM 2540 F-2011
Solids, Total	SM 2540 B-2011
Solids, Total Dissolved	SM 2540 C-2011
Solids, Total Suspended	SM 2540 D-2011

Semi-Volatile Organics

1,1'-Biphenyl	EPA 8270D
	EPA 8270E
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
2-Methylnaphthalene	EPA 8270D
	EPA 8270E
Acetophenone	EPA 8270D
	EPA 8270E
alpha-Terpineol	EPA 625.1
	EPA 8270E
Benzaldehyde	EPA 8270D
	EPA 8270E
Benzoic Acid	EPA 8270D
	EPA 8270E
Benzyl alcohol	EPA 8270D
	EPA 8270E
Caprolactam	EPA 8270D
	EPA 8270E
Dibenzofuran	EPA 8270D
	EPA 8270E

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Volatile Aromatics	
1,2,4-Trichlorobenzene, Volatile	EPA 8260D
	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
	EPA 624.1
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D
	EPA 8260C
Benzene	EPA 8260D
	EPA 8260C
	EPA 624.1
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C

Volatile Aromatics	
Chlorobenzene	EPA 624.1
Ethyl benzene	EPA 8260D
	EPA 8260C
	EPA 624.1
Isopropylbenzene	EPA 8260D
	EPA 8260C
m/p-Xylenes	EPA 8260D
	EPA 8260C
	EPA 624.1
Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
	EPA 624.1
p-Isopropyltoluene (P-Cymene)	EPA 8260D
	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C
Styrene	EPA 8260D
	EPA 8260C
	EPA 624.1
tert-Butylbenzene	EPA 8260D

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Volatile Aromatics	
tert-Butylbenzene	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
	EPA 624.1
Total Xylenes	EPA 8260D
	EPA 8260C
	EPA 624.1
Volatile Halocarbons	
1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1-Dichloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,1-Dichloroethene	EPA 8260D

Volatile Halocarbons	
1,1-Dichloroethene	EPA 8260C
	EPA 624.1
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D
	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,2-Dichloropropane	EPA 8260D
	EPA 8260C
	EPA 624.1
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C
	EPA 624.1
Bromochloromethane	EPA 8260D
	EPA 8260C
Bromodichloromethane	EPA 8260D

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Volatile Halocarbons	
Bromodichloromethane	EPA 8260C
	EPA 624.1
Bromoform	EPA 8260D
	EPA 8260C
	EPA 624.1
Bromomethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Carbon tetrachloride	EPA 8260D
	EPA 8260C
	EPA 624.1
Chloroethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Chloroform	EPA 8260D
	EPA 8260C
	EPA 624.1
Chloromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
	EPA 624.1

Volatile Halocarbons	
Dibromochloromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Hexachlorobutadiene, Volatile	EPA 8260D
	EPA 8260C
Methylene chloride	EPA 8260D
	EPA 8260C
	EPA 624.1
Tetrachloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
	EPA 624.1
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
	EPA 624.1
trans-1,4-Dichloro-2-butene	EPA 8260D
	EPA 8260C
Trichloroethene	EPA 8260D
	EPA 8260C

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Volatile Halocarbons	
Trichloroethene	EPA 624.1
Trichlorofluoromethane	EPA 8260D
	EPA 8260C
	EPA 624.1
Vinyl chloride	EPA 8260D
	EPA 8260C
	EPA 624.1
Volatiles Organics	
1,4-Dioxane	EPA 8260D
	EPA 8260C
	EPA 8270D SIM
	EPA 8270E
	EPA 8270E SIM
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
	EPA 8260C
Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Volatiles Organics	
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C
Sample Preparation Methods	
	SM 4500-P B(5)-2011
	EPA 5030C
	SM 4500-CN B-2011 and C-201
	EPA 3015A
	EPA 3010A
	EPA 3005A
	EPA 3510C
	SM 4500-N Org B-2011 or C-20

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Acrylates	
Acrolein (Propenal)	EPA 8260D
	EPA 8260C
Acrylonitrile	EPA 8260D
	EPA 8260C
Methyl methacrylate	EPA 8260D
	EPA 8260C
Amines	
1,2-Diphenylhydrazine	EPA 8270D
	EPA 8270E
2-Nitroaniline	EPA 8270D
	EPA 8270E
3-Nitroaniline	EPA 8270D
	EPA 8270E
4-Chloroaniline	EPA 8270D
	EPA 8270E
4-Nitroaniline	EPA 8270D
	EPA 8270E
Aniline	EPA 8270D
	EPA 8270E
Carbazole	EPA 8270D
	EPA 8270E
Diphenylamine	EPA 8270D
	EPA 8270E
Benzidines	
3,3'-Dichlorobenzidine	EPA 8270D

Benzidines	
3,3'-Dichlorobenzidine	EPA 8270E
Benzidine	EPA 8270D
	EPA 8270E
Characteristic Testing	
Corrosivity (pH)	EPA 9045D
Free Liquids	EPA 9095B
Ignitability	EPA 1010A
Synthetic Precipitation Leaching Proc.	EPA 1312
TCLP	EPA 1311
Chlorinated Hydrocarbon Pesticides	
4,4'-DDD	EPA 8081B
4,4'-DDE	EPA 8081B
4,4'-DDT	EPA 8081B
Aldrin	EPA 8081B
alpha-BHC	EPA 8081B
alpha-Chlordane	EPA 8081B
Atrazine	EPA 8270D
	EPA 8270E
beta-BHC	EPA 8081B
Chlordane Total	EPA 8081B
delta-BHC	EPA 8081B
Dieldrin	EPA 8081B
Endosulfan I	EPA 8081B
Endosulfan II	EPA 8081B
Endosulfan sulfate	EPA 8081B

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Chlorinated Hydrocarbon Pesticides	
Endrin	EPA 8081B
Endrin aldehyde	EPA 8081B
Endrin Ketone	EPA 8081B
gamma-Chlordane	EPA 8081B
Heptachlor	EPA 8081B
Heptachlor epoxide	EPA 8081B
Lindane	EPA 8081B
Methoxychlor	EPA 8081B
Mirex	EPA 8081B
Toxaphene	EPA 8081B
Chlorinated Hydrocarbons	
1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
1,2,4,5-Tetrachlorobenzene	EPA 8270D
	EPA 8270E
1,2,4-Trichlorobenzene	EPA 8270D
	EPA 8270E
2-Chloronaphthalene	EPA 8270D
	EPA 8270E
Hexachlorobenzene	EPA 8270D
	EPA 8270E
Hexachlorobutadiene	EPA 8270D
	EPA 8270E
Hexachlorocyclopentadiene	EPA 8270D
	EPA 8270E
Chlorinated Hydrocarbons	
Hexachloroethane	EPA 8270D
	EPA 8270E
Chlorophenoxy Acid Pesticides	
2,4,5-T	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A
2,4-D	EPA 8151A
Dicamba	EPA 8151A
Haloethers	
2,2'-Oxybis(1-chloropropane)	EPA 8270D
	EPA 8270E
4-Bromophenylphenyl ether	EPA 8270D
	EPA 8270E
4-Chlorophenylphenyl ether	EPA 8270D
	EPA 8270E
Bis(2-chloroethoxy)methane	EPA 8270D
	EPA 8270E
Bis(2-chloroethyl)ether	EPA 8270D
	EPA 8270E
Metals I	
Barium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Cadmium, Total	EPA 6010C

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Metals I		**Metals I**	
Cadmium, Total	EPA 6010D	Nickel, Total	EPA 6010D
	EPA 6020A		EPA 6020A
	EPA 6020B		EPA 6020B
Calcium, Total	EPA 6010C	Potassium, Total	EPA 6010C
	EPA 6010D		EPA 6010D
Chromium, Total	EPA 6010C	Silver, Total	EPA 6010C
	EPA 6010D		EPA 6010D
	EPA 6020A		EPA 6020A
	EPA 6020B		EPA 6020B
Copper, Total	EPA 6010C	Sodium, Total	EPA 6010C
	EPA 6010D		EPA 6010D
	EPA 6020A	**Metals II**	
	EPA 6020B	Aluminum, Total	EPA 6010C
Iron, Total	EPA 6010C		EPA 6010D
	EPA 6010D		EPA 6020A
Lead, Total	EPA 6010C		EPA 6020B
	EPA 6010D	Antimony, Total	EPA 6010C
	EPA 6020A		EPA 6010D
	EPA 6020B		EPA 6020A
Magnesium, Total	EPA 6010C		EPA 6020B
	EPA 6010D	Arsenic, Total	EPA 6010C
Manganese, Total	EPA 6010C		EPA 6010D
	EPA 6010D		EPA 6020A
	EPA 6020A		EPA 6020B
	EPA 6020B	Beryllium, Total	EPA 6010C
Nickel, Total	EPA 6010C		

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Metals II	
Beryllium, Total	EPA 6010D
Chromium VI	EPA 7196A
Mercury, Total	EPA 7471B
	EPA 7473
Selenium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Vanadium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Zinc, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Metals III	
Cobalt, Total	EPA 6010C
	EPA 6010D
	EPA 6020A
	EPA 6020B
Molybdenum, Total	EPA 6020A
Thallium, Total	EPA 6010C
	EPA 6010D
	EPA 6020A

Metals III	
Thallium, Total	EPA 6020B
Tin, Total	EPA 6020A
	EPA 6020B
Titanium, Total	EPA 6020A
Miscellaneous	
Boron, Total	EPA 6020A
	EPA 6020B
Cyanide, Total	EPA 9014
Extractable Organic Halides	EPA 9023
Nitroaromatics and Isophorone	
2,4-Dinitrotoluene	EPA 8270D
	EPA 8270E
2,6-Dinitrotoluene	EPA 8270D
	EPA 8270E
Isophorone	EPA 8270D
	EPA 8270E
Nitrobenzene	EPA 8270D
	EPA 8270E
Pyridine	EPA 8270D
	EPA 8270E
Nitrosoamines	
N-Nitrosodimethylamine	EPA 8270D
	EPA 8270E
N-Nitrosodi-n-propylamine	EPA 8270D

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Nitrosoamines	
N-Nitrosodi-n-propylamine	EPA 8270E
N-Nitrosodiphenylamine	EPA 8270D
	EPA 8270E
Organophosphate Pesticides	
Parathion ethyl	EPA 8270D
	EPA 8270E
Petroleum Hydrocarbons	
Diesel Range Organics	EPA 8015D
Gasoline Range Organics	EPA 8015D
Phthalate Esters	
Benzyl butyl phthalate	EPA 8270D
	EPA 8270E
Bis(2-ethylhexyl) phthalate	EPA 8270D
	EPA 8270E
Diethyl phthalate	EPA 8270D
	EPA 8270E
Dimethyl phthalate	EPA 8270D
	EPA 8270E
Di-n-butyl phthalate	EPA 8270D
	EPA 8270E
Di-n-octyl phthalate	EPA 8270D
	EPA 8270E
Polychlorinated Biphenyls	
Aroclor 1016 (PCB-1016)	EPA 8082A
Polychlorinated Biphenyls	
Aroclor 1016 (PCB-1016) in Oil	EPA 8082A
Aroclor 1221 (PCB-1221)	EPA 8082A
Aroclor 1221 (PCB-1221) in Oil	EPA 8082A
Aroclor 1232 (PCB-1232)	EPA 8082A
Aroclor 1232 (PCB-1232) in Oil	EPA 8082A
Aroclor 1242 (PCB-1242)	EPA 8082A
Aroclor 1242 (PCB-1242) in Oil	EPA 8082A
Aroclor 1248 (PCB-1248)	EPA 8082A
Aroclor 1248 (PCB-1248) in Oil	EPA 8082A
Aroclor 1254 (PCB-1254)	EPA 8082A
Aroclor 1254 (PCB-1254) in Oil	EPA 8082A
Aroclor 1260 (PCB-1260)	EPA 8082A
Aroclor 1260 (PCB-1260) in Oil	EPA 8082A
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1262 (PCB-1262) in Oil	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A
Aroclor 1268 (PCB-1268) in Oil	EPA 8082A
Polynuclear Aromatic Hydrocarbons	
Acenaphthene	EPA 8270D
	EPA 8270E
Acenaphthylene	EPA 8270D
	EPA 8270E
Anthracene	EPA 8270D
	EPA 8270E
Benzo(a)anthracene	EPA 8270D

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Polynuclear Aromatic Hydrocarbons

Benzo(a)anthracene	EPA 8270E
Benzo(a)pyrene	EPA 8270D
	EPA 8270E
Benzo(b)fluoranthene	EPA 8270D
	EPA 8270E
Benzo(g,h,i)perylene	EPA 8270D
	EPA 8270E
Benzo(k)fluoranthene	EPA 8270D
	EPA 8270E
Chrysene	EPA 8270D
	EPA 8270E
Dibenzo(a,h)anthracene	EPA 8270D
	EPA 8270E
Fluoranthene	EPA 8270D
	EPA 8270E
Fluorene	EPA 8270D
	EPA 8270E
Indeno(1,2,3-cd)pyrene	EPA 8270D
	EPA 8270E
Naphthalene	EPA 8270D
	EPA 8270E
Phenanthrene	EPA 8270D
	EPA 8270E
Pyrene	EPA 8270D
	EPA 8270E

Priority Pollutant Phenols

2,3,4,6 Tetrachlorophenol	EPA 8270D
	EPA 8270E
2,4,5-Trichlorophenol	EPA 8270D
	EPA 8270E
2,4,6-Trichlorophenol	EPA 8270D
	EPA 8270E
2,4-Dichlorophenol	EPA 8270D
	EPA 8270E
2,4-Dimethylphenol	EPA 8270D
	EPA 8270E
2,4-Dinitrophenol	EPA 8270D
	EPA 8270E
2-Chlorophenol	EPA 8270D
	EPA 8270E
2-Methyl-4,6-dinitrophenol	EPA 8270D
	EPA 8270E
2-Methylphenol	EPA 8270D
	EPA 8270E
2-Nitrophenol	EPA 8270D
	EPA 8270E
4-Chloro-3-methylphenol	EPA 8270D
	EPA 8270E
4-Methylphenol	EPA 8270D
	EPA 8270E
4-Nitrophenol	EPA 8270D
	EPA 8270E

Serial No.: 62805

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2022
Issued April 01, 2021

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. ROBERT Q. BRADLEY
YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

NY Lab Id No: 10854

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Priority Pollutant Phenols	
Pentachlorophenol	EPA 8270D
	EPA 8270E
Phenol	EPA 8270D
	EPA 8270E
Semi-Volatile Organics	
1,1'-Biphenyl	EPA 8270D
	EPA 8270E
1,2-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,3-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
1,4-Dichlorobenzene, Semi-volatile	EPA 8270D
	EPA 8270E
2-Methylnaphthalene	EPA 8270D
	EPA 8270E
Acetophenone	EPA 8270D
	EPA 8270E
Benzaldehyde	EPA 8270D
	EPA 8270E
Benzoic Acid	EPA 8270D
	EPA 8270E
Benzyl alcohol	EPA 8270D
	EPA 8270E
Caprolactam	EPA 8270D
	EPA 8270E
Semi-Volatile Organics	
Dibenzofuran	EPA 8270D
	EPA 8270E
Volatile Aromatics	
1,2,4-Trichlorobenzene, Volatile	EPA 8260D
	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D
	EPA 8260C
Benzene	EPA 8260D
	EPA 8260C
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C

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All approved analytes are listed below:

Volatile Aromatics		Volatile Halocarbons	
Ethyl benzene	EPA 8260D	1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C		EPA 8260C
Isopropylbenzene	EPA 8260D	1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C		EPA 8260C
m/p-Xylenes	EPA 8260D	1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C		EPA 8260C
Naphthalene, Volatile	EPA 8260D	1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C		EPA 8260C
n-Butylbenzene	EPA 8260D	1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C		EPA 8260C
n-Propylbenzene	EPA 8260D	1,1-Dichloroethane	EPA 8260D
	EPA 8260C		EPA 8260C
o-Xylene	EPA 8260D	1,1-Dichloroethene	EPA 8260D
	EPA 8260C		EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260D	1,1-Dichloropropene	EPA 8260D
	EPA 8260C		EPA 8260C
sec-Butylbenzene	EPA 8260D	1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C		EPA 8260C
Styrene	EPA 8260D	1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C		EPA 8260C
tert-Butylbenzene	EPA 8260D	1,2-Dibromoethane	EPA 8260D
	EPA 8260C		EPA 8260C
Toluene	EPA 8260D	1,2-Dichloroethane	EPA 8260D
	EPA 8260C		EPA 8260C
Total Xylenes	EPA 8260D	1,2-Dichloropropane	EPA 8260D
	EPA 8260C		EPA 8260C

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All approved analytes are listed below:

Volatile Halocarbons	
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C
Bromochloromethane	EPA 8260D
	EPA 8260C
Bromodichloromethane	EPA 8260D
	EPA 8260C
Bromoform	EPA 8260D
	EPA 8260C
Bromomethane	EPA 8260D
	EPA 8260C
Carbon tetrachloride	EPA 8260D
	EPA 8260C
Chloroethane	EPA 8260D
	EPA 8260C
Chloroform	EPA 8260D
	EPA 8260C
Chloromethane	EPA 8260D
	EPA 8260C
cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Volatile Halocarbons	
Dibromochloromethane	EPA 8260D
	EPA 8260C
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260D
	EPA 8260C
Methylene chloride	EPA 8260D
	EPA 8260C
Tetrachloroethene	EPA 8260D
	EPA 8260C
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Trichloroethene	EPA 8260D
	EPA 8260C
Trichlorofluoromethane	EPA 8260D
	EPA 8260C
Vinyl chloride	EPA 8260D
	EPA 8260C
Volatile Organics	
1,4-Dioxane	EPA 8260D
	EPA 8260C

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All approved analytes are listed below:

Volatile Organics	
1,4-Dioxane	EPA 8270D SIM
	EPA 8270E
	EPA 8270E SIM
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
	EPA 8260C
Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods
EPA 5035A-L
EPA 5035A-H
EPA 3580A
EPA 3010A
EPA 3050B
EPA 3550C
EPA 3546
EPA 3545A
EPA 3060A
EPA 9010C

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YORK ANALYTICAL LABORATORIES INC
120 RESEARCH DRIVE
STRATFORD, CT 06615

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is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Lead in Dust Wipes	EPA 6010C
Lead in Paint	EPA 6010C

Sample Preparation Methods

EPA 3050B

NEW YORK STATE OF OPPORTUNITY. Department of Health

Serial No.: 62806

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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MR. JON WALSH
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Acrylates	
Acrylonitrile	EPA TO-15
Methyl methacrylate	EPA TO-15
Chlorinated Hydrocarbons	
1,2,4-Trichlorobenzene	EPA TO-15
Hexachlorobutadiene	EPA TO-15
Hexachloroethane	EPA TO-15
Purgeable Aromatics	
1,2,4-Trimethylbenzene	EPA TO-15
1,2-Dichlorobenzene	EPA TO-15
1,3,5-Trimethylbenzene	EPA TO-15
1,3-Dichlorobenzene	EPA TO-15
1,4-Dichlorobenzene	EPA TO-15
Benzene	EPA TO-15
Chlorobenzene	EPA TO-15
Ethyl benzene	EPA TO-15
Isopropylbenzene	EPA TO-15
m/p-Xylenes	EPA TO-15
o-Xylene	EPA TO-15
Styrene	EPA TO-15
Toluene	EPA TO-15
Total Xylenes	EPA TO-15
Purgeable Halocarbons	
1,1,1-Trichloroethane	EPA TO-15
1,1,2,2-Tetrachloroethane	EPA TO-15
Purgeable Halocarbons	
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA TO-15
1,1,2-Trichloroethane	EPA TO-15
1,1-Dichloroethane	EPA TO-15
1,1-Dichloroethene	EPA TO-15
1,2-Dibromoethane	EPA TO-15
1,2-Dichloroethane	EPA TO-15
1,2-Dichloropropane	EPA TO-15
3-Chloropropene (Allyl chloride)	EPA TO-15
Bromodichloromethane	EPA TO-15
Bromoform	EPA TO-15
Bromomethane	EPA TO-15
Carbon tetrachloride	EPA TO-15
Chloroethane	EPA TO-15
Chloroform	EPA TO-15
Chloromethane	EPA TO-15
cis-1,2-Dichloroethene	EPA TO-15
cis-1,3-Dichloropropene	EPA TO-15
Dibromochloromethane	EPA TO-15
Dichlorodifluoromethane	EPA TO-15
Methylene chloride	EPA TO-15
Tetrachloroethene	EPA TO-15
trans-1,2-Dichloroethene	EPA TO-15
trans-1,3-Dichloropropene	EPA TO-15
Trichloroethene	EPA TO-15
Trichlorofluoromethane	EPA TO-15
Vinyl bromide	EPA TO-15

Serial No.: 63316

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

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MR. JON WALSH
YORK ANALYTICAL LABORATORIES, INC. (II)
132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES AIR AND EMISSIONS
All approved analytes are listed below:

Purgeable Halocarbons	
Vinyl chloride	EPA TO-15
Volatile Chlorinated Organics	
Benzyl chloride	EPA TO-15
Volatile Organics	
1,2-Dichlorotetrafluoroethane	EPA TO-15
1,3-Butadiene	EPA TO-15
1,4-Dioxane	EPA TO-15
2-Butanone (Methylethyl ketone)	EPA TO-15
4-Methyl-2-Pentanone	EPA TO-15
Acetone	EPA TO-15
Carbon Disulfide	EPA TO-15
Cyclohexane	EPA TO-15
Hexane	EPA TO-15
Isopropanol	EPA TO-15
Methyl tert-butyl ether	EPA TO-15
n-Heptane	EPA TO-15
Vinyl acetate	EPA TO-15

NEW YORK STATE OF OPPORTUNITY Department of Health

Serial No.: 63316

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

NELAP RECOGNIZED TNI ACCREDITATION BODY

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

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is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES NON POTABLE WATER
All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 8260D
	EPA 8260C
Acrylonitrile	EPA 8260D
	EPA 8260C
Methyl methacrylate	EPA 8260D
	EPA 8260C
Chlorinated Hydrocarbons	
1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
Fuel Oxygenates	
Di-isopropyl ether	EPA 8260D
	EPA 8260C
Ethanol	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D
	EPA 8260C
tert-amyl alcohol	EPA 8260D
	EPA 8260C
tert-amyl methyl ether (TAME)	EPA 8260D
	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
tert-butyl ethyl ether (ETBE)	EPA 8260D
	EPA 8260C

Volatile Aromatics	
1,2,4-Trichlorobenzene, Volatile	EPA 8260D
	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D
	EPA 8260C
Benzene	EPA 8260D
	EPA 8260C
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C
Ethyl benzene	EPA 8260D
	EPA 8260C
Isopropylbenzene	EPA 8260D
	EPA 8260C

Serial No.: 63314

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All approved analytes are listed below:

Volatile Aromatics

m/p-Xylenes	EPA 8260D
	EPA 8260C
Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260D
	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C
Styrene	EPA 8260D
	EPA 8260C
tert-Butylbenzene	EPA 8260D
	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
Total Xylenes	EPA 8260D
	EPA 8260C

Volatile Halocarbons

1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C

Volatile Halocarbons

1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethene	EPA 8260D
	EPA 8260C
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D
	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
1,2-Dichloropropane	EPA 8260D
	EPA 8260C
1,3-Dichloropropane	EPA 8260D
	EPA 8260C

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All approved analytes are listed below:

Volatile Halocarbons		
2,2-Dichloropropane	EPA 8260D	
	EPA 8260C	
2-Chloroethylvinyl ether	EPA 8260D	
	EPA 8260C	
Bromochloromethane	EPA 8260D	
	EPA 8260C	
Bromodichloromethane	EPA 8260D	
	EPA 8260C	
Bromoform	EPA 8260D	
	EPA 8260C	
Bromomethane	EPA 8260D	
	EPA 8260C	
Carbon tetrachloride	EPA 8260D	
	EPA 8260C	
Chloroethane	EPA 8260D	
	EPA 8260C	
Chloroform	EPA 8260D	
	EPA 8260C	
Chloromethane	EPA 8260D	
	EPA 8260C	
cis-1,2-Dichloroethene	EPA 8260D	
	EPA 8260C	
cis-1,3-Dichloropropene	EPA 8260D	
	EPA 8260C	
Dibromochloromethane	EPA 8260D	
	EPA 8260C	
Volatile Halocarbons		
Dibromomethane	EPA 8260D	
	EPA 8260C	
Dichlorodifluoromethane	EPA 8260D	
	EPA 8260C	
Hexachlorobutadiene, Volatile	EPA 8260D	
	EPA 8260C	
Methylene chloride	EPA 8260D	
	EPA 8260C	
Tetrachloroethene	EPA 8260D	
	EPA 8260C	
trans-1,2-Dichloroethene	EPA 8260D	
	EPA 8260C	
trans-1,3-Dichloropropene	EPA 8260D	
	EPA 8260C	
trans-1,4-Dichloro-2-butene	EPA 8260D	
	EPA 8260C	
Trichloroethene	EPA 8260D	
	EPA 8260C	
Trichlorofluoromethane	EPA 8260D	
	EPA 8260C	
Vinyl chloride	EPA 8260D	
	EPA 8260C	
Volatiles Organics		
1,4-Dioxane	EPA 8260D	
	EPA 8260C	

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All approved analytes are listed below:

Volatiles Organics

2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
	EPA 8260C
Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods

	EPA 5030C

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132-02 89TH AVENUE SUITE 217
RICHMOND HILL, NY 11418

NY Lab Id No: 12058

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2016) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Acrylates	
Acrolein (Propenal)	EPA 8260D
	EPA 8260C
Acrylonitrile	EPA 8260D
	EPA 8260C
Methyl methacrylate	EPA 8260D
	EPA 8260C
Chlorinated Hydrocarbons	
1,2,3-Trichlorobenzene	EPA 8260D
	EPA 8260C
Volatile Aromatics	
1,2,4-Trichlorobenzene, Volatile	EPA 8260D
	EPA 8260C
1,2,4-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,2-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,3,5-Trimethylbenzene	EPA 8260D
	EPA 8260C
1,3-Dichlorobenzene	EPA 8260D
	EPA 8260C
1,4-Dichlorobenzene	EPA 8260D
	EPA 8260C
2-Chlorotoluene	EPA 8260D
	EPA 8260C
4-Chlorotoluene	EPA 8260D

Volatile Aromatics	
4-Chlorotoluene	EPA 8260C
Benzene	EPA 8260D
	EPA 8260C
Bromobenzene	EPA 8260D
	EPA 8260C
Chlorobenzene	EPA 8260D
	EPA 8260C
Ethyl benzene	EPA 8260D
	EPA 8260C
Isopropylbenzene	EPA 8260D
	EPA 8260C
m/p-Xylenes	EPA 8260D
	EPA 8260C
Naphthalene, Volatile	EPA 8260D
	EPA 8260C
n-Butylbenzene	EPA 8260D
	EPA 8260C
n-Propylbenzene	EPA 8260D
	EPA 8260C
o-Xylene	EPA 8260D
	EPA 8260C
p-Isopropyltoluene (P-Cymene)	EPA 8260D
	EPA 8260C
sec-Butylbenzene	EPA 8260D
	EPA 8260C
Styrene	EPA 8260D

Serial No.: 63315

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2022
Issued April 01, 2021

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

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Volatile Aromatics	
Styrene	EPA 8260C
tert-Butylbenzene	EPA 8260D
	EPA 8260C
Toluene	EPA 8260D
	EPA 8260C
Total Xylenes	EPA 8260D
	EPA 8260C
Volatile Halocarbons	
1,1,1,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,1-Trichloroethane	EPA 8260D
	EPA 8260C
1,1,2,2-Tetrachloroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 8260D
	EPA 8260C
1,1,2-Trichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethane	EPA 8260D
	EPA 8260C
1,1-Dichloroethene	EPA 8260D
	EPA 8260C
1,1-Dichloropropene	EPA 8260D
	EPA 8260C
1,2,3-Trichloropropane	EPA 8260D

Volatile Halocarbons	
1,2,3-Trichloropropane	EPA 8260C
1,2-Dibromo-3-chloropropane	EPA 8260D
	EPA 8260C
1,2-Dibromoethane	EPA 8260D
	EPA 8260C
1,2-Dichloroethane	EPA 8260D
	EPA 8260C
1,2-Dichloropropane	EPA 8260D
	EPA 8260C
1,3-Dichloropropane	EPA 8260D
	EPA 8260C
2,2-Dichloropropane	EPA 8260D
	EPA 8260C
2-Chloroethylvinyl ether	EPA 8260D
	EPA 8260C
Bromochloromethane	EPA 8260D
	EPA 8260C
Bromodichloromethane	EPA 8260D
	EPA 8260C
Bromoform	EPA 8260D
	EPA 8260C
Bromomethane	EPA 8260D
	EPA 8260C
Carbon tetrachloride	EPA 8260D
	EPA 8260C
Chloroethane	EPA 8260D

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Volatile Halocarbons	
Chloroethane	EPA 8260C
Chloroform	EPA 8260D
	EPA 8260C
Chloromethane	EPA 8260D
	EPA 8260C
cis-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
cis-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Dibromochloromethane	EPA 8260D
	EPA 8260C
Dibromomethane	EPA 8260D
	EPA 8260C
Dichlorodifluoromethane	EPA 8260D
	EPA 8260C
Hexachlorobutadiene, Volatile	EPA 8260D
	EPA 8260C
Methylene chloride	EPA 8260D
	EPA 8260C
Tetrachloroethene	EPA 8260D
	EPA 8260C
trans-1,2-Dichloroethene	EPA 8260D
	EPA 8260C
trans-1,3-Dichloropropene	EPA 8260D
	EPA 8260C
Trichloroethene	EPA 8260D

Volatile Halocarbons	
Trichloroethene	EPA 8260C
Trichlorofluoromethane	EPA 8260D
	EPA 8260C
Vinyl chloride	EPA 8260D
	EPA 8260C
Volatile Organics	
1,4-Dioxane	EPA 8260D
	EPA 8260C
2-Butanone (Methylethyl ketone)	EPA 8260D
	EPA 8260C
2-Hexanone	EPA 8260D
	EPA 8260C
4-Methyl-2-Pentanone	EPA 8260D
	EPA 8260C
Acetone	EPA 8260D
	EPA 8260C
Carbon Disulfide	EPA 8260D
	EPA 8260C
Cyclohexane	EPA 8260D
	EPA 8260C
Methyl acetate	EPA 8260D
	EPA 8260C
Methyl cyclohexane	EPA 8260D
	EPA 8260C
Methyl tert-butyl ether	EPA 8260D

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Volatile Organics

Methyl tert-butyl ether	EPA 8260C
tert-butyl alcohol	EPA 8260D
	EPA 8260C
Vinyl acetate	EPA 8260D
	EPA 8260C

Sample Preparation Methods

EPA 5035A-L
EPA 5035A-H

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APPENDIX C

Previous Reports

(submitted under separate cover)